



Animal &
Plant Health
Agency

Highly Pathogenic Avian Influenza H5N1 outbreaks in Great Britain

United Kingdom

October 2021 to September 2022



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Abbreviations

ABP:	Animal by-products.
APHA:	The Animal and Plant Health Agency.
BTO:	British Trust for Ornithology.
CBMCZ:	Captive Bird (Monitoring) Control Zone
C&D:	Cleansing and disinfection.
DAERA:	Department of Agriculture, Environment and Rural Affairs (Northern Ireland).
Defra:	The Department for Environment Food and Rural Affairs.
FAO:	The Food and Agriculture Organisation.
HAIRS:	UK Human Animal Infections and Risk Surveillance (HAIRS) group.
HPAIV:	Highly pathogenic avian influenza virus.
IP:	Infected Premises.
PPE:	Personal protective equipment.
RPE:	Respiratory protective equipment.
PZ:	Protection Zone.
SZ:	Surveillance Zone.
WOAH:	The World Organisation for Animal Health (formerly the Organisation International des Epizooties).

Definitions

Commercial premises are any premises with more than 1,000 birds that:

1. rears or keeps birds in captivity for the production of any commercial products, or
2. for breeding birds for this purpose, includes birds used for restocking supplies of game or for breeding for this purpose until they are released from captivity.

Indicator species and non-indicator species:

1. indicator species are species that exhibit clinical signs or mortality with the virus strain in question.
2. non-indicator species are those that do not exhibit readily apparent clinical signs or mortality with the virus strain in question.

Small commercial premises are any premises with 1,000 birds or less that:

1. rears or keeps birds in captivity for the production of any commercial products, or
2. for breeding birds for this purpose -this includes birds used for restocking supplies of game or for breeding for this purpose until they are released from captivity.

Note that this definition includes household/backyard flocks that sell, barter or give away products.

Non-commercial and pet premises are non-commercial flocks:

1. producing only for own consumption (no selling, bartering or giving away products), or
2. as pets/hobby (showing, racing), or
3. rearing and selling for these purposes.

Note that these premises usually had fewer than 50 birds, but a few premises have more than 50 birds.

Sanctuaries/rehabilitators: premises taking in animals on a regular basis, whether companion, farmed, wild, protected or other species, with a view to rehabilitating and either rehoming or releasing (back to the wild), or providing long-term care.

Wildlife centre: wildlife centres, nature reserves.

Zoo: licenced zoological collections.

Species

The species on site is listed, however if more than one species is kept on the premises, they are summarised as follows:

Mixed domestic: chickens, turkeys, ducks or geese

Mixed gamebird: pheasants, partridges, quails or ducks (if kept as gamebirds)

Mixed captive wild species

Mixed aviary birds: canaries, budgerigars, parrots, parakeets, etc.

Mixed other: premises keeping a mixture of domestic, gamebirds, aviary birds or captive wild species.

Executive summary

This report summarises the epidemiological investigations carried out in order to describe and explain the outbreak in Great Britain of highly pathogenic avian influenza (HPAI) infection that occurred between 01 October 2021 and 30 September 2022 (the “2021 to 2022 season”). The HPAI event reported to the World Organisation of Animal Health (WOAH) was a United Kingdom event, and a separate epidemiological report describing the cases of avian influenza in Northern Ireland is produced by the Department of Agriculture, Environment and Rural Affairs (DAERA www.daera-ni.gov.uk).

Some apparent clustering of infected premises was identified through routine outbreak and tracings investigations that flagged potential epidemiological links between cases, and also the use of genomic, quantitative data, spatial and network analysis methods. These apparent clusters were all investigated in detail.

Any infected premises that were plausibly biologically linked from the same event, or risk pathway pressure, were considered in more depth at this higher level as a potential cluster. These are described in Annex 1.

The epidemiological findings from all individual cases are described in detail in Annexes 2 and 3.

Background

Since 2020, the United Kingdom and Europe have experienced annual epizootics of highly pathogenic avian influenza virus (HPAIV). The first during the autumn and winter of 2020 to 2021, involved the detection of 6 H5Nx subtypes, although H5N8 HPAIV dominated in the UK (read the 2020 to 2021 epidemiological report <https://www.gov.uk/government/publications/reports-relating-to-recent-cases-of-avian-influenza-bird-flu>).

Following a small number of detections of H5N1 in wild birds over the summer of 2021, the autumn and winter of 2021 to 2022 saw another European H5 HPAI epizootic that dwarfed the prior epizootic. This second epizootic has been dominated almost exclusively by H5N1 HPAIV.

The existing data suggest that the H5N1 circulating in Europe during late 2020 continued to circulate in wild birds throughout 2021 with minimal adaptation. Data suggest it has then gone on to reassort with AIVs circulating in the wild bird population.

The genomic assessment of H5 HPAIVs detected in the UK over the last 2 winter seasons has demonstrated the utility of in-depth genomic analyses in defining:

- the diversity of H5 HPAIVs circulating in avian species
- the potential for zoonotic risk
- whether incidents of lateral spread could be defined in addition to independent incursion of infection from wild birds

- Further, the emergence of infection in terrestrial mammals, most likely through scavenging activities, has led to an increased interest in HPAIV H5N1 as a potential zoonotic agent.

The most likely ancestral virus has been determined to be a common ancestral virus to that responsible for spread across the Middle East and Central Asia. Furthermore, the current isolates are distinct from those H5N8 viruses detected in the UK in 2016 to 2017. Again, this assessment supports the conclusion that this virus has been recently introduced into the UK through migratory wild birds entering the UK, as part of their winter migration

The first time HPAIV virus was detected in kept birds (this term includes all poultry and other captive birds) during the 2021 to 2022 season was in Worcestershire on 26/10/2021 (AIV 2021/07). Between then and 30/09/2022, a total 152 infected premises were identified across England (134), Scotland (11) and Wales (7) (see figure 1). These were in commercial layer and broiler flocks, small-holder flocks, gamebird flocks, captive bird collections and birds of prey – including conservation and animal rescue sanctuaries and rehabilitation centres.

Surveillance activities

A census to identify all premises containing poultry was undertaken in both the Protection and Surveillance Zones (PZ and SZ), in line with UK legislative requirements.

Guidance notes were sent to all holdings within a PZ to raise awareness and remind keepers of the restrictions applying in this zone. The poultry on premises in the PZ were clinically inspected by APHA personnel, together with their production and medicine records. Epidemiological sampling and laboratory testing was undertaken where there was unlikely to be effective mixing of indicator species (those that exhibit clinical signs or mortality with the strain in question) with non-indicator species (those which do not exhibit readily apparent clinical signs or mortality), with no evidence of HPAI virus being identified. This surveillance was repeated prior to the merging of PZs into an SZ.

Owners of premises within the SZs were sent guidance notes to raise awareness and remind keepers of the restrictions applying in this zone.

For all HPAI IPs confirmed after 01/01/2021, enhanced surveillance was implemented within 0 to 10 km for a period of 90 days following effective preliminary cleansing and disinfection (C&D) on the relevant IPs.

Surveillance of wild birds - background surveillance

There is ongoing routine surveillance for avian influenza in wild birds. This surveillance is conducted using patrols by wild bird reserve wardens and collections of found-dead wild birds reported by members of the public. These data only represent cases where birds have tested positive for avian influenza. During the 2021 to 2022 season, 1,637 cases of HPAI were identified in 73 species of dead wild birds. (See figure 2)

Ornithological overview

Wild bird activity is an important risk factor in the epidemiology of the current avian influenza outbreaks and assessments of likely infection pressure were carried out by APHA Wildlife ornithologists.

Limited ornithological resource prevented a full assessment for every case. Each IP was risk assessed for prioritisation and the majority were considered in one form or another, including important contributions to case investigations and reporting. Similar analyses were carried out for each outbreak cluster.

Assessments were rapid, desk-based opinions of the type, abundance, and aggregation of wild birds that might support a plausible source of infection close to the infected premise (IP), and the potential for species specific wild bird behaviours that might give rise to infection pathways in that case. This was particularly helpful in cases when infection pressure might be dynamic (reflecting seasonal variation produced by migration or weather), in certain geographical contexts, or in complex or novel cases involving kept birds.

Assessment of the potential infection pathways by 'bridge species' was more complex. Bridge species are defined as bird species which bridge the gap between outbreaks of H5N1 among populations of wild birds and the human environment (human settlements, poultry farms) or vice versa. In this context we reserve the term 'bridge species' for those species that pose significant risks, meaning very likely to acquire virus, and transmit it to poultry premises because of their behaviour (including gulls, corvids, and starling), without necessarily succumbing to the infection themselves.

In winter, these 3 bridge species are likely to aggregate in night roosts, as well as whilst foraging. They are comfortable visiting poultry houses and are likely to exploit forage provided by farming operations, thus contaminating surfaces. Finally, corvids and gulls are regular scavengers and some fly relatively long distances as part of their daily movements in winter, increasing the likelihood that infection from local wild bird cases might find its way onto a farm.

The epidemiological, tracings and genome sequencing evidence strongly indicates that all but one of the infected premises became infected as a result of independent, direct or indirect, introductions from wild birds. The cluster investigations of premises that were functionally part of the same commercial business, and therefore potentially shared staff and equipment, showed that in all but one case (AIV 2021/66), they were more likely to have been infected directly or indirectly from wild birds rather than through a plausible epidemiological link with another IP (Annex 1).

Apart from this one infected premises, extensive epidemiological tracings and genome sequencing investigations revealed no evidence of spread between any of the infected holdings, either within the United Kingdom, nor to trading partners.

Despite the high level of genetic identity, the geographical and temporal split of cases across Great Britain suggests that there was no direct relationship between infected premises. This supports the hypothesis of multiple independent introductions from wild birds with minimal viral divergence.

Several risk factors for the introduction of infection were identified and included:

- bedding management
- building maintenance (especially leaking, poorly maintained roofs)
- flooding events
- staff, equipment and poor biosecurity discipline
- proximity to large water bodies.

Location of the HPAI H5N1 infected premises

During this season there were 152 infected premises (IPs) across Great Britain of which 134 were in England, 11 in Scotland and 7 in Wales.

Figure 1: Epidemic curve by date of IP confirmation (between October 2021 and September 2022).

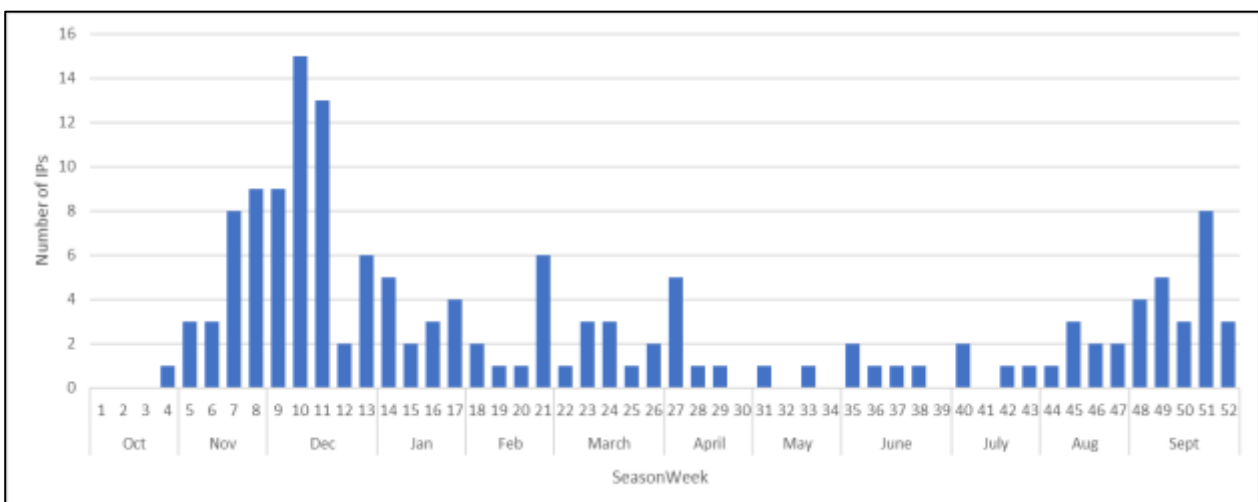


Figure 1 shows the seasonal nature of the outbreak with the majority of the cases being infected during the winter months then increasing again in September. This seasonal variation was likely to have been caused by wild bird migration, weather and other seasonal bird behaviour.

The majority of IPs were commercial premises. 75 were large premises with over 1,000 birds and 28 small commercial premises with fewer than 1,000 birds). 39 were non-commercial flocks. 6 were bird sanctuaries or rehabilitators, 4 wildlife centres and 1 zoo were also infected. 2 of the 4 wildlife centres were also zoos.

114 IPs held either mixed domestic, turkeys or chickens.

Figure 2: Infected premises by species.

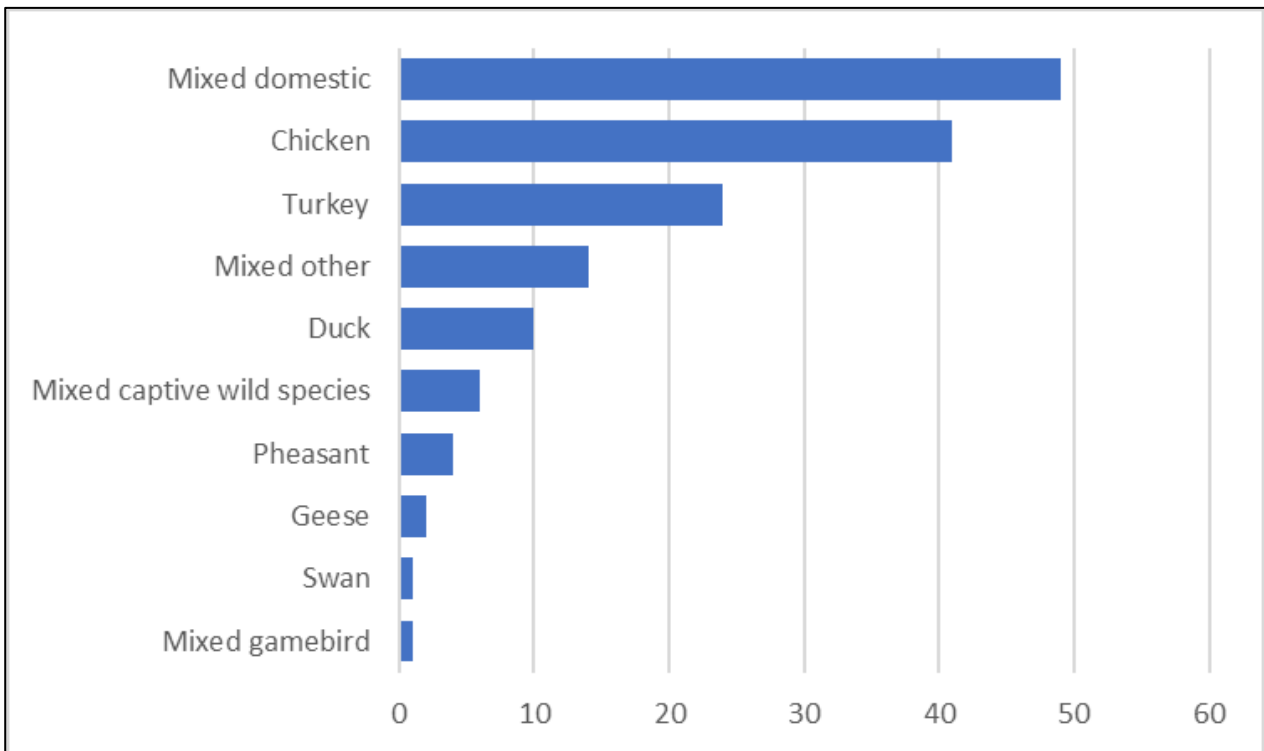


Figure 2 shows the number of each species infected, with the species on the y axis and the number of infected premises shown on the x axis.

Figure 3: Location of the HPAI H5N1 infected premises in 2021 to 2022

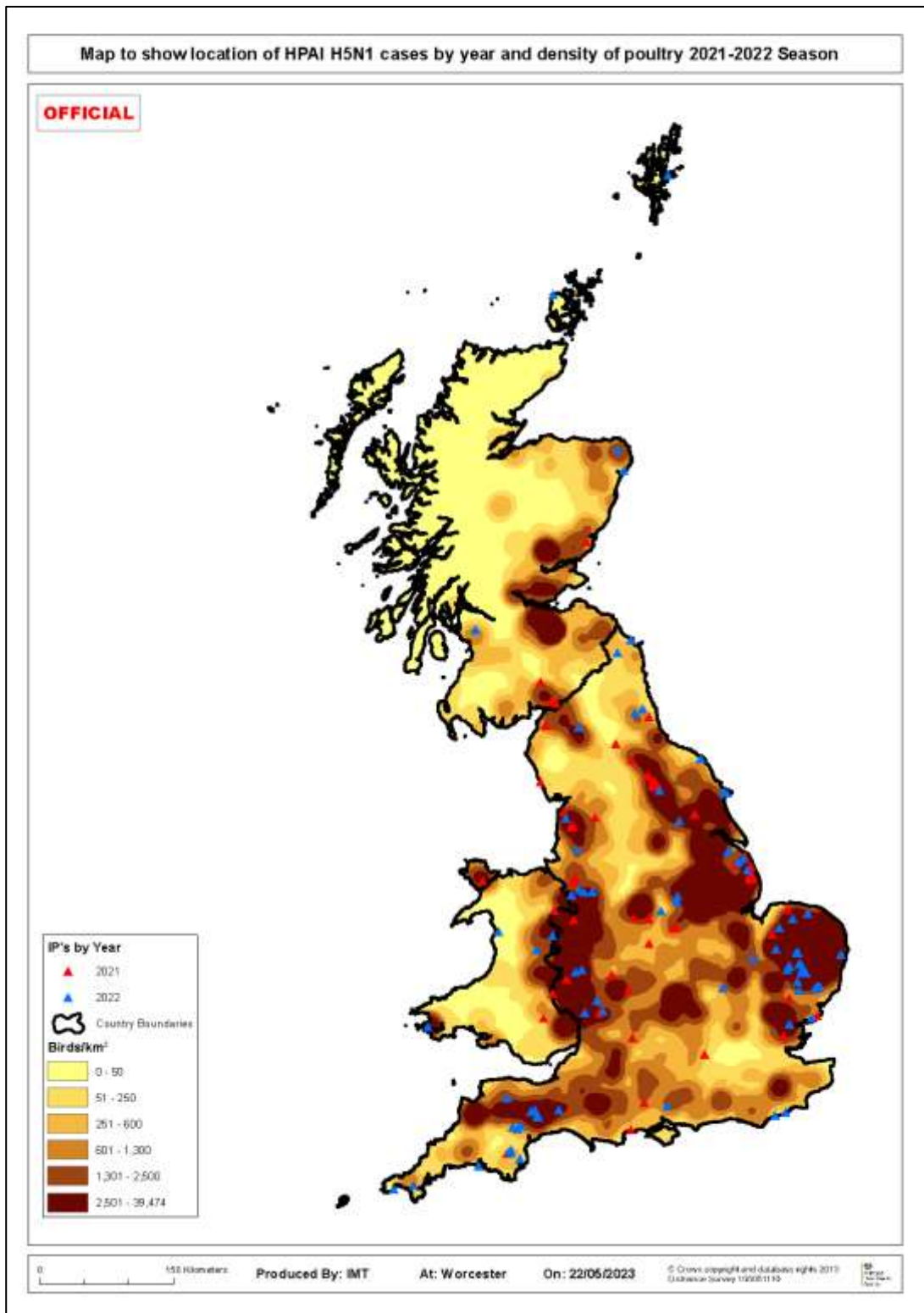


Figure 3 is a map showing the location of the HPAI H5N1 infected premises in 2021 to 2022. The premises infected in 2021 are shown with red triangles and the premises infected in 2022 are shown with blue triangles. The distribution of infected premises largely reflects the areas of high poultry density.

Location of the wild bird cases 2021 to 2022

During the 2021 to 2022 season there were 1637 wild bird cases involving 73 species of birds. The majority (53%) were of the order Anseriformes (wildfowl including ducks, geese and swans) and 20% were Charadriiformes (shore birds including seagulls).

Figure 4: Location of the wild bird cases 2021 to 2022.

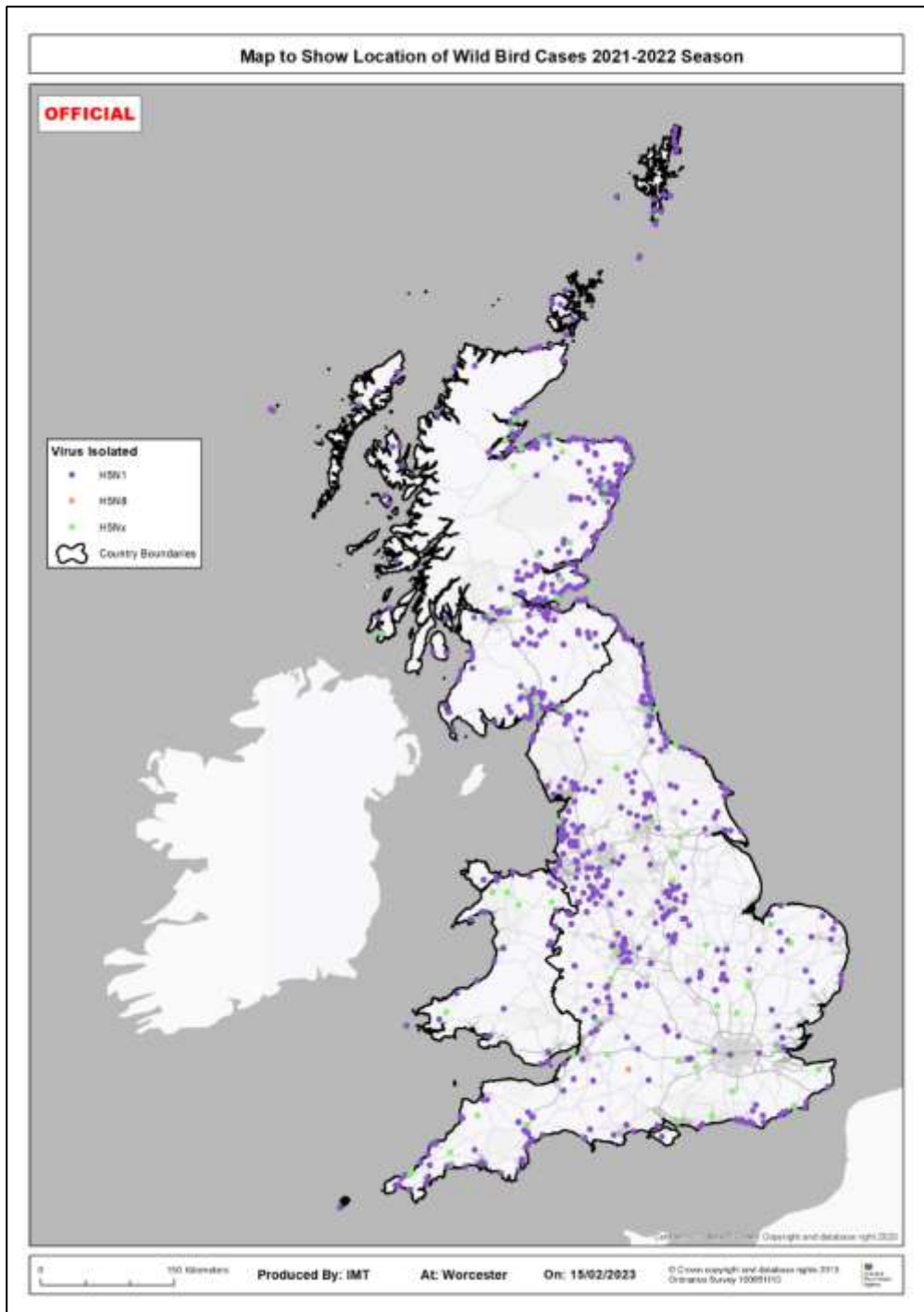


Figure 4 is a map showing the location of wild bird cases infected with the different types of HPAI in 2021 to 2022. The wild birds infected with H5N1 are shown as purple dots, those infected with H5N8 are shown with orange dots and those infected with H5NX are shown with green dots.

Analysis of the virus

Description of the epizootic

Outbreaks caused by highly pathogenic avian influenza virus (HPAIV) have the ability to devastate avian species across all sectors, having both economic and ecological impacts through mortalities in poultry and wild birds, respectively. These viruses can also represent a significant zoonotic risk. Since 2020, the United Kingdom (UK) and Europe have experienced annual epizootics of HPAIV. The first during autumn/winter 2020 to 2021 involved the detection of 6 H5Nx subtypes, although H5N8 HPAIV dominated in the UK. Whilst genetic assessment of the H5N8 HPAIVs within the UK demonstrated relative homogeneity, there was a background of other genotypes circulating at a lower degree with different neuraminidase and internal genes.

Following a small number of summer detections of H5N1 in wild birds over the summer of 2021, autumn/winter 2021 to 2022 saw another European H5 HPAIV epizootic, that dwarfed the prior epizootic. This second epizootic has been dominated almost exclusively by H5N1 HPAIV, although 10 distinct genotypes have been defined albeit with broadly the same haemagglutinin and neuraminidase genes.

Genetic analysis has demonstrated the emergence of the different genotypes and has enabled linkage to potential reassortment events that may have led to the emergence of these novel genotypes. The existing data suggests that the H5N1 circulating in Europe during late 2020, continued to circulate in wild birds throughout 2021, with minimal adaptation, but has then gone on to reassort with AIVs circulating in the wild bird population. The in-depth genetic assessment of H5 HPAIVs detected in the UK over the last two winter seasons has demonstrated:

- the utility of in-depth genetic analyses in defining the diversity of H5 HPAIVs circulating in avian species
- the potential for zoonotic risk
- whether incidents of lateral spread can be defined over independent incursion of infection from wild birds at poultry premises.

Further, the emergence of infection in terrestrial mammals, most likely through scavenging activities, has led to an increased interest in HPAIV H5N1 as a potential zoonotic agent.

Description of the virus – H5N1

Since autumn 2021 the H5N1 clade 2.3.4.4b HPAIV has undergone both genetic drift and reassortment events with other circulating viruses. The haemagglutinin gene of the H5N1 isolates detected across Great Britain during autumn/winter 2021 to 2022 is closely related to the H5N1 viruses detected across Europe in the months preceding the Great Britain outbreak events (read the 2020 to 2021 epidemiology report

<https://www.gov.uk/government/publications/reports-relating-to-recent-cases-of-avian-influenza-bird-flu>).

Following the 2020 to 2021 outbreak season the H5N1 subtype of the virus was seen to persist within some populations in Northern Europe over the summer of 2021, despite the apparent dominance of H5N8 in the preceding months, with infection in seabirds being reported (Banyard et al., 2022). During that time a genetic assessment of the virus infecting the skuas established the relationship of the H5N1 HPAIV with respect to the H5N1 viruses detected across the UK and Europe during the 2020 to 2021 autumn/winter AIV season. At that time, all genes clustered closely with isolates detected during the 2020 to 2021 season with 99% nucleotide similarity with the H5N1 virus detected in pheasants (*Phasianus colchicus*) in Scotland (Accession number: EPI1848936) as well as poultry (EPI1838670), Eurasian teal (*Anas crecca*) (EPI1812373), greylag goose (*Anser anser*) (EPI1812373) and Eurasian wigeon (*Mareca penelope*) (EPI1815140) from the Netherlands. The haemagglutinin (HA) cleavage site (CS) sequence motif for the skua isolates was PLREKRRKRGLF as reported across the vast majority of H5 HPAIV CS sequences determined over the 2020 to 2021 autumn/winter season across Great Britain and continental Europe.

During 2020 to 2021 season only a single H5N1 genotype was detected and the genetic identity was high across the small number of isolates observed. However, following the summer detections of H5N1 in skuas a different picture of viral heterogeneity developed in the HPAIVs detected within Great Britain with several genotypes being detected (Figure 5).

The first virus detected on an infected premises during the 2021 to 2022 season was detected in Worcestershire on 26 October 2021. This virus, detected on DPR 2021/45 was denoted AIV 2021/07 (AIV07 from here on). Within days the same virus was also detected in a dead wild gull (*Larus canus*) collected in Scotland on 14 October 2021 through the UK passive avian influenza wild bird surveillance system. This AIV07 H5N1 genotype had the same gene constellation as the H5N1 detected across wild birds and the two UK 2020 to 2021 season poultry cases during the previous epizootic. Interestingly, during the 2021 to 2022 season this virus demonstrated divergence within the HA gene with two sub-lineages being defined. The AIV07-B1 genotype contained a HA with high similarity to the virus from 2020 to 2021 and was the initial UK H5N1 detection during 2021 to 2022. The AIV07-B2 genotype, possesses a HA gene that has diverged from AIV07-B1, although both genotypes were detected in wild bird and poultry cases throughout the UK during the reporting period. The emergence of these two HA sub-lineages was followed by co-circulation since the autumn of 2021 in Europe (Pohlmann et al., 2022).

The divergence within these sub-lineages amounted to between 0 and 9 nucleotides (AIV07-B1 lineage) compared to 2 to 18 nucleotides (AIV07-B2 lineage), which results in up to 3 (AIV07-B1) and 5 (AIV07-B2) amino acid differences. A lineage-indicating substitution was present at HA position 548 (HA548), coding for methionine in AIV07-B1 and isoleucine in AIV07-B2. The close phylogenetic relationship amongst AIV07-B1 sub-lineage viruses, supported its continuous circulation at a low level in the UK, north-western Europe, and Scandinavia during the summer of 2021. Whilst relationships between AIV07-B1 viruses appeared linked to a small period of evolution, the AIV07-B2 viruses are linked across a broader time scale with a larger time gap being evident in the AIV07-B2 sub-lineage where relationships between Nigerian poultry HPAIV sequences of March 2021 (such as EPI_ISL_4061491) and a virus detected in a jackdaw (EPI_ISL_7050532) in August 2021 in Sweden were observed. A gap in the detection and phylogenetic relationship between these viruses most likely indicates epidemiological gaps or missing 'bridging sequences' where

viruses from relevant species and/or geographic regions have been under sampled. However, the ability of these viruses to spread between highly mobile avian hosts across broad geographical distributions means that establishing and confirming linkages between reassortant genotypes is problematic. Interestingly, whilst AIV07-B2 is still detected within the UK the AIV07-B1 genotype has since become a minority population in the UK and has not been detected since February 2022.

Figure 5: Genetic composition of HPAIV H5N1 clade 2.3.4.4b viruses detected during the 2021 to 22 season

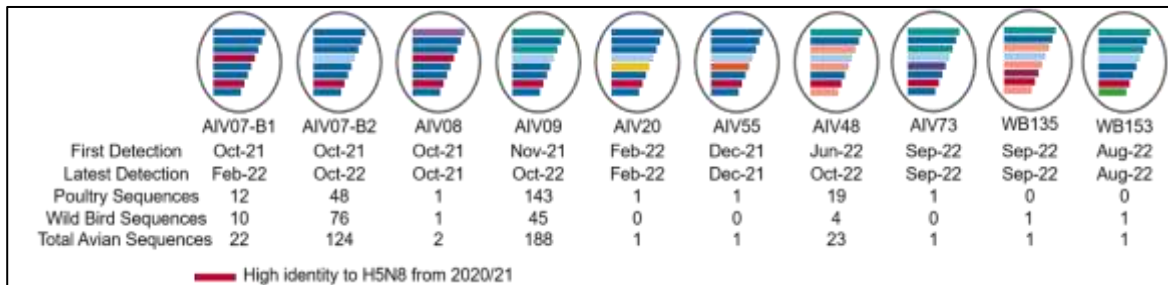


Figure 5 shows the genetic composition of HPAIV H5N1 clade 2.3.4.4b viruses detected during the 2021 to 2022 season.

The third H5N1 genotype, AIV08, was only detected in a single poultry case, and an associated wild bird detection from the same site in Wales in October 2021. This genotype shared high genetic similarity in all gene segments to AIV07-B1, except for the polymerase basic 2 (PB2) segment, which had high similarity to that observed in low pathogenicity (LP) AIVs detected in the Netherlands and Ireland during 2020. H5N1 HPAIV sequences with a similar PB2 segment were detected in poultry and wild birds in France, Italy, Moldova and Romania between October 2021 and February 2022. However, since these detections this genotype has not been detected within the UK during the reporting period.

The fourth H5N1 genotype defined within Great Britain, termed AIV09, was first detected in Scotland in November 2021, but has since been detected across the UK in poultry and wild birds. The AIV09 genotype was a reassortant sharing the polymerase basic 1 (PB1), nucleoprotein (NP), neuraminidase (NA), MP, and non-structural (NS) segments with AIV07-B1 and AIV07-B2 but possessing the HA from the B2 sub-lineage. The PB2 and polymerase acidic (PA) segments, however, demonstrated dissimilarity to both AIV07 genotypes, as well as AIV08. The AIV09 PB2 had high genetic similarity to the sequence observed in the H5N3 AIVs in the UK and Europe during the 2020/21 epizootic, and the PA with LPAIVs from the Netherlands and Belgium detected since 2017.

A further two H5N1 HPAIV genotypes, AIV20 and AIV55, have only been detected once during the 2021/22 outbreak season. AIV20 was detected on a turkey farm in Lincolnshire in February 2022, whilst AIV55 was detected in chickens from County Durham in December 2021. Both genotypes shared seven of their eight gene segments with AIV07-B2, including the HA gene, but had alternative NP gene segments. For AIV20, the NP segment demonstrated similarity to those from AIVs in the Netherlands and Belgium, but also the H5N3 HPAIVs observed during 2020/21. The AIV55 NP segment was more closely related to those observed in H5N1 and H5N5 HPAIVs from Eastern Europe and Russia, as well as a H12N5 sequence from Belgium.

In June 2022, another new genotype was detected, AIV48, this time being linked to disease in gulls initially and later being associated with several wild bird cases, as well as poultry report cases. These viruses were the result of reassortment between contemporary H5N1 viruses and AIVs with internal genes being most closely related to sequences from H13 and H16 viruses which are most commonly associated with gulls and have a different evolutionary ancestor to the Goose/Guangdong lineage H5 HPAIVs. The sequences from AIV48 viruses possess the same PB2 as the AIV09-like viruses that have been observed through the epizootic, with the PB1, NA and MP genes being shared with AIV07-like viruses, and the HA grouping within the B2 sub-lineage. For the PA, NP and NS, these sequences cluster with gull H13/H16 sequences obtained from Europa, Asia, and North America between 2007 and 2022. The closest relative across all gene segments is a H5N1 sequence collected from an unspecified gull in France during May 2022, followed by a H13N8 sequence obtained from a Black-headed gull in Belgium in December 2021 for the PA, NP, and NS segments only. These analyses would suggest that the AIV48 genotype, is the result of an AIV09-like virus circulating in Europe reassorting with an H13/H16 AIV circulating in gulls and obtaining the novel PA, NP, and NS.

Finally, two further genotypes have been detected in wild birds, WB135 and WB153 (Figure 5). The WB135 genotype was detected once in a Herring Gull collected from Cornwall in early September 2022, and shares most gene segments (PB2, PB1, PA, HA, NP, MP, and NS) with the AIV48 genotype, but possessed a novel NA gene. This NA gene demonstrates high similarity to an older lineage of AIVs observed to circulate in Eurasia. The WB153 genotype was also only detected once in pheasant from Norfolk in late August 2022. The WB153 genotype shares most of its gene segments (PB2, PB1, PA, HA, NP, NA, and MP) with AIV09 viruses, but the NS shows high similarity to AIVs from 2019 to present, including European H5N1 AIVs from Europe in 2021 and 2022.

During the 2021 to 2022 reporting period a handful of detections of HPAIV in mammalian species have also been reported. During the previous outbreak period, the detection of H5N8 influenza A virus of avian origin was detected in a fox and some seals (Floyd et al., 2022). This raised awareness of species-to-species transmission, especially where mammals are in close contact, and therefore at a higher risk of infection from, virus being excreted from birds.

During the 2021 to 2022 season, mammalian infection has been detected in 4 otters and 4 foxes, but this could not be confirmed as being the cause of death. Otters submitted included from 14/03/2022 (Fife), 06 and 28 June (Shetland isles and Fife, respectively, and the Isle of Skye (also collected on the 28 June). Four foxes also tested positive for H5N1 HPAIV during the reporting period including a fox collected from Tyne and Wear on the 07/12/2021, on the 07/03/2022 (Cheshire), and two out of three foxes submitted from Cornwall on the 01/08/2022.

Where possible, WGS has been generated from these samples and a full assessment of potential adaptive mutations undertaken. Sequence data was derived from either clinical material or live virus isolates and assessed. From the 8 positive animals, 4 full genomes were generated, and phylogenetic analysis demonstrated that two were of the AIV07-B2 genotype (Otters from Fife and the Isle of Skye) and two were of the AIV09 genotype (foxes from Cheshire and Tyne and Wear). All genomes had the E627K amino acid substitution in the PB2 protein that has been linked to mammalian adaptation, but no other key residues associated with increased risk for humans were identified. This highlights the need for

increased surveillance of mammalian species for H5 AIVs, in combination with in-depth genomic analysis to better understand the ability of these viruses to cross species barriers, and the potential risk they may pose to public health.

Epidemiological investigations

Epidemiology is the study of the distribution, the determinants (risk factors) and causes of disease outbreaks. Epidemiologists, using sophisticated statistical analyses, field investigations, and complex laboratory techniques, investigate the cause of a disease, its distribution and method of spread, and provide advice on measures for control and prevention. Epidemiology draws conclusions based on the evidence available and the balance of probabilities.

The epidemiological investigation is undertaken to determine when infection was introduced by assessing the clinical history. It also investigates all possible sources of infection including possible movements of susceptible animals and their products, people, vehicles, equipment, feedstuffs, bedding material, etc. The findings are detailed for each infected premises in Annex 3. In this outbreak there has been specific involvement of experts in virology and ornithology.

Investigations for source and spread of infection are described as 'tracings', and are based on the estimated incubation period, statutory requirements and period over which virus is excreted by infected birds. Source tracings were assessed from 1 – 21 days prior to first clinical signs; spread tracings were assessed from one day after the start of source tracings until the imposition of movement restrictions.

Tracings visits were carried out for contacts during the high-risk source and spread windows which were 3 days prior to clinical signs for source and 2 days before for spread.

Surveillance was also carried out on potentially exposed premises in the protection zones. This comprised a clinical inspection of the poultry and other captive birds at each site for signs of disease typical of avian influenza and an examination of the records of water and feed intake and daily mortality rates at each site. Birds were sampled and tested where there was unlikely to be effective mixing of non-indicator species with indicator species as a result of segregation as a result due to routine management practices on the premises.

Surveillance activities

A census to identify all premises containing poultry and other captive birds was undertaken in the Protection Zone. All commercial poultry were identified in the Surveillance Zone, in line with Great Britain legislative requirements.

Guidance notes were sent to all holdings within the PZ to raise awareness and remind keepers of the restrictions applying in this zone.

The poultry on these premises in the PZ, together with their production and medicine records were also clinically inspected by APHA personnel (and sampled and tested where there was unlikely to be effective mixing of non-indicator species with indicator species) with

no evidence of HPAI virus being identified. This surveillance was repeated prior to the merging PZ into the SZ.

Owners of premises within the SZ were sent guidance notes to raise awareness and also remind keepers of the restrictions applying in this zone.

For all HPAI IPs confirmed after 01 January 2021, approaches were made to all households within the SZ to encourage voluntary registration of all poultry and other captive birds to establish the population at risk and enhanced surveillance was implemented within 0-10 km for a period of 90 days following effective preliminary cleansing and disinfection (C&D) on the relevant IPs.

Ornithological overview

Wild bird activity is an important risk factor in the epidemiology of the current avian influenza outbreaks. In this context values the opinion and expertise of colleagues in the APHA wildlife research teams; the investigation of infected premises was often supported by ornithologists from the wildlife research team to assess the abundance and behaviour of wild birds in the landscapes around IPs. During the 2020 to 2021 campaign, with the increased number of cases, the availability of the ornithological resource and Covid restrictions made it more difficult to obtain detailed opinions for individual infected premises based on field activity. Further, it was noted that field-based assessments were often not timely, with valid observations around cases confounded by the necessity of working in parallel with disease control operations, as these were likely to completely change the behaviour of wild birds.

As an alternative, an approach producing a desk-based opinion was devised to support thinking in complex cases. These narrative opinions on the environmental HPAIV 'infection pressure' around IPs were designed to be delivered relatively quickly and by individuals working remotely from home (i.e. based purely on publicly available and accessible maps and information, supported by deep expertise). Limited ornithological resource through the 2021 to 2022 campaign prevented a full assessment for every case, but each IP was risk assessed for prioritisation and the majority were considered in one form or another, including important contributions to case investigations and reporting, including analysis of outbreak clusters.

Assessments were rapid, desk-based opinions of the type, abundance, and aggregation of wild birds that might produce a source of infection close to the infected premise (IP), and the potential for specific wild bird behaviours that might produce infection pathways in that case. Assessments were undertaken using a consistent framework and whilst this lacks any formal precision, they produce useful and timely descriptions of relative infection pressure for cases, which were found to be very useful to support operational decision-making and reporting. This was particularly helpful in cases when infection pressure might be dynamic (reflecting seasonal variation produced by migration or weather), in certain geographical contexts, or in complex or novel cases involving kept birds.

Sources of infection are those features in the landscape (such as waterbodies) at which HPAIV is most likely to be acquired, and then be maintained within wild bird populations, such that significant quantities of virus will be released into the environment over extended

periods; both the scale and period of risk produced by a source are important. Principal here are aggregations of species known to be susceptible to HPAIV (especially wildfowl, gulls, and waders) where both faeces and carcasses will be infective. The larger these aggregations are, and the more diverse the list of susceptible species likely to be present, the more likely are we to consider a lake, river, wetland, woodland, or estuary as a potential source of infection. Publicly available counts and reports (such as from the British Trust for Ornithology or nature reserves) are used directly to inform opinion where these are local to cases, although assessors usually had to use their expert opinion to extrapolate reports of counts at some distance for most case locations.

Assessment of the potential infection pathways by 'bridge species' was more complex. These involve opinions on the behaviour of a varied suites of wild birds and how likely it might be for virus to move from a likely source and infect kept birds directly, or indirectly where wild birds might contaminate operational surfaces at an IP (such as yards, stores of bedding or feed, roofs). The type and character of the case is important (such as production system, level of biosecurity, implementation of the conditions of the housing order) as these may emphasise the potential contribution of specific infection pathways. Similarly, the distance to potential sources of infection is important, as it mediates which species of wild birds might be involved. For example, in winter the daily movements of small passerines (perching birds) are relatively limited, requiring pathways involving these to include a nearby source of infection. Grazing wildfowl might contaminate ranges, or other grassy operational surfaces at premises, but the likelihood of this would be mediated by species (some travel further to forage than others). Starlings (due to indirect fomite transmission), and gulls and corvids (due to active infection) are often considered as producing the most likely infection pathway: in winter, all three are likely to aggregate in night roosts, as well as whilst foraging; all three are comfortable visiting poultry houses and are likely to exploit forage provided by farming operations, thus contaminating surfaces. Finally, corvids and gulls are regular scavengers and some fly relatively long distances as part of their daily movements in winter, increasing the likelihood that infection from local wild bird cases might find its way onto a farm.

Assessments of infection pressure combine opinions on sources of infection and their location relative to the IP, infection pathways relevant to the case and the likely traffic of wild birds between them. For each suite of wild birds, the traffic between source of infection and case is mediated by opinions on their local abundance, distances between sources and cases, and the relative attractiveness of the farm site in its neighbourhood. Although this approach was designed around the disease ecology of wintering wild birds, including the presence and movements of substantial populations of migrant wildfowl, the thinking behind the approach appears to have been useful in also considering the widespread continuation of cases throughout the spring and summer. Whilst new suites of species had to be considered (such as colonial breeding seabirds) and many bird behaviours change dramatically between seasons, the basic approach continued providing informative assessments.

Throughout the 2021 to 2022 campaign the substantial immersion of wildlife researchers at APHA in the needs and challenges of decision-making during the delivery of control operations was invaluable in helping to first define, and subsequently refine, key ecological concepts important in managing and potentially preventing future cases. The unique experience produced by considering in detail a substantial number of 'lived' operational

cases now permits the formulation of outbreak related research activity, which it is hoped will enable a quantitative description of the concepts described here; a detailed and defensible map of 'infection pressure'. The importance of this work is that such a description is the denominator against which many individual components of farm biosecurity can be evaluated, establishing and quantifying the effectiveness of specific biosecurity measures, and promoting their value in reducing future cases of HPAIV in kept birds.

Public health impact

Food safety

Based on the current scientific evidence, the Food Standards Agency and Food Standards Scotland advise that avian influenza poses a very low food safety risk for consumers.

Properly cooked poultry meat and poultry meat products are safe to eat and the Agencies' advice on consumption of poultry meat and poultry products, including eggs, does not change during outbreaks of avian influenza.

H5N1 Public Health Risk Statement

The UKHSA considers the risk to the public as a result of contact with infected poultry to be very low for the general public and low for those who have prolonged contact with the contaminated environment or infected birds without the use of appropriate PPE. The UK Technical Advisory Group considers the overall risk for the current virus strain is Level 3, meaning some mammals have been infected, but there is no change in the virus indicative of adaptation to mammalian cell receptors. The UK Human Animal Infections and Risk Surveillance (HAIRS) group risk assessment for the likelihood of exposure from contact with infected mammals is very low for the general public, and low for those in close contact. The impact for everyone is very low due to the small number of people and the available treatments or interventions, coupled with the lack of evidence for human-to-human transmission.

The risk assessment of 30 January 2023 remains appropriate. The risk to human health relates to the continued high levels of transmission in birds globally, increasing the opportunity for mammalian and human exposures, and the ability of the currently circulating clade to cause direct spill-over infection with opportunities therefore for adaptation and recombination. There is very limited evidence of aerosol transmission between mammals to date although in large mammal die-offs, direct prolonged close contact between the animals is likely to play a role, but this is a key gap to address with surveillance.

The global spread of this virus and the increased species range means there is an elevation of risk compared to the risk before the 2020 to 2021 emergence of the epidemic clade, but there is no evidence of currently increasing human health risk through genomic or epidemiological surveillance. The risk to the UK of human to human transmission emerging in the general population is likely to be greater from imported than domestic cases, however UK-based surveillance scenarios can be used to refine understanding of the human health threat.

The Great Britain viruses detected on poultry farms, wild birds and mammals were assessed for zoonotic potential by the WOA/FAO International Ref Lab (also the UK National Reference Laboratory), Weybridge UK using previously applied genetic analyses and it can be concluded that all the viruses are avian viruses, with no specific increased affinity for mammalian species including humans.

Genetic evaluation demonstrated that the H5N1 viruses were distinct from Asian H5N1 viruses historically associated with human infection.

Remaining uncertainty and risks

There remains some uncertainty around the risk posed by wild birds, and when and where further cases or outbreaks may occur. There is evidence of this AI strain still circulating in Europe, therefore we consider that there is an on-going risk of another outbreak occurring in poultry on individual premises. This likelihood will reduce over the summer months and is largely dependent on the level of biosecurity on the individual premises.

Concluding remarks

Extensive epidemiological investigations did not detect the presence of infection in any further premises investigated in connection with the IPs, either by known contact (source and spread tracings), or as a result of proximity (protection and surveillance zones).

Although the epidemiological investigation concludes that the most likely route of introduction of virus onto these infected premises was direct or indirect contact with wild birds, any incursion such as these onto an individual premises remains a low likelihood event and is influenced by the effectiveness of biosecurity measures that have been implemented.

The Reference Laboratory at Weybridge is the WOA/FAO International Reference Laboratory and the UK National Reference Laboratory for avian influenza, swine influenza and Newcastle disease. The laboratory undergoes continual fitness-for-purpose assessments on its frontline UKAS:17025 accredited diagnostic assays. It has the necessary ongoing proven diagnostic capability for these strains of virus, whether low or highly pathogenic avian influenza, and continually monitors changes in the virus.

Acknowledgements

The views expressed in this report are those of the National Emergency Epidemiology Group (NEEG). However, we would like to express our thanks to the avian virology experts within APHA, members of the APHA National Wildlife Management Centre, the Cardiff APHA Specialist Service Centre Tracings Team and the many other APHA colleagues in the Service Delivery Directorate who have assisted with this investigation.

The NEEG is comprised of staff from APHA's Veterinary Directorate, Service Delivery Directorate and Science Directorates.

Annex 1: Reports describing geographical clusters

Cluster investigations

When considering a potential cluster identified by routine outbreak and tracings investigations, all IPs with apparent links are investigated. This may be through suspected movement of fomite, or that they occurred close together in time and/or space.

Genomic and quantitative data scanning methods were also used to identify potential clusters (SaTScan[®] and Getis-Ord Gi*[®]) Any IPs that were biologically plausibly linked from the same event, or risk pathway pressure, were considered in more depth at this higher level as a potential cluster.

There were 6 cluster investigations:

1. The Lincolnshire company-linked cluster.
2. The Cheshire company-linked cluster.
3. The Loughborough company-linked cluster.
4. The Louth company-linked cluster.
5. The Thirsk company-linked cluster.
6. The Suffolk company-linked cluster.

1 The Lincolnshire company-linked cluster

Description of the cluster

This cluster affected a large integrated, commercial table egg producing, poultry company.

In total eight premises became infected premises (IPs) (see Table 1 below), whilst an additional eleven premises within the company structure did not become IPs (breeding, laying and/or rearing sites).

More detailed information on the company premises that became IPs and those that remained unaffected can be found in Annexes 1 and 2 respectively.

Table 1: Summary details of Company IPs (first affected bird type shown in bold font)

AIV Number	Species/type	Approximate numbers of birds	Age (weeks)	Date Confirmed
AIV 2021/51	Laying hens and rearing pullets	390,000 12,240	Affected birds 21-23 weeks	11/12/2021
*AIV 2021/53	Laying hens and rearing pullets	11,700 11,000	26 weeks 6 weeks	12/12/2021
AIV 2021/54	Laying hens	36,000	Affected birds 41 weeks. Others: 23, 40 and 60 weeks	12/12/2021
AIV 2021/57	Laying hens and rearing pullets	31,000 65,000	Affected birds 39 weeks. Others: 52 weeks. 3 and 7 weeks	14/12/2021
AIV 2021/62	Laying hens	616,500	Affected birds 61-65 weeks. Others: 24-72 weeks	16/12/2021
AIV 2021/64	Laying hens and rearing pullets	18,000 16,000	Affected birds 72 weeks. Others: 71 -79 weeks. 1 week.	16/12/2021
AIV 2021/65	Laying hens	24,000	Affected birds 73 weeks old. Others: 56 – 63 weeks.	17/12/2021
*AIV 2021/66	Laying hens	14000	Affected birds 76 weeks. Others: 56 weeks.	18/12/2021

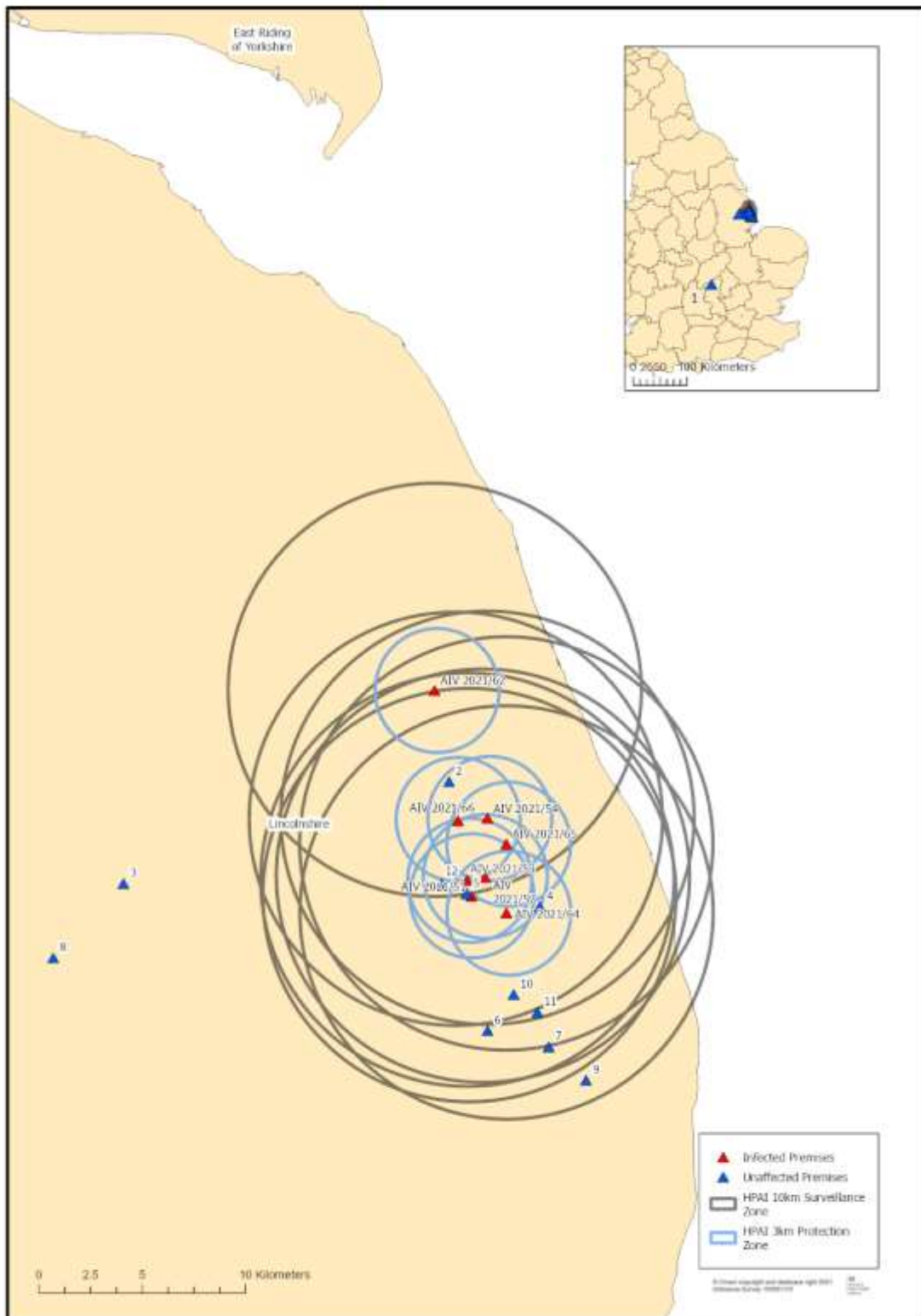
*AIV 2021/53 & AIV 2021/66 were independently managed, but linked to the company cluster via feed deliveries and egg collections/supply of egg trays.

An additional, subsequently confirmed IP (AIV 2022/06 – 9000 laying hens, aged 46 weeks), was an independent commercial table egg producer and was also loosely linked to the company as it supplied eggs to a company egg packing centre. It then received clean egg trays back from the packing centre (previously trays had been washed at AIV 2021/51).

The most likely date of infection for that IP was 03/01/2022, whereas the high-risk spread window for the last of the company IPs closed on 17/12/2021. Tracings investigated as a result of the egg collection route and associated egg trays, were assessed as being very low risk and closed. The most likely source identified for AIV 2022/06 was indirect contact with wild birds (high likelihood/medium uncertainty), and so it was not specifically considered further as part of this company or geographical cluster.

Map of IPs and overlapping zones

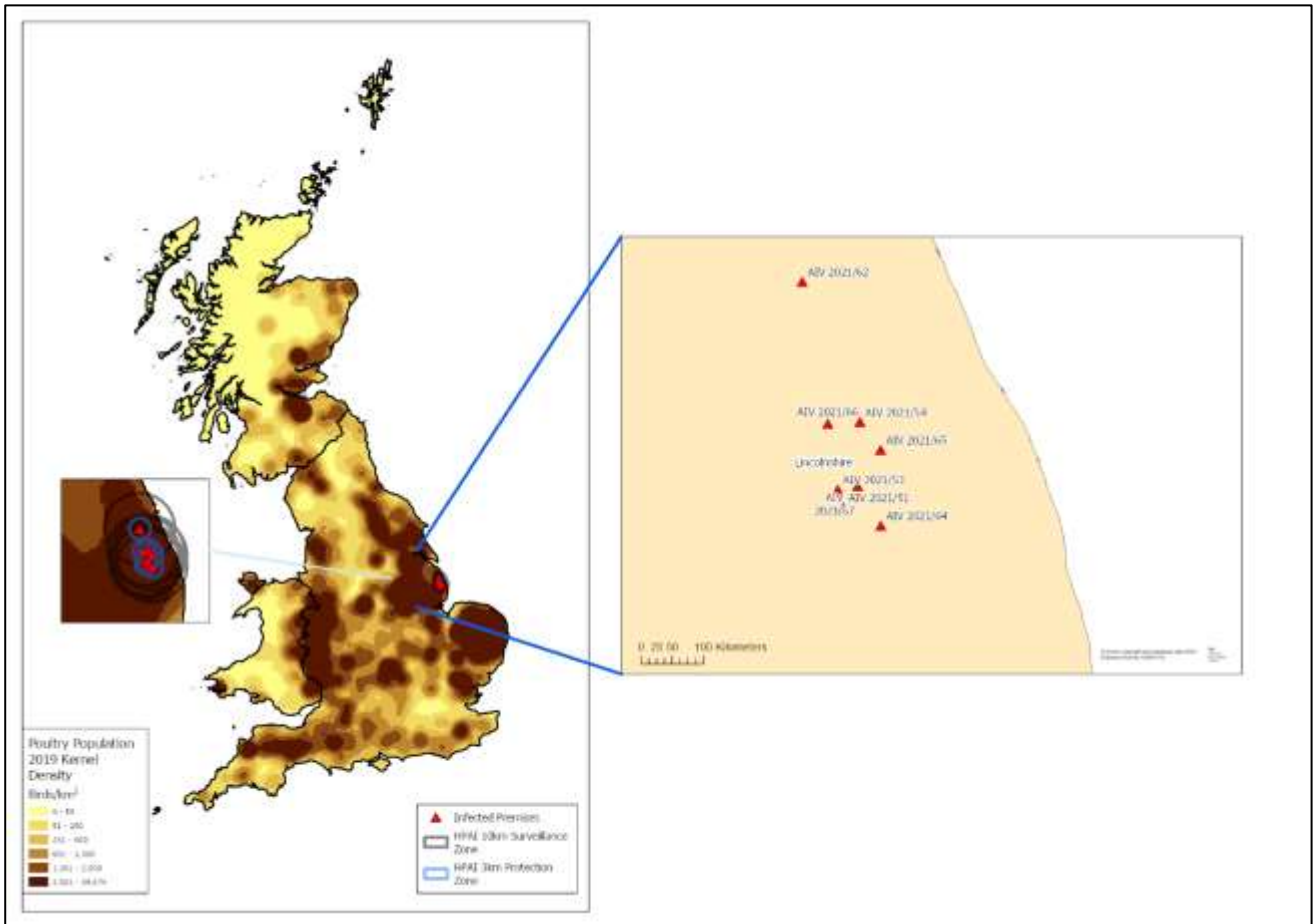
Figure 6: Map showing location of company IPs and other unaffected company premises



Map with location in Great Britain and poultry density

As can be seen from **Figure 7** below, all the IPs within this cluster were located in an area of high poultry density.

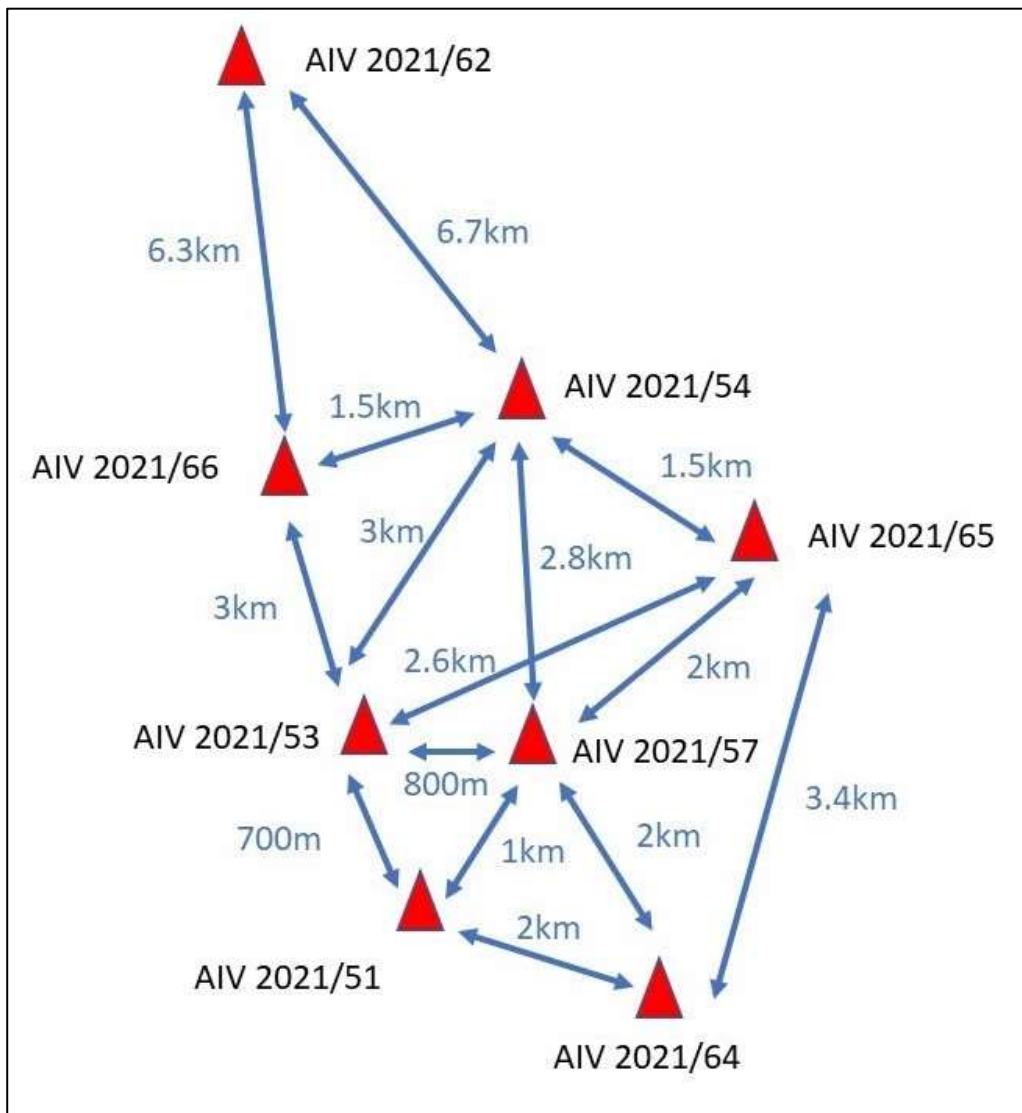
Figure 7: Locations of IPs in the Lincolnshire company linked cluster and poultry density



Overview of the surrounding area

These lowland and coastal IPs were set in an intensively managed agricultural landscape. Despite their geographic separation, most shared similar ecological contexts with only one being close to anything other than a small pond, and only one was close to a known aggregation of waterbirds.

Figure 8: Schematic map of IP spatial relationship and approximate distances between IPs (not to scale)



Ornithological assessment

An ornithological expert assessment was completed for the IPs in this cluster and concluded that wild birds were a likely source of infection pressure. This was a combined assessment covering seven IPs – five in relative geographical proximity (AIV 2021/51, AIV 2021/53, AIV 2021/57, AIV 2021/58, AIV 2021/64) and two more distant IPs (AIV 2021/54 and AIV 2021/62). AIV 2021/66 was located in close proximity to AIV 2021/54 and so it was assumed that similar conclusions would apply, albeit that the most likely infection source for AIV 2021/66 was from AIV 2021/53 via shared staff movements. Despite the unusual separation of these sites, this was an otherwise simple landscape, and as such they shared many features relevant to this assessment. As a cluster assessment we also considered the coincidence of these cases (as a temporal cluster).

Wildfowl were likely to be abundant and a significant sources of infection was anticipated regionally and suspected locally. Free-range sites may experience significant infection pressure from wildfowl. However, it must be noted that birds on all of these IPs had been

compulsorily housed before any of the most likely infection dates as a result of mandatory housing measures.

Waders and other waterbirds were likely to be abundant. Though not considered to contribute to sources of infection here, some may have exploited the ranges of the IPs and enabled indirect infection pathways by contaminating surfaces, contributing to the infection pressure at these sites.

Bridge species were considered likely to be abundant and presented the most likely potential infection pathway onto these sites. As well as producing significant infection pressure at free-range sites, these wild bird populations may have given rise to increased infection pressure for housed production systems too.


Wild passerines, woodpigeon and starlings may also have contributed a number of alternative infection risk pathways to add to the infection pressure here.

Composite Timeline Chart

A national housing order was imposed effective from 29/11/2021. From the timeline below it can be seen that all birds would have been compulsorily housed before any of the most likely infection dates as estimated from analysis of production records.

Figure 9: Composite timeline for the IPs within this cluster



 Key: Two separately managed premises but linked via egg collections and feed deliveries.

Overview of biosecurity

In general, biosecurity standards across the confirmed IPs were considered to be average to poor, with a variety of deficiencies identified across them, some examples of which are provided below.

PPE – Staff working on other sites accessed the canteen on AIV 2021/51 to clock in for their shift, collect PPE and access lockers and showers; there would have been cross-over between this foot traffic and workers coming from sheds, including the affected enriched colony units. This would have led to the potential for cross-contamination and onward transmission of infection to other farms.

Staff working on AIV 2021/51 were seen to not change boots or overalls when moving around the site, and visibly contaminated boots were present in the staff canteen.

Staff movements to other sites – Seven staff members that worked at AIV 2021/51 during the high-risk tracing window, also worked on other company poultry premises. Eight poultry premises were identified as potential tracings as a result, and four subsequently became IPs (AIVs 2021/54, AIV 2021/57, AIV 2021/62, and AIV 2021/64).

Some sites did not have their own toilet facilities meaning that staff would need to visit other sites for this purpose.

Compliance with company biosecurity protocols – There was evidence across the sites that documented company biosecurity protocols were not being fully or effectively followed.

Drivers delivering feed, egg trays and collecting eggs or carcasses were not supervised to ensure compliance with biosecurity requirements.

Record keeping – Visitor books were not present on all sites and where they were they were not always complete such as staff moving between different sites (i.e. not dedicated to a particular site) did not always record their visits.

Inadequate routine maintenance – Structural deficits were found on some sites (such as gaps in the building fabric, missing manure belt covers) which could potentially allow ingress by wild birds and rodents).

Vermin control and attraction of vermin – Evidence of rodent activity was seen on some sites and some were untidy potentially providing a habitat/cover for vermin.

Bedding storage – One site stored plastic wrapped bedding outdoors – the wrapping was seen to be visibly damaged and there was evidence of contamination with wild bird faeces.

Summary of possible source and spread transmission routes

A number of different source and spread pathways were present between the different IPs (and also involving other company sites that did not subsequently become IPs) such as egg collections and egg tray delivery, feed delivery, ABP and manure collections, sharing of staff.

Initial delays in the provision of sufficiently accurate, detailed and clear farm records, specifically staff movements and activities such as egg and manure collections, during the high-risk source and spread windows for the initial IPs. This led to delays in being able to identify, raise and action high-risk tracing investigations in a timely manner, and as

subsequent premises became IPs, those tracings identified were superseded and consequently it is difficult to confidently attribute a particular individual most-likely transmission pathway for source and spread from IPs subsequent to AIV 2021/51.

It is also possible that the source for each IP was an independent introduction from a wild bird source, as a result of high background infection pressure in the wild bird population and suboptimal biosecurity standards.

From detailed biosecurity assessments of the remaining company premises that did not become IPs, it became clear that standards of biosecurity being practised varied widely between sites, even within the same company structure.

Summary of possible lateral spread transmission routes

Table 2: Summary of possible lateral spread transmission routes

AIV	Hypothesis for spread	Likelihood	Uncertainty
2021/51	Indirect spread to other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	High	Medium
2021/53	Indirect spread to other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Medium	Medium
2021/54	Indirect spread to other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Medium	Medium
2021/57	Indirect spread to other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Medium	Medium
2021/62	Indirect spread to other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Medium	Medium
2021/64	Indirect spread to other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Medium	Medium

AIV	Hypothesis for spread	Likelihood	Uncertainty
2021/65	Indirect spread to other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Very low	Medium
2021/66	Indirect spread to other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Low	Low

Onward transmission through wildlife was assessed, as being no higher than the background wild bird risk for all sites.

Table 3: Hypotheses for source on each IP

AIV	Hypothesis for source	Likelihood	Uncertainty
2021/51	Indirect contact with wild birds.	High	Low
2021/53	Indirect contact with wild birds.	High	Medium
2021/54	Indirect contact with wild birds.	High	Medium
	Indirect introduction from other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections).	Medium	Medium
2021/57	Indirect contact with wild birds.	High	Medium
	Indirect introduction from other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections).	Medium	Medium
2021/62	Indirect contact with wild birds.	High	Medium
	Direct contact with wild birds.	Medium	Medium
	Indirect introduction from other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections).	Medium	Medium
2021/64	Indirect contact with wild birds.	High	Medium
	Direct contact with wild birds.	Medium	Medium
	Indirect introduction from other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Medium	Medium

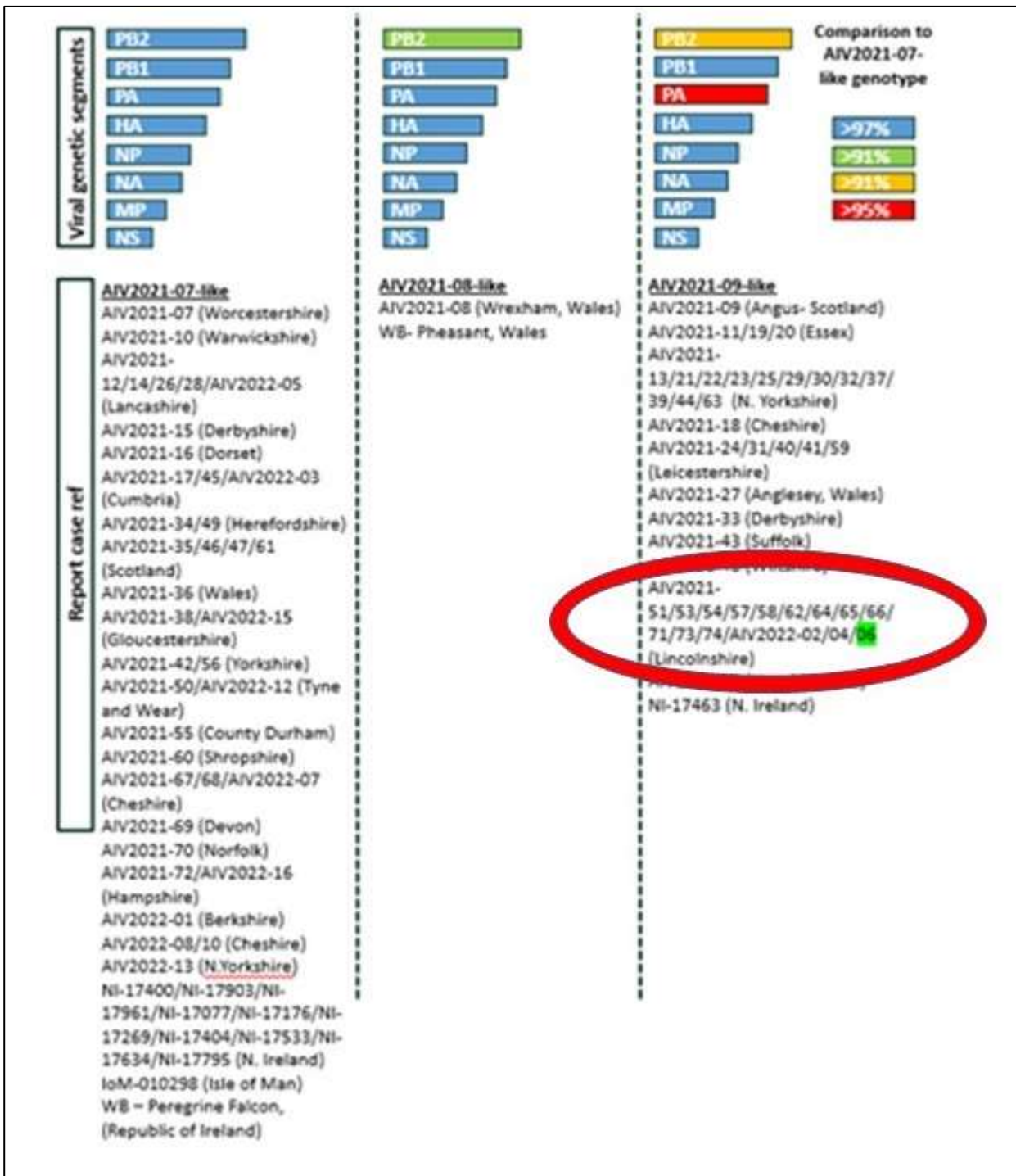
AIV	Hypothesis for source	Likelihood	Uncertainty
2021/65	Indirect contact with wild birds.	High	Medium
	Indirect introduction from other domestic flock (such as egg collection/egg tray delivery, feed delivery, ABP collections, staff sharing).	Medium	Medium
2021/66	Staff movements from AIV 2021/53	High	Medium
	Indirect contact with wild birds.	High	Medium
	Direct contact with wild birds.	Medium	Medium

Genomic Analysis

Genomic analysis indicated close genetic relationship of viruses isolated from premises in both the Louth company cluster, just to the north of the Alford cluster (AIVs 2021/71 and 2021/74 and AIVs 2022/04 and 2022/06), another unrelated commercial company IP (AIV 2021/58) and two non-commercial IPs (AIV 2021/73 and AIV 2022/02).

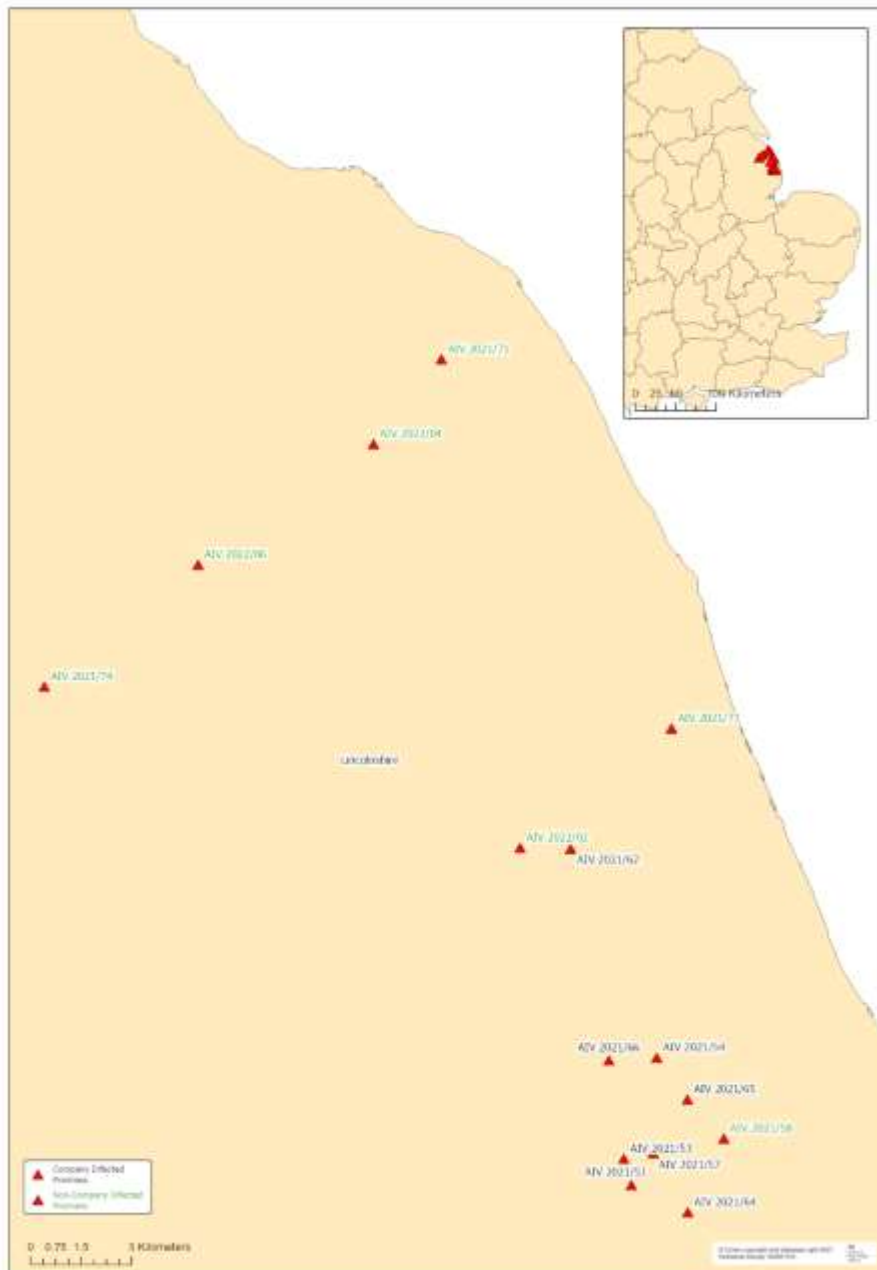
Phylogenetic analyses of the whole genome sequence from the UK H5N1 HPAIV outbreaks in poultry on these IPs, revealed that all segments were closely related to other contemporary Eurasian H5N1 viruses from 2020 to 2021. This is supported by relatively short branch lengths within a distinct genetic group observed across all segments consisting of mostly H5N1 viruses. Furthermore, these isolates are genetically distinguishable from all gene segments carried by H5N8 viruses from the 2020 to 2021 season.

Figure 10: Phylogenetic Analysis



Sequence variability across isolates suggested independent introduction events which were likely reflective of the genetic diversity amongst these viruses within wild birds. Sequence data from global isolates is required to further resolve the ancestral origin of each viral segment.

Figure 11: Spatial relationship of IPs with closely related virus isolates (“2021-09-like”) in Lincolnshire. Premises unrelated to the Alford company cluster are shown in green font.



Provisional assessment at the nucleotide level suggests that virus from AIV 2021/58 could be differentiated from the other sequences in this cluster, although it is of note that this site was under different ownership and was linked only through geographical location to the other nearby company infected premises under consideration in this summary report (AIVs 2021/51, 2021/53, 2021/54, 2021/57, 2021/64, 2021/65 and 2021/66).

Uncertainties

It remains uncertain whether any of the subsequent IPs were caused by lateral spread from AIV 2021/51, or were the result of independent incursion events, as a result of direct or indirect contact with the local wild bird population.

As referred to previously, there were initially problems and delays in the provision of sufficiently accurate, detailed and clear farm records, specifically staff movements and activities such as egg and manure collections, during the high-risk source and spread

windows for the initial IPs. This led to delays in being able to identify, raise and action high-risk tracing investigations in a timely manner and as subsequent premises became IPs those tracings identified were superseded.

However, as can be seen from the composite timeline at **Figure 9** the high-risk spread window for the first infected IP, AIV 2021/51, overlapped the high-risk source windows for all of the subsequent IPs and most, if not all, of the other IPs had most likely already been seeded with infection (whether from AIV 2021/51 or via other pathways) during a relatively short time window between 02/12/2021 and 10/12/2021, with three pairs of IPs most likely being infected on the same day (AIV 2021/53 and 2021/54, AIV 2021/62 and 2021/64 and AIV 2021/65 and 2021/66), before suspicion of disease on AIV 2021/51 was reported to APHA (at 18:30 on 09/12/2021) and then investigated on 10/12/2021.

Following concerns about the initial lack of provision of records of a suitable quality to enable accurate and timely tracing activities to be instigated, together with the standards of biosecurity observed on IPs, all of the remaining company premises were placed under EXD 124 (AI) restrictions on 13/12/2021. With ongoing concerns and detection of further IPs these restrictions were subsequently upgraded to the more restrictive EXD 08 (HPAI) on 15/12/2021.

Two further IPs, which would already have been likely to be infected prior to 13/12/2021, were reported on 16/12/2021, but thereafter no further company premises became infected. The remaining premises remained under restrictions until detailed biosecurity assessments were completed and any identified deficiencies rectified. There is some uncertainty as to whether this course of action was directly instrumental in preventing further IPs, by reducing unnecessary uncontrolled movements between premises, and leading to enhanced biosecurity measures being undertaken, or whether the cluster had already run its course.

Provision of suitable tracing information did however improve during the course of this event.

The onset of severe adverse weather conditions in the period preceding the most likely infection dates (Storms Arwen and Barra) may have had an effect either by modifying wild bird behaviour (such as for AIV 2021/51 it was reported that wild ducks and geese had recently been present on fields close to the site, an unusual observation for the time of year), causing flooding events or water ingress into housing (such as for AIV 2021/54 the manager had reported heavy rainfall, which may have led to ingress of flood water into the affected house, in the week preceding onset of clinical signs) or modifying human behaviour leading to short cuts in biosecurity protocols being taken.

Table 4: Details of storm events

Name	Date named	Date of impact on UK and/or Ireland
Arwen	25/11/2021	26/11/2021 to 27/11/2021
Barra	05/12/2021	07/12/2021 to 08/12/2021

Conclusions

It is not possible to conclude with any degree of certainty whether any of the subsequent IPs were caused by lateral spread from AIV 2021/51, or were the result of independent

incursion events, as a result of direct or indirect contact with wild birds, and inadequate implementation of sufficiently robust biosecurity procedures prior to the first suspicion of disease together with subsequent utilisation of contact restrictions and biosecurity assessments to further raise awareness and improve biosecurity standards.

AIV 2021/53 and AIV 2021/66, although linked to the company via egg collections, delivery of clean replacement egg trays and feed deliveries, were separately managed and did not share other contacts (such as staff) with the company. The most likely source of infection for AIV 2021/53 was assessed as being indirect contact with wild birds (high likelihood with medium uncertainty) and the most likely source for AIV 2021/66 was assessed as fomite spread from AIV 2021/53, via movements of shared staff between the two premises (high likelihood with medium uncertainty), although direct or indirect contact with wild birds cannot be entirely excluded. Separation of staff between the two premises was implemented from 11/12/2021, but the most likely infection date for AIV 2021/66 was 10/12/2021.

These two separately managed premises could effectively be considered as a subset of the company cluster. AIV 2021/53 had three egg collections or egg tray deliveries (trays washed at AIV 201/51 during the relevant time period) during the high-risk tracing window but was also in relatively close proximity to AIV 2021/51, and so could have been exposed to a similar level of wild bird infection pressure. AIV 2021/66, more distant from AIV 2021/51, had no egg collections during the high-risk tracing window and a single feed delivery but did share common staff movements with AIV 2021/53.

Table 5: Details of Infected Premises

Infected Premises No.	Date of notification to APHA	Date of confirmation	Most likely infection date	High-risk source window	High-risk spread window	Date(s) of culling	Preliminary C&D effective
AIV 2021/51	10/12/2021	11/12/2021	02/12/2021	02/12/2021 – 04/12/2021	03/12/2021 - 10/12/2021	14/12/2021 - 16/12/2021	23/01/2022
*AIV 2021/53	11/12/2021	12/12/2021	05/12/2021	05/12/2021 – 07/12/2021	06/12/2021 – 11/12/2021	17/12/2021	19/12/2021
AIV 2021/54	11/12/2021	12/12/2021	05/12/2021	05/12/2021 – 07/12/2021	06/12/2021 – 11/12/2021	20/12/2021	28/12/2021
AIV 2021/57	12/12/2021	14/12/2021	07/12/2021	07/12/2021 – 09/12/2021	08/12/2021 – 13/12/2021	21/12/2021	01/02/2022
AIV 2021/62	14/12/2021	16/12/2021	09/12/2021	09/12/2021 – 12/12/2021	10/12/2021 – 14/12/2021	20/12/2021 – 31/12/2021	12/01/2022
AIV 2021/64	15/12/2021	16/12/2021	09/12/2021	09/12/2021 – 11/12/2021	10/12/2021 – 15/12/2021	19/12/2021 – 21/12/2021	05/01/2022
AIV 2021/65	15/12/2021	17/12/2021	10/12/2021	10/12/2021 – 12/12/2021	11/12/2021 – 16/12/2021	20/12/2021 – 23/12/2021	05/01/2022
*AIV 2021/66	16/12/2021	18/12/2021	10/12/2021	10/12/2021 – 12/12/2021	11/12/2021 – 17/12/2021	22/12/2021	24/12/2021

* Separately managed premises but linked via egg collections and feed deliveries.

Table 6: Details of other company premises that were unaffected (anonymised)

Unaffected Premises	Production type	Comment
1	Laying	Located in Northamptonshire. Independently managed but linked via egg collections.
2	Laying or pullet rearing	
3	Pullet rearing	
4	Laying	
5	Laying	
6	Laying	
7	Laying	
8	Pullet rearing	
9	Laying or Pullet rearing	
10	Breeding or Laying	
11	Breeding or Pullet rearing	
12	Laying	Unused or not populated

2 The Cheshire company-linked cluster

Description of the cluster

The Cheshire cluster comprised seven IPs, of which five belonged to the same company.

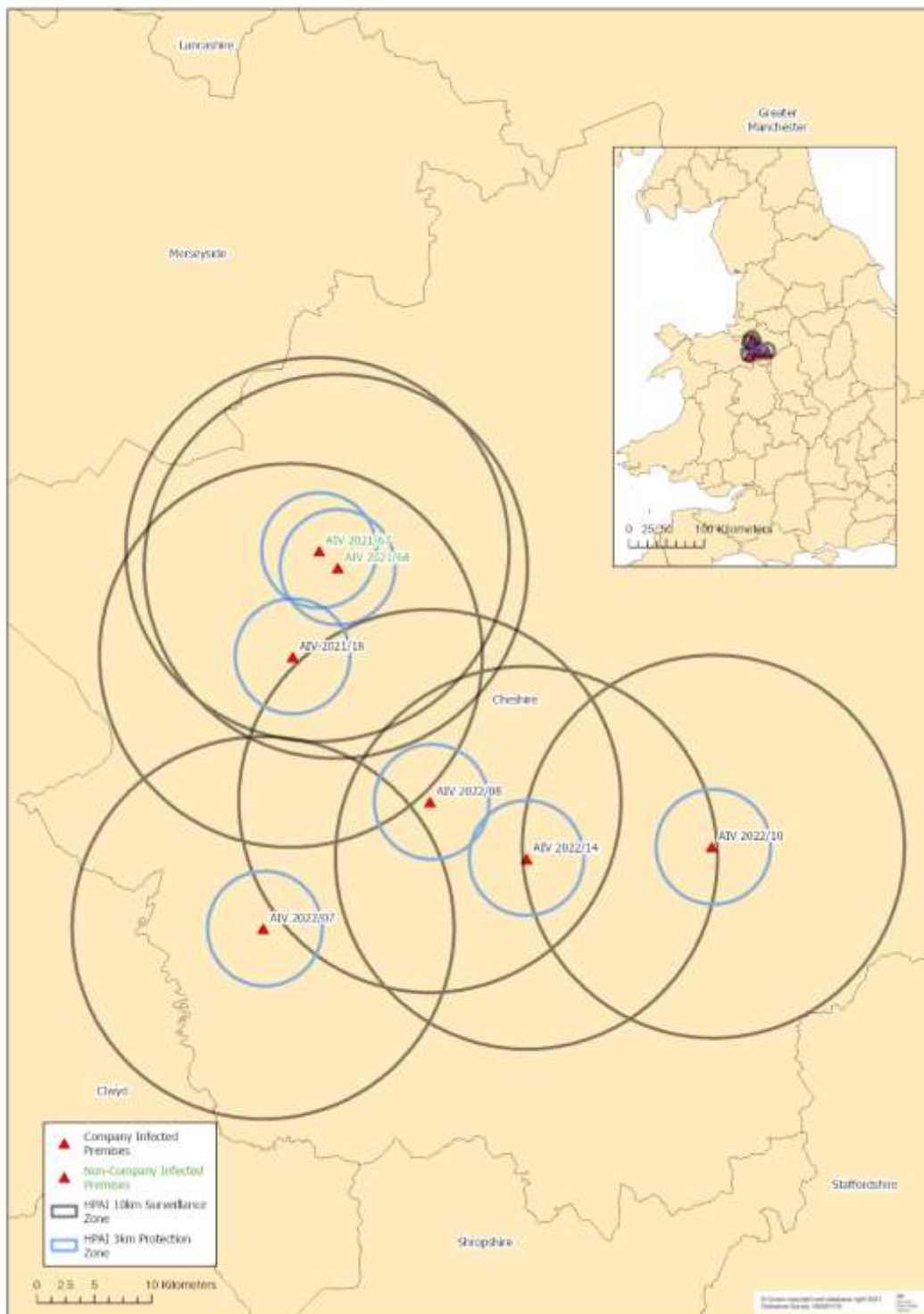
Within this cluster AIV 2021/18 belonged to the same company as AIV 2022/07, AIV 2022/08, AIV 2022/10 and AIV 2022/14. However, although in the same location, it was an outlier in regard to time of most likely infection; approximately eight weeks before AIV 2022/07. There were no known links between AIV 2021/18 and the two smallholder flocks of AIV 2021/67 and AIV 2021/68. Further, genomic analysis of the strains showed that AIV 2021/18 was distinctly different from the other IPs. Thus, AIV 2021/18 is not considered as being within the core of this cluster but is included for information.

Table 7: IPs within the Cheshire cluster

AIV Number	Species	Number	Age (weeks)	Date Confirmed	Most likely date infection	Small holder
AIV 2021/18	Turkey layer	8000	35-38	21/11/2021	13/11/2021	No
AIV 2021/67	Various	107	various	18/12/2021	12/12/2021	Yes
AIV 2021/68	Various	16	various	21/12/2021	11/12/2021	Yes
AIV 2022/07	Turkey rearer	3900	19	13/01/2022	07/01/2022	No
AIV 2022/08	Turkey layer	3500	17-19	13/01/2022	07/01/2022	No
AIV 2022/10	Turkey layer	4200	20	22/01/2022	16/01/2022	No
AIV 2022/14	Turkey layer	7500	20	28/01/2022	23/01/2022	No

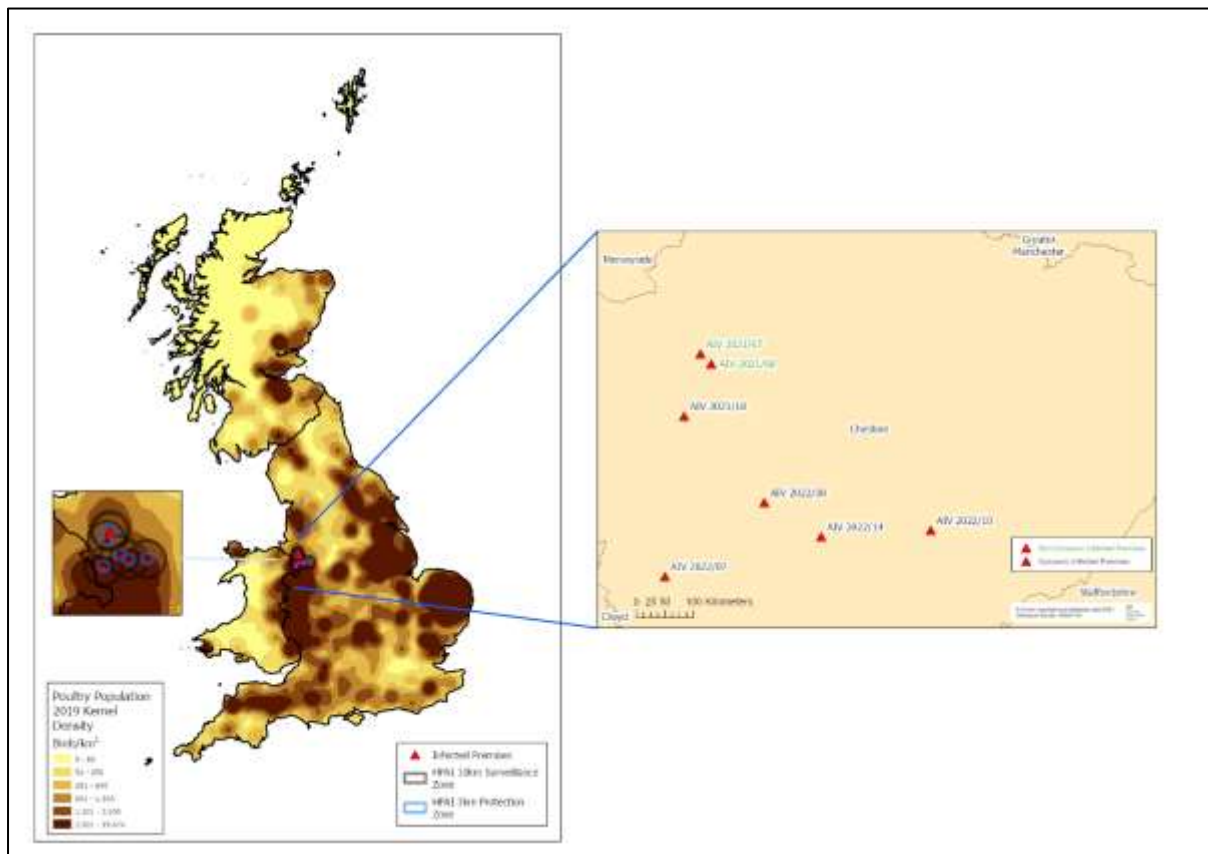
Map of IPs and overlapping zones

Figure 12: Map of IPs and overlapping zones in the Chester company-linked cluster



Map with location in Great Britain and poultry density

Figure 13: Poultry density with IPs of Cheshire cluster disease control zones in bold



Overview of surrounding area

The area around the IPs was predominantly arable land and permanent grassland used for grazing cattle. The landscape was flat and featureless.

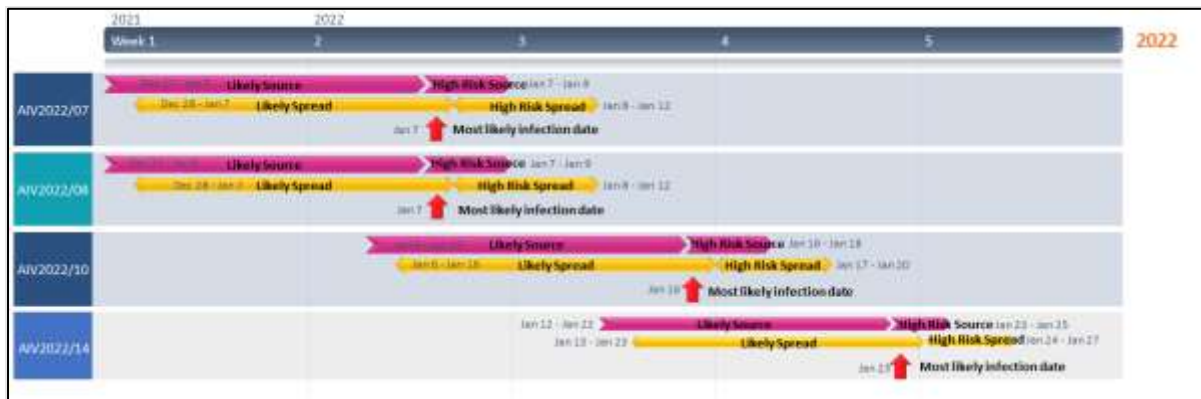
Ornithological assessment

Table 8: Summary of the ornithological assessment

IP	Desktop ornithological assessment	Local intelligence
AIV 2021/18	Estuarine setting with a high density of waterfowl with substantial populations of migrating species. Bridge species also abundant.	Wild duck shoots organised in the vicinity.
AIV 2021/67	See that of AIV 2022/07	
AIV 2021/68	See that of AIV 2022/08	

IP	Desktop ornithological assessment	Local intelligence
AIV 2022/07	Wildfowl and waders were considered not to produce a significant infection pressure. Bridge species are common and the most likely infection pathways for the IP.	IP co-located with dairy farm with multiple bridging species surround the site. Trees surround the IP giving opportunity for roosting birds contaminating the environment.
AIV 2022/08	Wildfowl and waders were considered abundant in the nearby area but unlikely to approach the IP. The suburban setting of this IP is likely to amplify the risks produced by bridge species such as gulls and corvids.	The area directly around the sheds is barren (concrete and hardcore) as it, overall unattractive to wild birds.
AIV 2022/10	A nearby series of lakes and pools which, along with wetland habitats, supports substantial aggregations of wild birds. Wildfowl were thought abundant in the neighbourhood of the IP and likely to produce a significant source of infection. Gulls and corvids may be abundant, with both groups of bridge species having the potential to produce substantial infection pressure.	The IP had old infrastructure and it is probable that passerines and pigeons roost in an open pole barn that stored bedding.
AIV 2022/14	Wildfowl and waders were considered not to produce a significant infection pressure. Bridge species are common and the most likely infection pathways for the IP.	None.

Figure 14: Composite timeline chart for the Cheshire cluster



Overview of biosecurity

Biosecurity on the smallholder premises was poor, with multiple breaches apparent (see the individual IP reports).

For the large commercial premises, biosecurity was good in terms of the outer shell of the sites and the inner shell of the individual sheds. However, features that appeared to be common to all the IPs in the cluster were related to the storage of bedding and procedures for its transfer from storage to the bird areas, together with the ventilation systems, the design of which, potentially allowed fomites to enter.

Summary of possible lateral spread transmission routes

A thorough investigation was carried out on the tracings identified for each of the IPs, and no links were found suggesting lateral spread between premises.

Whilst the turkey layer units shared an egg collection route and a hatchery, the timings of collections did not fit within the high-risk tracings windows.

Hypotheses for the source on each IP

The most likely source for all the IPs in this cluster (both large commercial and smallholder) was individual direct or indirect incursions from wild birds due to biosecurity breaches. Genomic analysis of the virus from AIV 2022/07 and AIV 2022/08 were similar, but sufficiently divergent to suggest these were independent incursions, as opposed to lateral spread. AIV 2022/07 and AIV 2022/08 were in the same lineage as AIV 2022/07. Likewise for AIV 2022/10 and AIV 2022/14.

In summary, based on phylogenetic analyses of the viruses obtained from the individual premises of the large commercial business, it is suggested that all five premises were the result of separate independent introductions from an external source, most likely wild birds.

Uncertainties

No additional uncertainty other than those described above.

Conclusion

There were no viable epidemiological links between the six IPs that occurred in the same area at a similar time. The short time-frame and the lack of tracings links, suggests that the IPs in this apparent cluster all arose as a result of direct or indirect incursions from wild birds during a focused period of heightened wild-bird infection pressure.

3 The Loughborough company-linked cluster

Description of the cluster

The Loughborough cluster comprised four IPs: AIV 2021/24, AIV 2021/31, AIV 2021/40 and AIV 2021/41. These were all chicken laying units, with a similar style of housing and husbandry. All the premises usually operated as free-range units, but in all of them, the poultry had been permanently housed (as a result of regulations introduced to minimise the risk of introduction of HPAIV) at the time when disease was confirmed. All four IPs were linked to the same table egg company that owned several other poultry premises.

Temporal distribution of the cluster IPs

Table 1 presents a summary of the IPs in the cluster, including the dates of permanent housing of the poultry, dates of confirmation as IP, and the estimated overlap between high-risk source and spread windows.

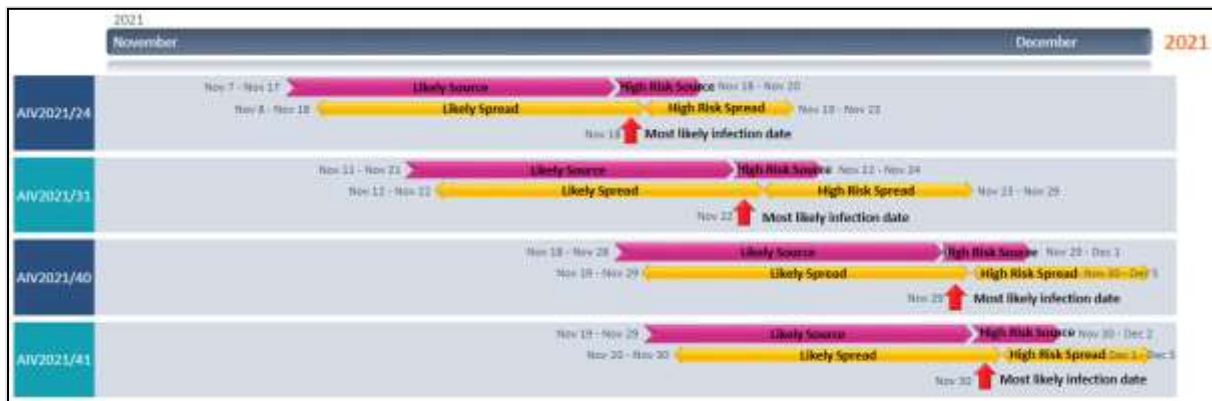
Although usually free range, the poultry had been permanently housed due to AI risk. However, this took place just shortly before being confirmed as IPs. In two of the IPs the poultry were free ranging during the high-risk source window and in the other two IPs, the poultry were free ranging during the likely source window.

The four IPs were closely clustered in time, with overlaps between the estimated high-risk source and spread windows of the different IPs.

Table 9: Summary of IPs in the cluster

AIV Number	Species	Production type	Number	Age (weeks)	Date poultry were housed	Most likely infection date	Date IP was Confirmed	Poultry free ranging during source window?	Overlapping High Risk (HR) source and spread windows between IPs
AIV 2021/24	Chickens	Free range laying hens	26,000	44	19/11/2021	18/11/2021	25/11/2021	Yes, within the high risk source window	HR spread window overlapping 2 days with HR source for AIV 2021/31
AIV 2021/31	Chickens	Free range laying hens	32,000	44	22/11/2021	22/11/2021	30/11/2021	Yes, within the high risk source window	HR spread window overlapping 1 day with HR source for AIV 2021/40
AIV 2021/40	Chickens	Free range laying hens	30,000	58	26/11/2021	29/11/2021	06/12/2021	Yes, within the likely source window	HR spread window overlapping 3 days with HR source for AIV 2021/41
AIV 2021/41	Chickens	Free range laying hens	96,000	25 to 46	19/11/2021	30/11/2021	07/12/2021	Yes, within the likely window	HR spread window overlapping 1 day with HR source for AIV 2021/40

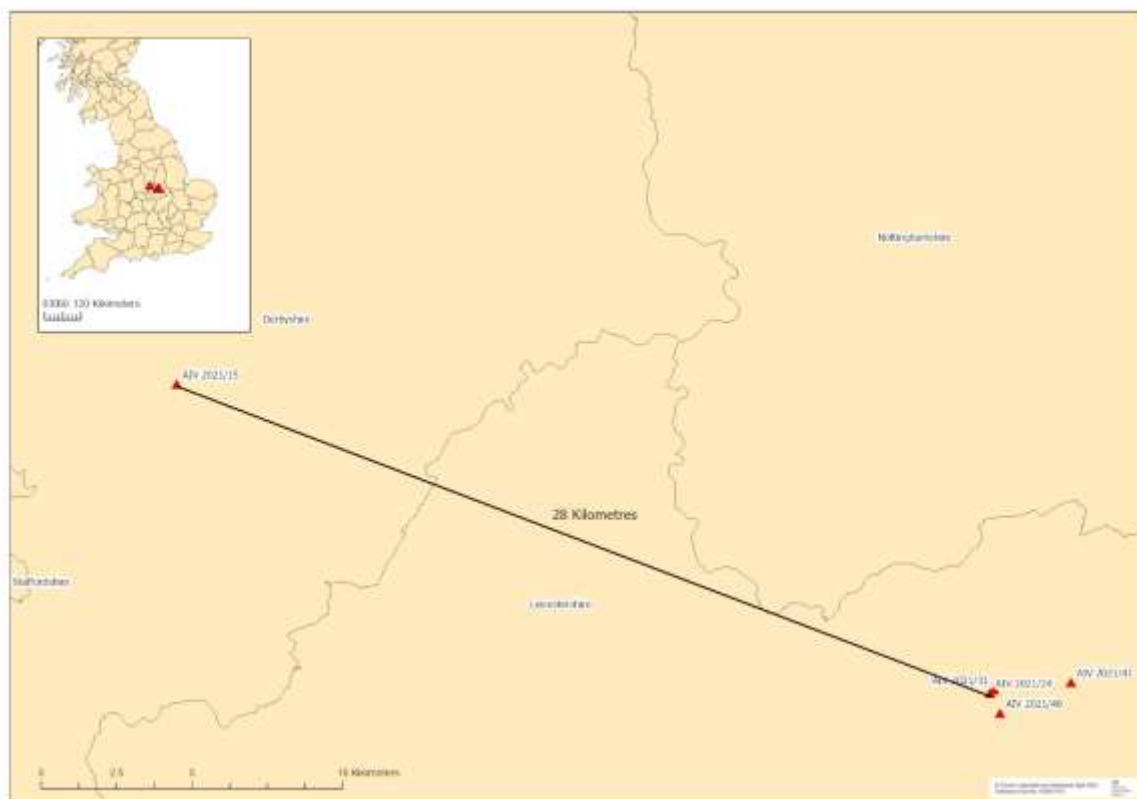
Figure 15: Composite timeline for the Loughborough cluster



Geographic distribution

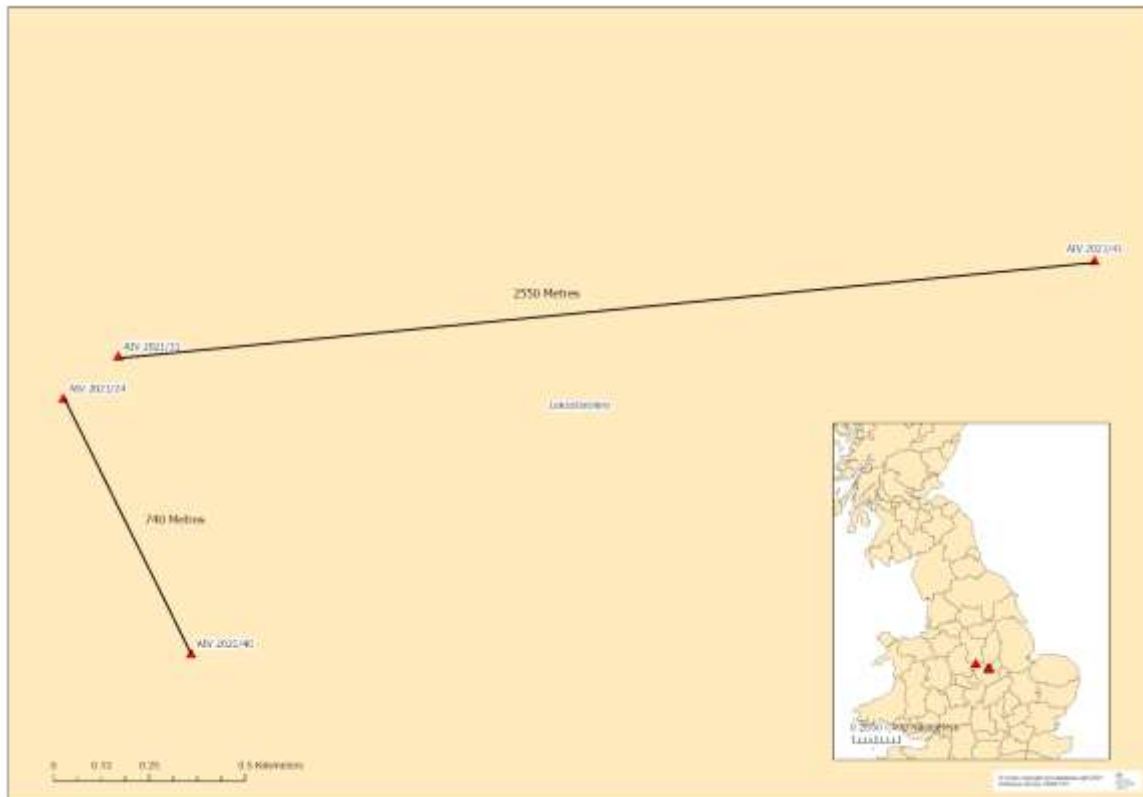
The cluster was 5 km to the east of Loughborough and there were no other IPs nearby. The closest active IPs outside this cluster were AIV 2021/15 and AIV 2021/52, (most likely infection dates of 09/11/2021 and 26/11/2021 respectively). These were approximately 43 kilometres away (see Figure 16) and there were no known epidemiological links.

Figure 16: Map indicating the location of the Loughborough cluster and the distance to the nearest IPs outside the cluster



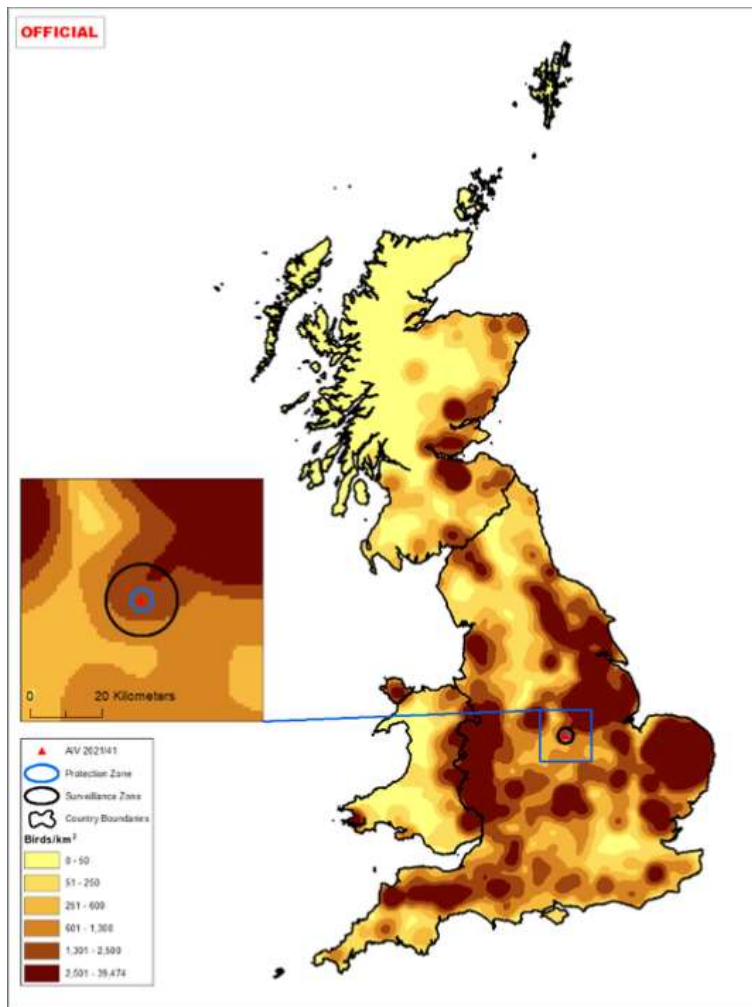
The four IPs were also closely clustered in space (see Figure 17), with a maximum distance between IPs of approximately 2.5 km. Three out of the four IPs were within 0.5 km, with two of them just under 100 meters apart, on opposite sides of a road.

Figure 17: Map indicating the location of the IPs in the Loughborough cluster and the distance between them



The cluster was located in an area of medium-high poultry density (see Figure 18)

Figure 18: Poultry density and location of Loughborough cluster



Ornithological assessment

A desktop assessment indicated that wildlife was an obvious substantial source of infection pressure for 3 out of the IPs in the cluster, and a likely source of infection pressure for the fourth IP. A series of fishing ponds known to attract wild waterfowl were located in close proximity to the cluster (see Figure 17)

Genomic analysis

Genomic analysis indicated that the four IPs in the cluster presented a similar genomic type, labelled as “AIV 2021-09-like”. However, this is a broad genomic type, and no inferences could be drawn regarding potential epidemiological links between the IPs.

Overview of biosecurity

Generally, all four IPs had reasonable biosecurity with dedicated staff for the premises and facilitates to mitigate the risk of disease spread within and between sites. However, the premises were usually operated as free range, and consequently they were not designed, or routinely operated as high biosecurity units. Although the premises operated all-in-all-out systems, frequent routine egg collections were a

common risk factor that increased the likelihood of disease introduction and spread. Lack of biosecurity supervision and gaps in record keeping were identified.

Summary of commercial links and tracings investigations

Tracings for potential links between IPs in the cluster were initiated for feed deliveries (shared routes), animal by-products (ABP) collections (one incinerator in one of the IPs was used by other IPs) and collection of table eggs to the egg packing centre (shared vehicles and routes)

Hypotheses for source on each IP

The most likely source identified in all four IPs was direct/indirect contact with infected wild birds. This was based on the fact that the infection pressure was likely to apply to all the IPs (and was obviously substantial in three out of the four IPs) and that poultry had been free-ranging during either the high-risk or likely source windows. Additionally, biosecurity was not assessed as being sufficient to have fully mitigated the risk of indirect introduction after the poultry were permanently housed. Finally, all tracings identified were closed following investigation, indicating low or very low risk of disease spread between premises

Uncertainties

It remains uncertain whether there may have been some instances of onward transmission between IPs, as there are some overlaps between source and spread windows and some common egg and ABP (manure and poultry carcasses) collection routes, albeit considered to be very low risk following the conclusion of tracings investigations.

4 The Louth company-linked cluster

Description of the cluster

The Louth cluster comprised four IPs all belonging to the same company. The IP AIV 2022/06 was in proximity to these but was not owned by the same company. The cluster lay just to the north of the Alford cluster, see

Figure 19.

It was considered as part of the Alford cluster which partially overlaps this one. All four premises were turkey fatteners, and all had the same style of housing and husbandry. AIV 2021/71, AIV 2021/74 and AIV 2022/04 were closely linked in time and space.

Table 10: Details of premises in the Louth cluster

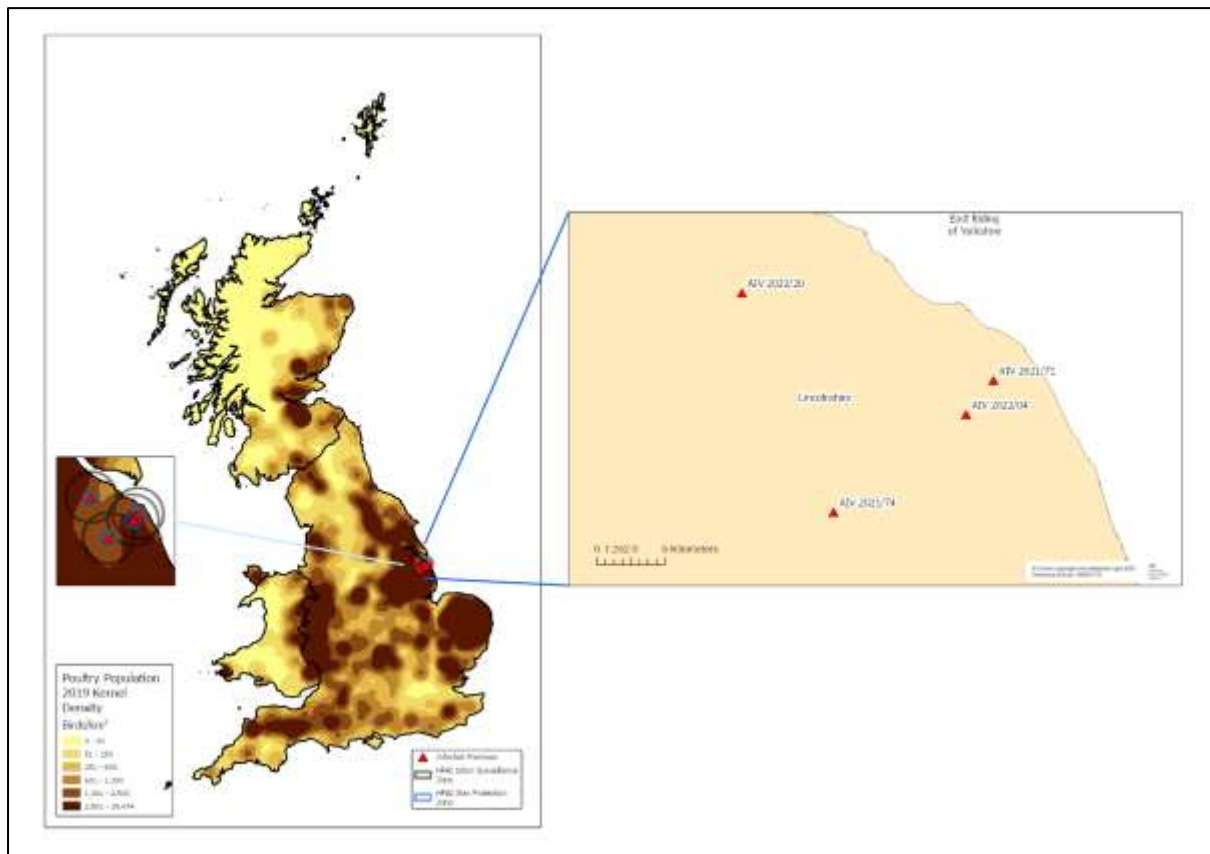
AIV Number	Species	Number	Age (weeks)	Date Confirmed	Most likely date of infection
AIV 2021/71	Turkeys	3900	19	28/12/2021	21/12/2021
AIV 2021/74	Turkeys	3500	17-19	02/01/2022	25/12/2021
AIV 2022/04	Turkeys	4200	20	03/01/2022	31/12/2021
AIV 2022/20	Turkeys	7500	20	21/02/2022	15/02/2022

Figure 19: Map of the Louth cluster IPs and overlapping zones



Map with location in Great Britain and poultry density

Figure 20: Poultry density with IPs of the Louth cluster



Overview of surrounding area

The area around the IPs was predominantly permanent grass for cattle and arable land. The land was flat and featureless.

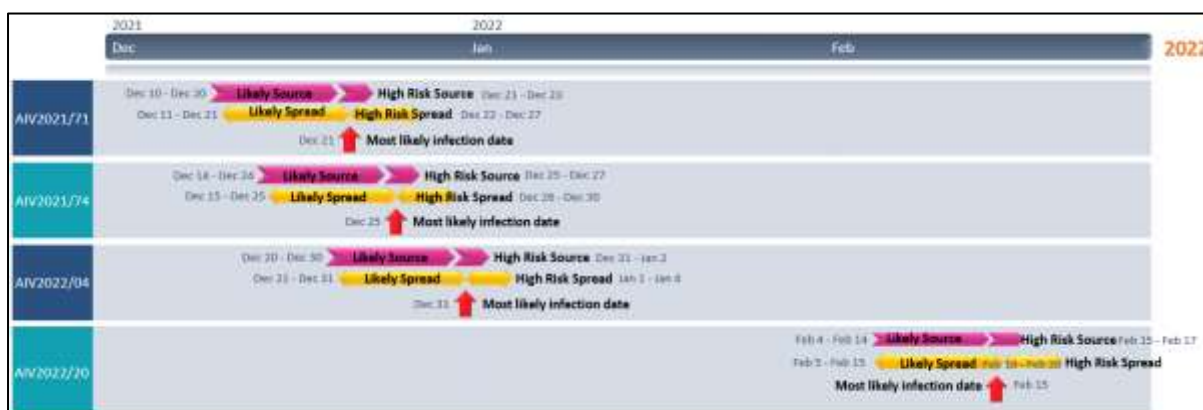
Ornithological assessment

Desktop assessment: These rural and lowland IPs lay very close to coastal habitats likely to be favoured by many waterbirds. Wildfowl were likely to have been abundant and were likely to have produced a substantial infection pressure. Bridge species, principally gulls, were likely to have been abundant in the area. They represented one of the strongest sources of infection pressure. The IPs were between the Wash in the south and the Humber Estuary in the north- an important flightpath for wild birds including bridge species.

Local intelligence: Wild birds of various species were reported to be abundant by APHA staff working on the premises.

Composite timeline chart

Figure 21: Composite disease timeline for the Louth cluster



Overview of biosecurity

All four IPs had poor biosecurity. Staff moved between premises and there remains uncertainty about the accuracy of visitor records. Equipment such as feed bags and vehicles were also shared between IPs.

Building integrity was poor ranging from holes in the exterior walls, lack of effective lobbies for the bird area and no outer-shell for biosecurity. Personal biosecurity was poor, with no foot dips or secure changing areas on some premises. There was no notable vehicle biosecurity.

Summary of possible lateral spread transmission routes

Table 11: Summary of possible lateral spread transmission routes

Link	Comment	Likelihood	Uncertainty
Shared staff	AIV 2021/71, AIV 2021/74 and AIV 2022/04 had same area manager. He had also visited other premises that were not IPs AIV 2021/71 and AIV 2022/04 had the same stockperson until AIV 2021/71 became an IP	Low	Medium
ABP storage facility	AIV 2021/71 and AIV 2021/74 shared the same unregistered ABP collection centre. Potential path for spread, but following inspection from APHA, it was felt that sufficient mitigations were in place to avoid spread.	Very low	Low
Feed lorries	AIV 2021/71 and AIV 2022/04 delivered together, no C & D of vehicles. However, AIV 2022/04 was delivered before AIV 2021/71, so no risk of spread.	Very low	Low

Link	Comment	Likelihood	Uncertainty
Bagged-up spare feed	Feed leftover after depopulation of another company premises was moved to other premises (including the IPs) in dirty/re-used plastic bags. Potential common source or lateral spread.	Very low	Medium
Straw source	Straw for both AIV 2021/71 and AIV 2022/04 was from a common source, the same open-sided shed halfway between the 2 IPs. Wild birds were reported to be in frequent and abundant in and around the barn. No C & D of the straw was undertaken.	Medium	Medium
Geographical distance	AIV 2021/71 and AIV 2022/04 are 3 km apart. The landscape in this area is barren, which would encourage carnivores such as foxes to use sheds as shelters. It is possible that an infected bird was brought by a fox from AIV 2021/71 to AIV 2022/04, perhaps during culling operations.	Very low	Medium

Hypotheses for source on each IP

It has been difficult to prove a source pathway with high likelihood and low uncertainty. IPs AIV 2021/71, AIV 2021/74 and AIV 2022/04 all belonged to the same genetic group (AIV 2021-09-like) as was the same with many of the other Lincolnshire IPs. Whilst lateral spread by anthropogenic behaviour cannot be ruled out the current understanding is that four separate wild bird introductions are most likely, either through direct contact with turkeys or indirect for that particular site.

There was however potential for infection via staff movement (most likely the area manager), shared straw source between IP AIV 2021/71 and AIV 2022/04 or indirect movement of infected birds by wildlife between AIV 2021/71 and AIV 2022/04. Biosecurity was poor on sites such as sheds were not bird proof and personal biosecurity was poorly communicated to staff, and between sites such as the area manager may visit several sites per day. ABP was moved from all farms in the group to a single point of storage. This is now regarded as not playing a key role as source or spread.

Uncertainties

Question marks around the accuracy and completeness of the farm records, specifically those relating to staff moves and activities during the high-risk source and spread windows, introduced uncertainty with regard to identifying specific risk pathways of importance in this cluster.

Conclusion

Overall, the findings showed potential biosecurity breaches that could have led to disease being spread between the premises by staff or equipment. The absence of specific epidemiological links did not allow definitive conclusions to be drawn as to whether the infection came from the added weight direct or indirect wild bird contact from the common wild bird population, or infection from the nearby IPs.

5 The Thirsk company-linked cluster

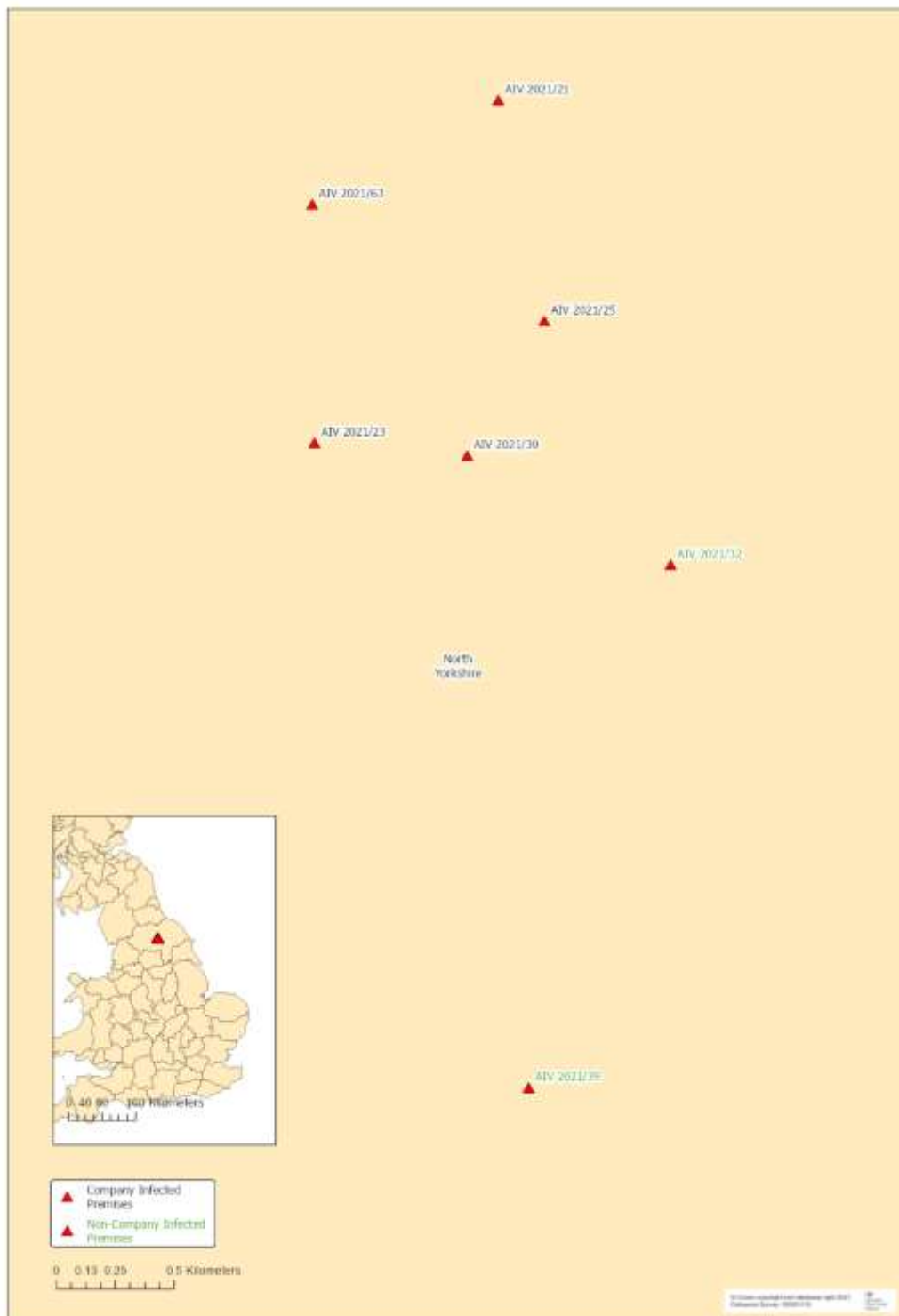
Description of the Thirsk Cluster

The Thirsk Cluster consisted of seven commercial units that were geographically and temporally linked. Five of them (AIV 2021/21, AIV 2021/23, AIV 2021/25, AIV 2021/30 and AIV 2021/63) were owned by the same company and were present on the same disused airfield site. AIV 2021/32 was independently owned, but supplied eggs to the egg packing centre that was part of the enterprise, which also included AIV 2021/39.

Table 12: Summary details of IPs comprising the Thirsk cluster

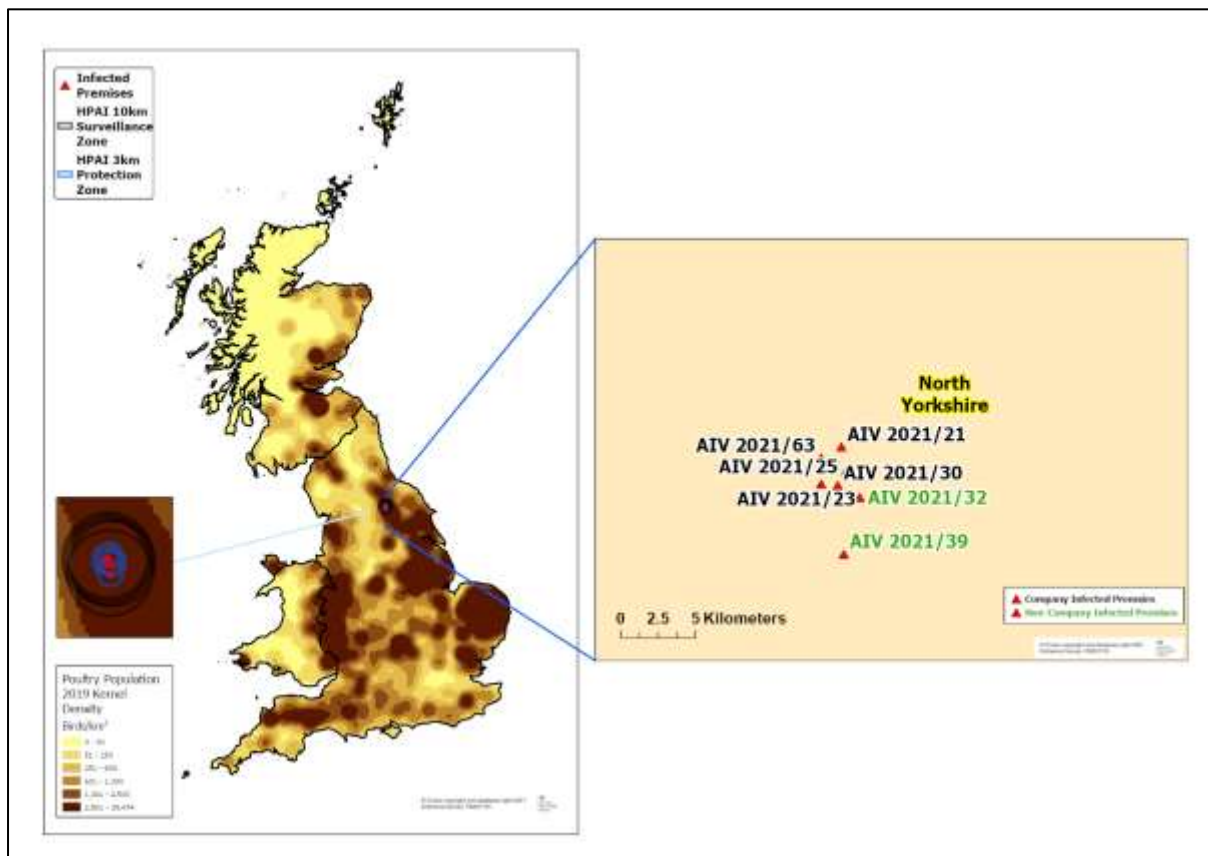
AIV Number	Common Company Ownership	Species	Number	Age	Date Confirmed	Most likely date of infection
AIV 2021/21	Yes	Fattening Turkeys	30,000	75-79 days	21/11/2021	15/11/2021
AIV 2021/23	Yes	Fattening Turkeys	24,000	96 days	22/11/2021	16/11/2021
AIV 2021/25	Yes	Fattening Turkeys	35,000	78-82 days	25/11/2021	19/11/2021
AIV 2021/30	Yes	Fattening Turkeys	22,900	99 days	28/11/2021	22/11/2021
AIV 2021/32	No	Free range Laying chickens	16,000	47 weeks	02/12/2021	25/11/2021
AIV 2021/39	No	Free Range Laying chickens	60,000	48 weeks	05/12/2021	28/11/2021
AIV 2021/63	Yes	Broilers	109,000	31-32 days	16/12/21	08/12/2021

Figure 22: Map showing relative location of IPs



Map to show IPs and overlapping zones

Figure 21: Map showing the location of the Thirsk company-linked cluster in Great Britain and poultry density



Overview of Surrounding Area

The airfield site comprising AIV 2021/21, AIV 2021/23, AIV 2021/25, AIV 2021/30 and AIV 2021/63 also included a green waste composting plant, a biomass enterprise, land for storing logs and some buildings of WW2 significance. There was a pig unit and a pet crematorium contiguous to the site.

AIV 2021/32 was approximately 800 m from the nearest airfield unit. There was also a cattle enterprise and a group of four sheep on the holding.

AIV 2021/39 was approximately 2.5 km from the nearest airfield unit and was part of a larger business comprising five additional laying premises and a pullet rearing premises. There was an egg packing centre, other independent farms and a farm shop on this site. There was a pond in proximity to the bird housing

More widely, there was arable ground and a river to the west. There were various gamebird shoots nearby.

Ornithological assessments

The airfield site

All IPs on the airfield were subject to the same wild bird presence as described below. There were some specific factors relevant to the individual units which may have encouraged presence of wild birds to them specifically as shown in the table.

Table 13: Specific risk factors relevant to the individual units

AIV 2021/21	AIV 2021/23	AIV 2021/25	AIV 2021/30	AIV 2021/63
Adjacent to green waste composting plant. May also be attractive to vermin	Adjacent to log storage area. May also be attractive to vermin	Adjacent to a large woodchip storage area which is used to supply the biomass boilers.	None	None

Desktop assessment: Bridge species were considered likely to be common and appeared to present the most likely potential wild bird infection pathway onto the site. Both gulls and corvids were likely to visit the wider airfield site and approach buildings to contaminate surfaces. Although wildfowl, waders and other water birds were likely to be generally common in the landscape, it was not thought that they would pose significant infection pressure on this IP. Passerines were not thought to be significant here.

Local intelligence: A small group of partridges and several pheasants had been seen around the site. Large numbers of geese had been seen flying overhead within the two weeks preceding the onset of disease.

AIV 2021/32 and AIV 2021/39

AIV 2021/32 and 39 both had range areas, which although not in use at the time due to the housing order, would have been attractive to wild birds which may have increased the amount of contamination around the sites.

AIV 2021/32

Desktop Assessment: Bridge species were considered likely to have been common and appeared to present the most potential wild bird infection pathway onto the site. Both gulls and corvids were likely to exploit farm ranges and contaminate operational surfaces. Wildfowl were likely to be common although it is unclear whether there were suitable habitats to host large aggregations nearby. Nevertheless, there was potential for them to contaminate the site and produce some infection pressure. Although waders were not thought to be common in the landscape, they may also have visited the ranges on this IP. Wild passerines, woodpigeon and starlings may

also have contributed several alternative infection pathways to add to the infection pressure here.

Local intelligence: Large numbers of geese had been seen in the area within the two weeks prior to onset of disease. Various wild birds were seen on the site daily.

AIV 2021/39

Desktop Assessment: Most waterbodies close to the IP were too small to host substantial populations of waterbirds. The large waterbodies known to host aggregations were distant, reducing their significance here. Wildfowl were likely to be generally common though it was not clear if any waterbodies close to the IP hosted aggregations likely to have produced a source of infection. However, wildfowl might have contaminated the ranges at the IP and produced some infection pressure in this case. Waders and other waterbirds were not thought common in this landscape and it appeared unlikely that they might have moved infection from the distant likely sources. However, as they might have shared the ranges with poultry, they may have contributed to some infection pressure here. Bridge species were considered likely to be common and appear to be the most likely infection pathway onto the IP, with both gulls and corvids likely to have exploited the farm ranges and contaminated operational surfaces. Wild passerines, Woodpigeon and Starling may also have contributed several alternative infection pathways to add to the infection pressure here.

Local intelligence: High numbers of geese were reported to have flown over the area of the premises during the previous month. Spreading of manure in a nearby field just over a week previously had attracted high numbers of crows and seagulls.

Composite tracings timeline

This shows overlap of high-risk spread and high-risk source periods for AIV 2022/21, AIV 2022/23, AIV 2022/25 and AIV 2022/30 but not for AIV 2021/63.

Figure 23: The composite tracings timeline for the Thirsk cluster



Overview of Biosecurity

Biosecurity on the Airfield site (AIV 202/21, AIV 2022/23, AIV 2022/25, AIV 2022/30 and AIV 2021/63)

In general all the units on the airfield were considered to have had good biosecurity, but there were some inadequacies that could have increased their likelihood of becoming infected.

Staff: Despite the proximity, staff were dedicated to each unit. However, it later became apparent that there had been some changes in staffing and one member of staff had reportedly been working on AIV 2021/23, AIV 2022/30 and the other geographically and temporally linked IP, AIV 2022/39. Information held indicated that the timing of these movements together with biosecurity protocols were unlikely to explain the occurrence of IP however, some uncertainty remains. Company contracts require staff to agree not to keep their own poultry at home.

PPE: All units had dedicated PPE, including overalls and wellingtons. There was a further change of wellingtons required for entering bird areas. Visitors were provided with boot covers. Hygiene barrier systems were in place for entry to bird areas in all units. Boot dips were present at the office entrance, entrance to bird houses and entrance to bird areas. AIV 2021/25 was reported to have a shower-in shower-out facility, but this could be easily by-passed.

Housing and maintenance: In general , all housing was well maintained and wild birds would not have been able to enter.

Cleansing and disinfection: The discipline and approach to cleansing and disinfection of vehicles entering the perimeter of the units was variable.

Bedding: Bales of wood shavings for bedding were stored outside on all units. These were double-wrapped and a protocol was described for discarding any bales with damaged wrapping. Cleansing and disinfection of each bale was reportedly carried out before being taken into the houses to top up the bedding.

ABP: ABP was collected from outside the perimeter of the units. On some sites, a forklift would be unloaded from the ABP trailer and enter the perimeter of the unit. Cleansing and disinfection was reportedly carried out before and after.

Vermin control: Vermin were present on the airfield site and it is likely that some of the other enterprises on the site would be attractive to them as described above. Pest control was carried out monthly by a contractor and records on all unit showed that there had been recent activity. Vermin would have been able to enter the bird houses.

Biosecurity on AIV 2021/32

Overall, the unit was clean, tidy and well-maintained. However, some biosecurity procedures were lacking and this could have increased the likelihood of indirect contact with wild birds.

PPE: Two family members attended to the birds and had no other contact with poultry. Boot dips containing disinfectant were in place, but the same wellingtons and clothing were worn inside, outside and in the egg collection room.

Housing and maintenance: Housing was well-maintained and since the housing order had been in place, wild birds would not be able to enter. It was reported that the baffles on the ventilation fans could be blown open by strong winds (which there had been recently) and this could allow ingress of contaminated organic matter. The area to become affected first was adjacent to the fan.

Cleansing and disinfection: There were no cleansing and disinfection measures for on-coming vehicles.

Eggs: Eggs were moved from the collection area to a separate storage area so egg collection personnel would not need to enter the poultry building.

ABP: Animal By-Products were collected from the gate.

Manure: Muck was removed via a muck belt and reportedly could not be accessed by wild birds or vermin.

Vermin control: Vermin control was carried out by the owner and recent activity had not been reported.

Biosecurity on AIV 2021/39

Biosecurity was generally good however, there were some inadequacies which could have increased the likelihood of indirect contact with wild birds.

Vehicles: All vehicles accessing the holding passed over an automatic disinfection spray.

Staff: Staff only visited one farm per day and used dedicated farm overalls. However, disposable over-boots were reported to be used for entering the poultry accommodation. These are known to break easily and are not effective at preventing ingress of faecal contamination and virus. Visitors were given disposable overalls and over-boots for outdoor areas and disinfectant foot dips were present on entry onto the site and into poultry accommodation.

Even though the poultry farm was co-located with the egg packing centre, a lorry collection was made for the eggs with single farm visit and a good biosecurity protocol was followed.

ABP: Animal By-Products were collected from outside the perimeter.

Vermin: Pest control was carried out by a contractor and had been increased to weekly visits.

Manure: The cover of the manure belt leaving the poultry accommodation was missing allowing wild bird access to it.

Summary of possible lateral spread transmission routes

The potential for lateral transmission amongst these units has been evaluated, taking into account the timelines, movements, biosecurity procedures and genomic analysis.

Discussion of AIV 2021/21 as a source for AIV 2021/23 and AIV 2021/25

The high-risk spread period for AIV 2021/21 overlapped with the high-risk source period for AIV 2021/23 and AIV 2021/25. Genomic analysis showed that infection on AIV 2021/21 was the result of an independent incursion due to differences when compared to isolates from the other units. Furthermore, tracing investigations did not show any likely transmission pathways from AIV 2021/21 to either AIV 2021/23 or AIV 2021/25.

Discussion of AIV 2021/23 as a source for AIV 2021/25

The high-risk spread period for AIV 2021/23 overlapped with the high-risk source period for AIV 2021/25. Genomic analysis could not be carried out on the isolate from AIV 2021/25 but tracings investigations did not find any likely transmission pathways from AIV 2021/23 to AIV 2021/25.

Discussion of AIV 2021/25 as a source for AIV 2021/30

The high-risk spread period for AIV 2021/25 overlapped the high-risk source period for AIV 2021/30. Genomic analysis could not be carried out for AIV 2021/25 but tracing investigations did not find any likely transmission pathways from AIV 2021/25 to AIV 2021/30.

Discussion of AIV 2021/30 as a source for AIV 2021/32

The high-risk spread period for AIV 2021/30 overlapped with the high-risk source period for AIV 2021/32. Tracing investigations did not find any transmission pathways from AIV 2021/30 to AIV 2021/32.

Discussion of AIV 2021/32 as a source for AIV 2021/39

The high-risk spread period for AIV 2021/32 overlapped with the high-risk source period for AIV 2021/39. Tracing investigations did not identify any likely transmission pathways from AIV 2021/32 to AIV 2021/39. In depth genomic comparison was not carried out for isolates from AIV 2021/39.

Discussion of AIV 2021/63

The high-risk source period for this site was outside the high-risk spread period for AIV 2021/39 and tracing investigations did not find any likely transmission pathways onto this unit.

Other considerations

Genomic analysis found that isolates from AIV 2021/23, 30 and 63 were closely related but these were also closely related to isolates from IPs which were not part of this cluster. It was therefore difficult to draw inferences from this and especially when

considering the timelines. The most closely related isolates were from AIV 2021/23 and AIV 2021/30 and it is possible that activities on IPs following the end of the high-risk spread period combined with the relative proximity could have facilitated lateral spread.

There was vermin activity across the whole airfield site as previously described. However, home ranges tend to be very small and it is therefore thought that they are unlikely to be moving from unit to unit. Wild birds could not enter the houses on any of the IPs considered here so transmission via wild birds would be relying on a number of fomite steps which makes reduces the likelihood of this pathway.

Other common risk factors

All units considered here were subject to the same temporal and geographical influences which underpin their same risk from infected wild birds.

Hypotheses for source on each IP

Direct or Indirect contact with wild birds was considered to be the most likely hypothesis for all the IPs considered here.

Uncertainties

Exact dates of movements of one particular staff member

The impact of disturbances caused by disease control activity on other IPs in this cluster post-confirmation

Conclusions

Although these units are all very close to each other and five of them are under the same overall management, likely lateral transmission pathways have not been found and it is known that there were at least two different incursions from wild birds as indicated by the genomic analysis. It is likely that these units, as well as others in the area were all subject to the same wild bird pressure during that particular time and that any breaches in biosecurity could have allowed the virus to enter the poultry housing.

6 The Suffolk company-linked cluster

Description of the cluster

The nine IPs in the table below were considered as a cluster due to them all being geographically and temporally related. Four of them were owned by the same large company which also had other IPs (AIV 2021 42, AIV 2021 56 and AIV 2022/37) which were geographically and in two cases temporally distinct from this cluster.

Table 14: Premises in the Suffolk cluster

AIV Number	Type of enterprise	Part of Same Company	Number and Species	Age	Date Confirmed	Most likely date of infection
AIV 2022/25	Mixed species smallholder	No	30 chickens 10 partridges 6 geese	Various	26/02/2022	11/02/2022
AIV 2022/26	Duck grower	Yes	39,000 ducks	39-40 days	01/03/2022	23/02/2022
AIV 2022/28	Contract duck grower	Yes	40,000 ducks	39 days	11/03/2022	07/03/2022
AIV 2022/29	Small commercial duck, chicken and seasonal goose fattening	No	700 ducks 50-60 broilers No geese at the time	Various	12/03/2022	25/02/2022
AIV 2022/32	Duck grower	Yes	82,400	31-38 days	20/03/2022	13/03/2022
AIV 2022/ 33	Parent duck layer	Yes	14,000	37 weeks	27/03/2022	20/03/2022
AIV 2022/34	Mixed species smallholder	No	6 ducks 14 chickens 2 guinea fowl	Various	28/03/2022	22/03/2022
AIV 2022/35	Smallholder	No	5 chickens	Various	30/03/2022	21/03/2022

AIV Number	Type of enterprise	Part of Same Company	Number and Species	Age	Date Confirmed	Most likely date of infection
AIV 2022/40	Small commercial poultry and waterfowl breeder	No	126 chickens 53 ducks 4 geese	Various	08/04/2022	28/03/2022

Figure 24: Map showing Relative Location of IPs in the Suffolk cluster

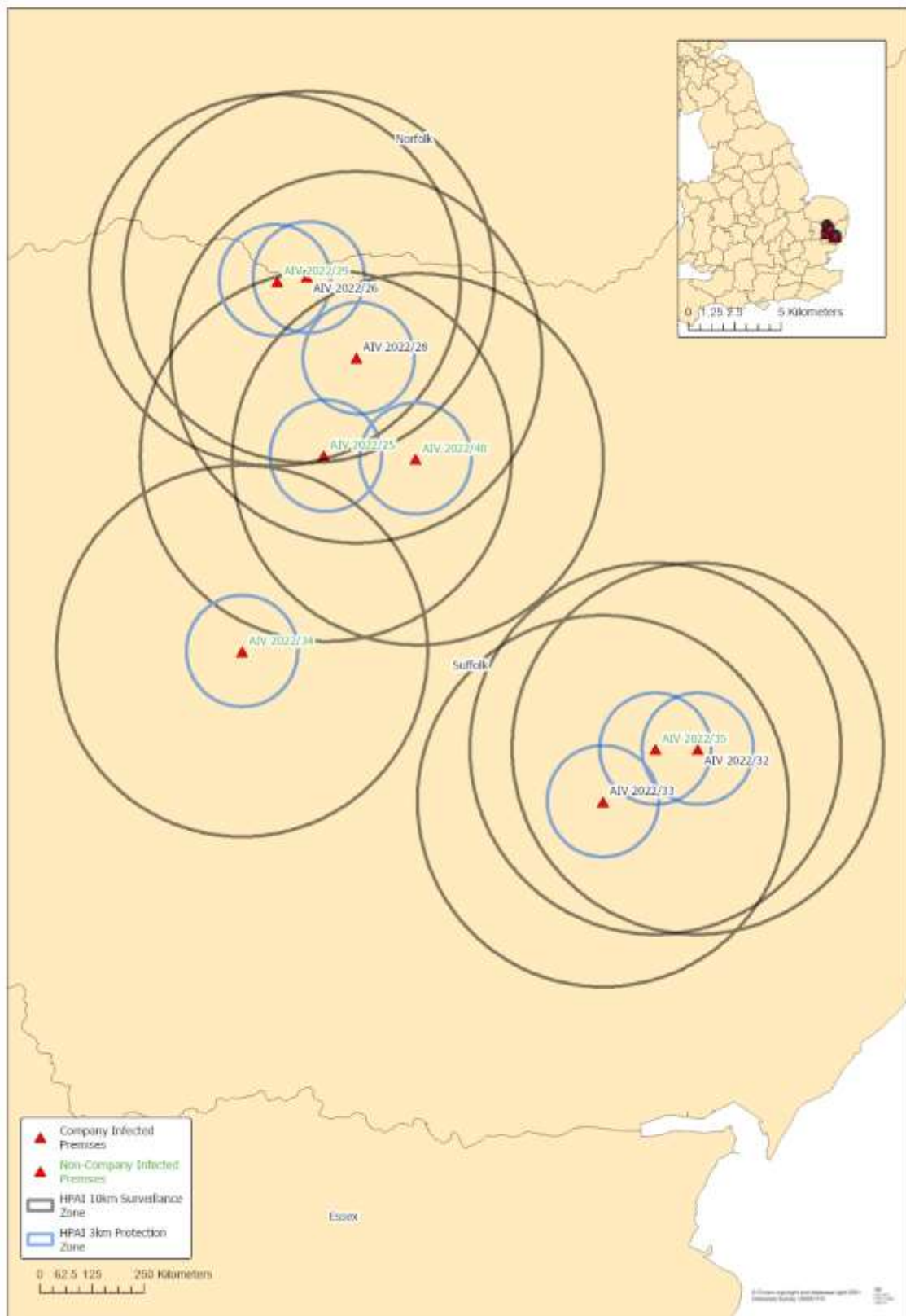
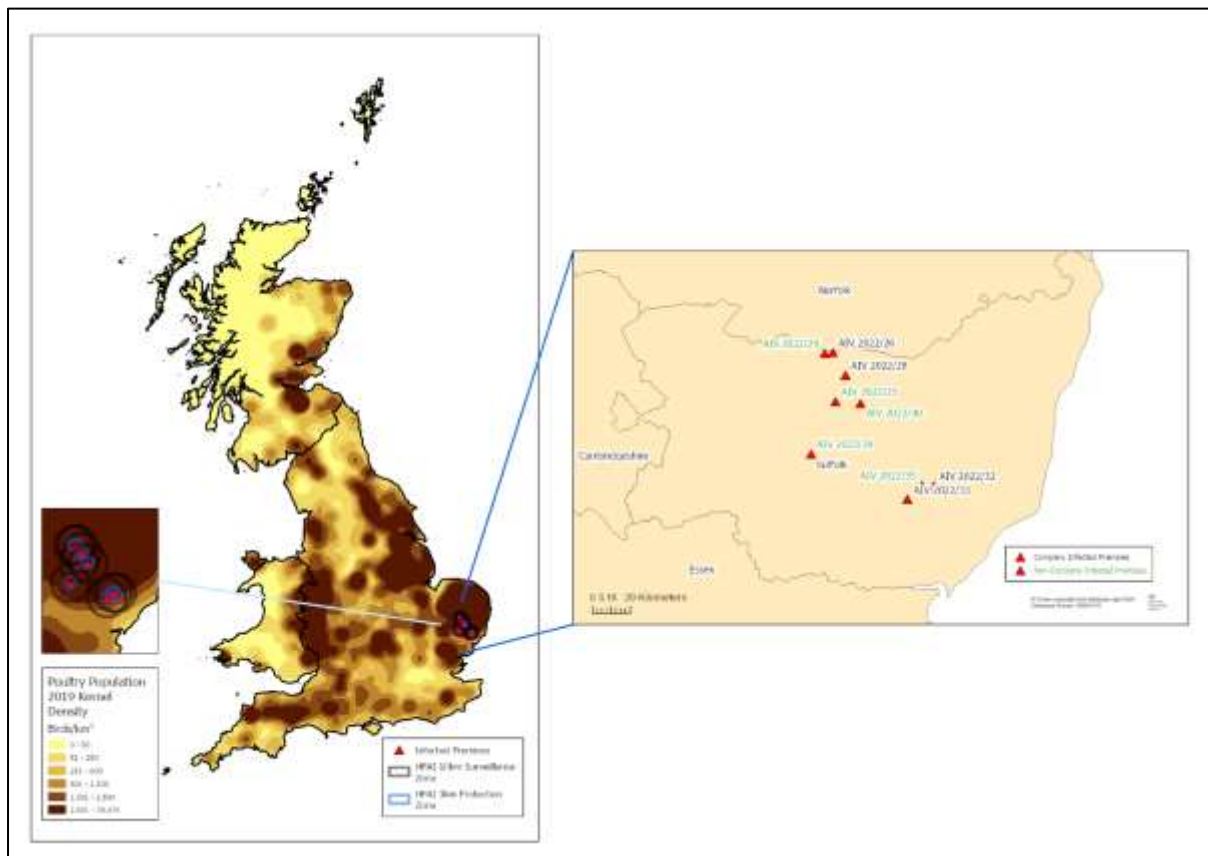


Figure 25: Map with Location in Great Britain of the Suffolk cluster and Poultry Density



Overview of surrounding area

All of these IPs were located in Suffolk, in an area of high poultry density. Waterbodies of various of types were reported to be present.

Ornithological assessment

The IPs are grouped below according to common wild bird influences.

AIV 2022/26, 2022/28 and 2022/29 were all subject to the same sources of infection pressure from wild birds. They were all situated within a mixed agricultural landscape typical of inland settings, close to the headwaters of the Little Ouse and Waveney rivers. The river valley landscape and close-by water bodies seemed favourable to waterbirds. Wildfowl would have been common although numbers were uncertain.

Bridge species were, however, likely to have been common and presented a more plausible route of infection than from wildfowl. Wild passerines, Woodpigeon and Starlings may have contributed to infection pressure due to the likelihood of wild bird ingress into the buildings.

Following the disease investigations, it was reported that crows, pheasants and wild geese had been seen on AIV 2022/26 and that pigeons were abundant on AIV 2022/28. Regarding AIV 2022/29, recent harvesting of contiguous fields had led to increased sightings of pigeons and geese. It was also thought that the population of gulls had increased in the area recently.

AIV 2022/32, 2022/33 and 2022/35 were subject to the same sources of infection pressure from wild birds. Waterbodies within three miles were generally small and assumed to be unattractive to waterbirds and unlikely to support aggregations of any species. There was a small stretch of estuary which was a significant area for waterbirds but the majority of this was too far away to be important in this case. Wildfowl were likely abundant in the wider landscape but there were unlikely to be dense aggregations close enough to have provided an infection pressure for these IPs and they were considered unlikely to use the operational surfaces. Waders and other waterbirds were also likely to be abundant but again, there were unlikely to be any aggregations close to the IPs.

Bridge species such as gulls and corvids were common to abundant in the landscape. These groups were likely to have produced the most significant infection pathways as it was only these species that were thought likely to travel regularly from the closest likely source of infection. Wild passerines and Woodpigeon might have supported indirect infection pathways from sources of infection; however, the likely absence of these sources close to the IPs suggests that these pathways were particularly unlikely.

Following the disease investigations, it was reported that pheasants and gamebirds were present on both AIV 2021 2022/32 and 2022/33. Wild ducks were also seen on AIV 2022/33. No changes in wild bird presence had been noted on AIV 2021/35.

AIV 2022/25 and 40 did not share the landscape influences as described for the groups above but here also, Starlings, Woodpigeon, corvids and gulls were likely to be generally abundant and able to move the virus from any local sources of infection.

Following the disease investigations, it was reported that moorhens and wild ducks had been seen on AIV 2022/25 and that wild ducks were able to mix with the resident poultry on AIV 2022/40.

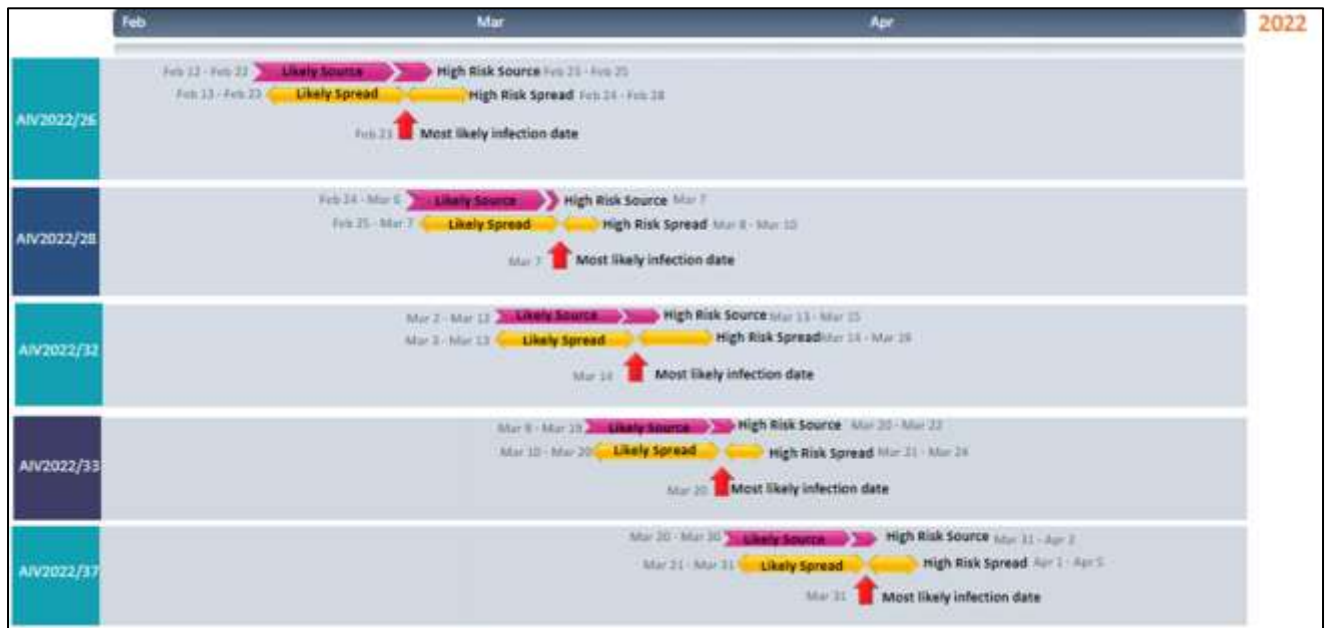
AIV 2022/34 also did not share the landscape influences of any of the others but was again likely to be subject to the activities of bridge species such as gulls and corvids. Following the disease investigation, it was reported that wild ducks were often present on an adjacent pond.

In summary, introduction of virus onto IPs via bridge species was thought to be the most likely route of infection via wild birds however it can be seen that a variety of birds including waterfowl were reported to be present on the IPs.

Composite timeline chart for the Suffolk cluster

This shows overlap of high-risk spread and high-risk source periods for the IPs in the cluster.

Figure 26: Composite timeline chart for the Suffolk cluster



Overview of biosecurity

The IPs which were part of the company all stored straw bedding in open barns which allowed wild bird access. Bedding up was carried out daily using a tractor and straw chopper. In some cases, it was reported that these were disinfected prior to entering the houses and between houses but adherence to this and efficacy was uncertain. The exposure to wild birds and the frequency of the procedure means that this constituted a potential risk for introduction of the virus. This was particularly significant as it was common to all the company IPs.

Apart from this, biosecurity protocols were found to be variable and ranged from good to poor. Full details can be found in the individual IP reports. Particular inadequacies identified on some of the units which could promote contact with wild birds included:

- (i) Potential for wild birds and vermin to enter houses
- (ii) Poorly maintained outside areas which could encourage vermin
- (ii) Clothing and footwear not dedicated to bird areas
- (iv) Hygiene barrier and lobby area not suitable for purpose
- (v) Presence of moss on roofs of buildings which would be attractive to wild birds
- (vi) Heavily contaminated boot dips
- (vii) Absence of protocol for making up correct dilution of disinfectant

(viii) Absence of C&D point for entering vehicles

Regarding the the IPs that were not part of the company, biosecurity measures were found to be either absent or generally poor.

Summary of possible lateral spread transmission routes

Following tracing investigations, there were no lateral spread transmission routes identified within this this cluster. It should also be noted that no lateral transmission pathways were identified between the IPs in this cluster which were owned by the large company and the other IPs owned by the large company.

Other considerations

Comparative genomic analysis was carried out for the company owned IPs. AIV 2022/26, 28, 32 and 33 were found to have a high level of similarity but the differences identified phylogenetically across the whole genome would suggest independent incursions to each premises as opposed to lateral spread. Genomic analysis carried out for AIV 2022/25, 29 and 34 concluded that these were likely to be independent incursions although more detailed comparison work wasn't carried out for these. AIV 2022/40 was in a completely different phylogentic group to the others and therefore very clearly the result of an independent incursion.

Other common risk factors

Common temporal, geographical, ownership and ornithological factors have been described. The five non-company IPs had poor or absent biosecurity measures and the four company IPs all had the common and signifcant bioscecurity risk associated with storage and use of straw bedding, aswell as other biosecurity inadequacies.

Hypotheses for source on each IP

Direct or indirect contact with wild birds was found to be the hypothesis for source on all the IPs considered here.

Conclusion

Lateral spread could not be indentified within this cluster. It was also not identified between the company owned IPs within this cluster and those outside the cluster. It is likely that the factors providing the most signifcant commonality here are sources of infection pressure from wild birds and inadequate biosecurity.

Uncertainties

There are no remaining uncertainties.

Annex 2: Reports of findings from the individual infected premises confirmed in 2021

AIV 2021/07, Near Droitwich Spa, Wychavon, Worcestershire, England

Description of the premises

Overview of the premises and the wider business

This was a wild bird rescue centre, co-located with an un-related retail business. Birds, mainly swans, were rescued by the public, or the keeper, from a vast geographical area and brought to the IP for rehabilitation before release. The IP was not open to the public. This premises was an IP in the previous season, AIV 2020/10.

Species and number of each present

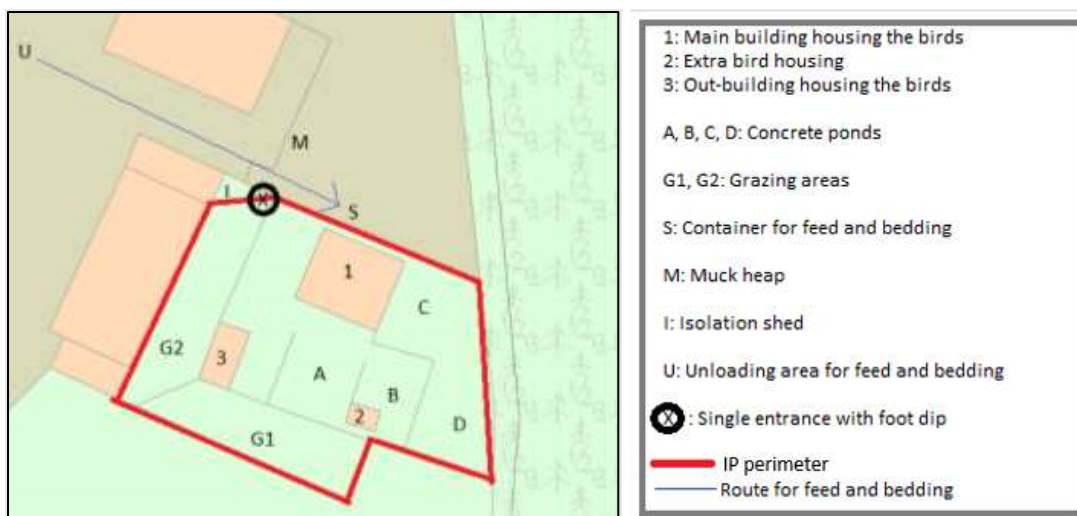
The number of birds varied according to the number of rescues and releases. At the time of the APHA investigation there were 33 swans, five ducks, four domestic geese, four chickens and two Canadian geese.

Description of the housing

The IP was approximately 26 x 22 m, and was entirely netted (all sides and the top) with three buildings and grazing areas within this netted area. Within the three buildings there were multiple pens holding the birds. Birds were allowed out once a day into the pond or grazing areas. The buildings were constructed of overlapping wooden panels.

Plan of the infected premises

Figure 27: Plan of AIV 2021/07



Overview of biosecurity

Biosecurity was poor. The principal concern, considering that any birds brought in were very likely to be unwell, was the lack of isolation of incoming birds when they were first introduced. These were placed with the resident birds and if infected with

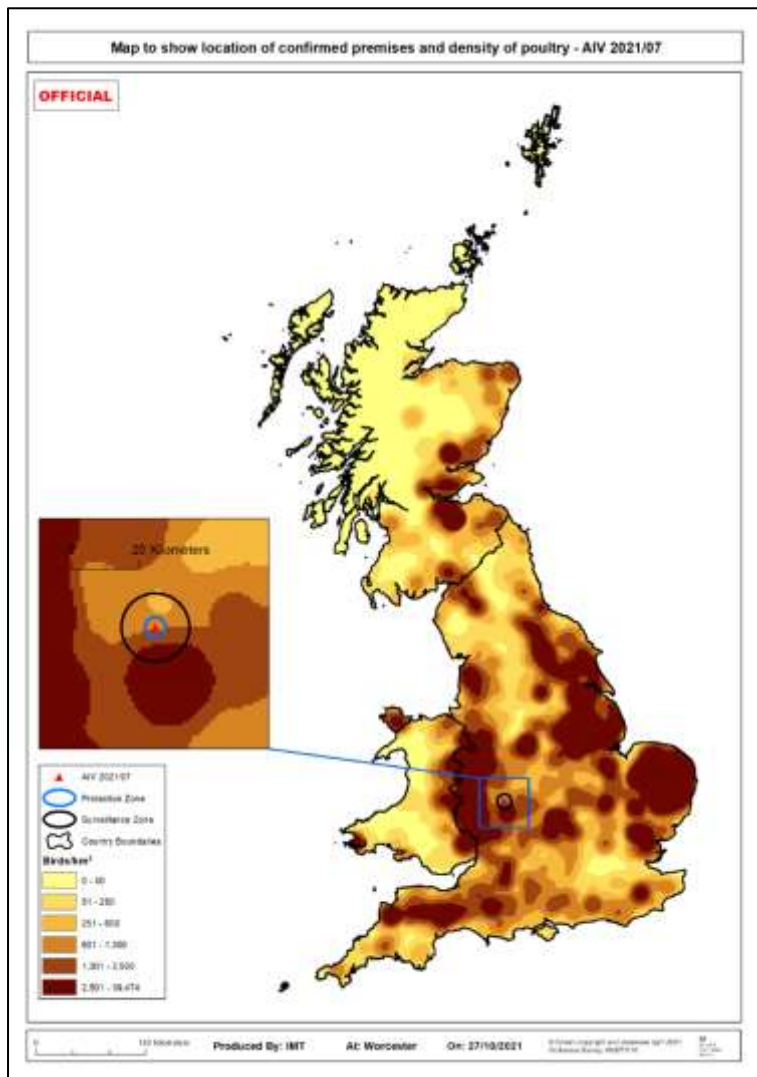
HPAI, could easily have transmitted it. Whilst netting was in place, some holes were observed, and beak-to-beak contact with wild birds was possible. It was also possible for indirect contact with wild birds via faecal contamination from above through the netting.

A foot-dip that was filled with a DEFRA approved disinfectant was in place, but was infrequently used. Ponds were emptied and cleaned regularly, but not disinfected. There was no bird-free period to allow for full C & D. No dedicated overalls or footwear was used for the different areas.

Last year, the IP suffered from a major rat infestation, which was reported to have been rectified by the time that disease was confirmed. Delivery vehicles did not enter the boundary of the IP.

Map with location in Great Britain and poultry density

Figure 28: Location of IP and poultry density



Overview of the surrounding area

The premises was adjacent to a motorway on its eastern boundary. There were a range of residential and commercial buildings next to the IP, but they were not agricultural. There were two ponds 150 metres away and a sewage works to the north. There were no contiguous poultry premises.

Ornithological assessment

Desktop assessment: This premises was not immediately associated with any landscape features suggestive of a substantial infection pressure from wild birds, lacking large permanent water bodies adjacent to the site, or locations likely to attract substantial aggregations of bridge species. There were aggregations of wildfowl relatively close to the premises (at more than 1.7 km) though these were restricted to larger waterbodies and there were not substantial collections of wild birds. However, it was likely that wildfowl and other waterbirds were present on

smaller ponds, or in rivers close to the site, though there appeared to be no reason or possibility for them to have encroached directly onto the premises. Bridge species would have been abundant and active in this landscape; this was in part a product of its proximity to some large gull roosts, as well as potential forage provided by a wet, low-lying, agricultural landscape with mixed land-uses in a peri-urban setting (i.e. gulls and corvids). There was a collection of fast-food restaurants within 250 metres of the site, and the premises was immediately adjacent to a motorway. Therefore, wild birds were considered to be a plausible source of infection pressure in addition to the direct introduction of sick wild birds.

Local intelligence: Wild birds were observed during the APHA investigation. Two large flocks of geese flew over and landed nearby to graze. The keeper reported that there were several visiting water birds including moorhens and herons on the nearby ponds. Buzzards were known to fly overhead and there was a family of pheasants living on site.

Clinical picture

23/10/2021 – six chickens died suddenly.

24/10/2021 – Suspicion of notifiable avian disease was reported. Chickens showed cyanotic combs and wattles, oedematous head, pyrexia and a nasal discharge. By the time of the APHA investigation, 13 more chickens had died. During the investigation two cygnets and one goose died, all showing signs consistent with HPAI.

A review of the mortality records showed that between 15/10/2021 and 23/10/2021 eight cygnets were brought from Hereford to the IP. They had neurological signs, malaise and green diarrhoea. All eight had died by 23/10/2021

Due to the number of ill birds moving onto the IP, it was difficult to be confident of the date of virus incursion; therefore, this IP has a longer than normal high-risk source window. The earliest date for source was 15/10/2021, but another date or a separate incursion could not be ruled out. As the cygnet was transported to the IP on 15/10/2021 and likely to be carrying infection at that point, this date was chosen as also being the beginning of the high-risk spread period.

Timeline

Tracings windows

Source tracings window:

High-risk: 15/10/2021 to 22/10/2021
 Likely: 09/10/2021 to 14/10/2021
 Precautionary: 03/10/2021 to 08/10/2021

Spread tracings window:

High-risk: 15/10/2021 to 24/10/2021
 Likely: 10/10/2021 to 14/10/2021
 Precautionary: 04/10/2021 to 09/10/2021

Most likely date of infection: 15/10/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 29: Source and spread timeline for AIV 2021/07

Source Tracing Window	Spread Tracing Window	Date	
Day 20		03/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		04/10/21	Start of precautionary spread tracing window (source + 24h).
Day 18		05/10/21	
Day 17		06/10/21	
Day 16		07/10/21	
Day 15		08/10/21	
Day 14		09/10/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	10/10/21	Start of likely spread tracing window for disease in chickens (source tracing window +24h).
Day 12	Day 2	11/10/21	
Day 11	Day 3	12/10/21	
Day 10	Day 4	13/10/21	
Day 9	Day 5	14/10/21	
Day 8	Day 6	15/10/21	Start of high-risk source and spread window. Most likely infection date for this outbreak.
Day 7	Day 7	16/10/21	
Day 6	Day 8	17/10/21	
Day 5	Day 9	18/10/21	
Day 4	Day 10	19/10/21	
Day 3	Day 11	20/10/21	
Day 2	Day 12	21/10/21	
Day 1	Day 13	22/10/21	
	Day 14	23/10/21	Onset of clinical signs and death of chickens. Three cygnets found dead
	Day 15	24/10/21	Notification of suspicion of disease to APHA. Report case initiated (DPR 2021/45). APHA investigation and sampling. Restrictions served.
	Day 16	25/10/21	
	Day 17	26/10/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-07. Culling completed.
	Day 18	27/10/21	Confirmed as HPAI. Preliminary C and D completed.
	Day 19	28/10/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

50 premises with poultry holding between 7-86 birds (1 premises with 50 or more birds)

SZ (3-10 km)

117 premises with poultry holding between 1-50,000 birds (19 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

There were three telephone source tracings to people who had bought in wild swans and cygnets in the high-risk window. In addition there were four telephone tracings to workers/volunteers, six to recipients of chicken table eggs, the private veterinary practice who had treated some sick birds and disposed of bird carcasses and a feed delivery. All were deemed very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct contact with infected rescued cygnets.

Assessment and evidence base for the likely source

Eight cygnets showing signs consistent with HPAI were moved onto the IP without being isolated. Biosecurity within the premises was poor and so there was a high likelihood that virus spread to the chickens. Incursion from wild birds flying over or congregating near the IP cannot be ruled out.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: The risk was not higher than the background risk.

All other spread pathways were assessed as being very low or negligible likelihood.

Remaining uncertainty

Uncertainty remains about the exact source.

AIV 2021/08, Near Wrexham, Wales

Description of the premises

Overview of the premises and the wider business

The premises was a large estate that ran a game shooting business. Pheasant poults were reared for release to the wild for shooting. There was also a backyard chicken enclosure on-site, producing eggs for home consumption.

Species and number of each present

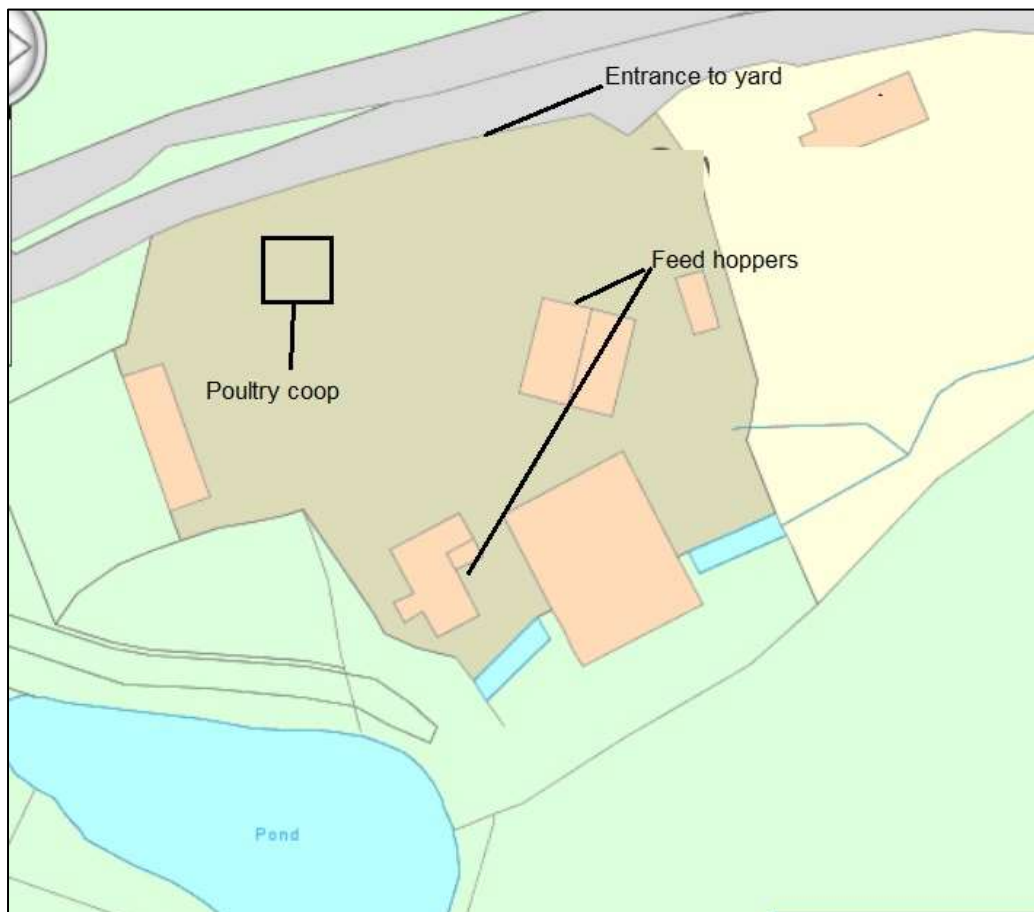
12 chickens.

Description of the housing

The birds were housed in a chicken coop at night, and ranged freely in a fenced area during the day. The coop and run were near the feed hopper, where the pheasant feed was stored, so there were many vehicle and people movements nearby.

Plan of the infected premises

Figure 30: Plan of AIV 2021/08

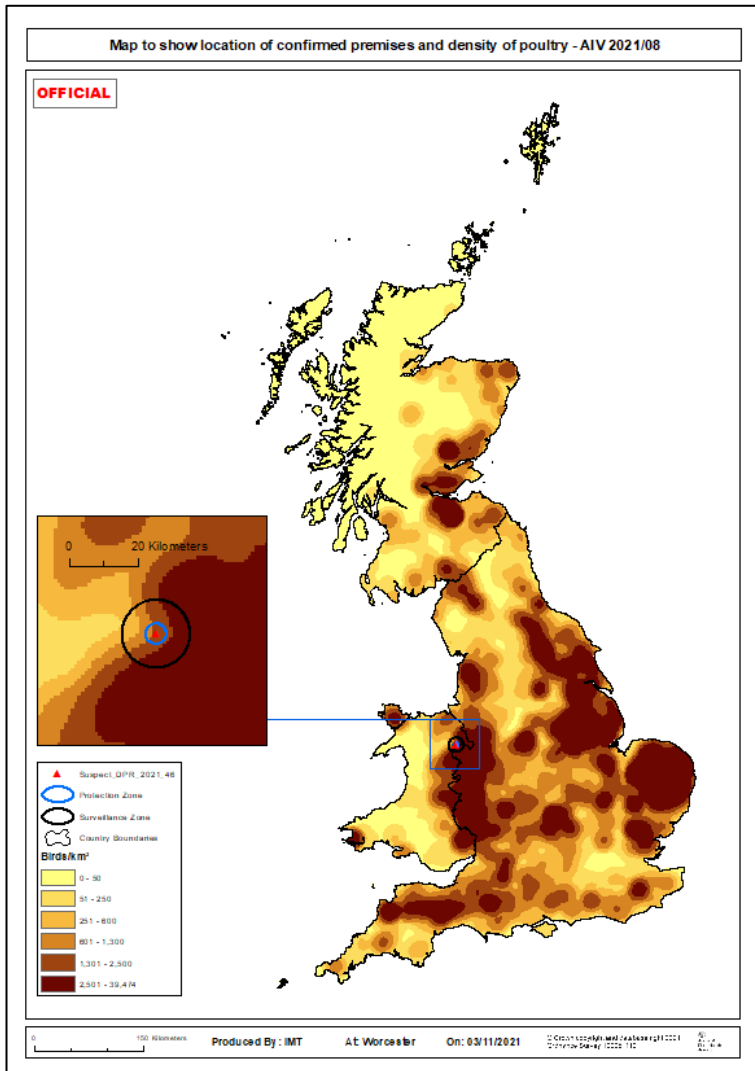


Overview of biosecurity

The coop and run were near a general storage area for feed, fuel and refrigerated carcasses for the estate so there were many vehicle and people movements nearby. The keeper responsible for the infected pheasants also tended to the chickens. No biosecurity measures were in place.

Map with location in Great Britain and poultry density

Figure 31: Location of IP and poultry density for AIV 2021/08



Overview of the surrounding area

Ornithological assessment:

Desktop ornithological assessment: While there were no substantial waterbodies likely to hold large groups of wildfowl, the premises was surrounded by a mix of habitats, including smaller water features, pasture, some semi natural habitats and many trees likely to suit many different types of bird. It lay within an extensive estate managed for gamebird shooting.

Wild passerines were likely to be relatively abundant here and may well also have been able to move directly between sources of infection (gamebird carcasses or infection at pheasant feeders) and the chickens. Visiting gamebirds may have provided both a direct source of infection if they had access to the site, or an indirect source of infection if dead or moribund birds were found near the site.

Local intelligence: Live pheasants had been observed in the yard where the chickens ranged.

Clinical picture

25/10/2021 – Dead pheasants were found near a pond on the estate.

30/10/2021 – The mortality rose to 200 pheasants and as well as deaths, the keeper reported seeing a small number of pheasants with neurological signs, lethargy, ataxia and opisthotonos.

29/10/2021 – Five of the 12 chickens died with no prior clinical signs and suspicion of disease was reported. A further 6 died overnight.

Timeline

Tracings windows

Source tracings window:

High-risk:	26/10/2021 to 28/10/2021
Likely:	15/10/2021 to 25/10/2021
Precautionary:	09/10/2021 to 14/10/2021

Spread tracings window:

High-risk:	27/10/2021 to 30/10/2021
Likely:	16/10/2021 to 26/10/2021
Precautionary:	10/10/2021 to 15/10/2021

Most likely date of infection: 26/10/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 32: Source and spread timeline for AIV 2021/08

Source Tracing Window	Spread Tracing Window	Date	
Day 21		08/10/21	
Day 20		09/10/21	Start of precautionary source tracing window (-21d from notification or suspicion to APHA) for disease in chickens.
Day 19		10/10/21	Start of precautionary spread tracing window (source + 24h) for disease in chickens.
Day 18		11/10/21	
Day 17		12/10/21	
Day 16		13/10/21	
Day 15		14/10/21	
Day 14		15/10/21	Start of likely source tracing window (-14d) for disease in chickens.
Day 13	Day 1	16/10/21	Start of likely spread tracing window (source tracing window +24h) for disease in chickens.
Day 12	Day 2	17/10/21	
Day 11	Day 3	18/10/21	
Day 10	Day 4	19/10/21	Most likely date of infection in wild pheasants.
Day 9	Day 5	20/10/21	
Day 8	Day 6	21/10/21	
Day 7	Day 7	22/10/21	Precautionary onset of clinical signs in wild pheasants based on 3-5 day old carcasses found on 27/10/21. N.B. considerable uncertainty.
Day 6	Day 8	23/10/21	
Day 5	Day 9	24/10/21	
Day 4	Day 10	25/10/21	First dead wild pheasants found.
Day 3	Day 11	26/10/21	Start of high risk source tracing window for disease in chickens (-3d). Increasing mortality in wild pheasants. APHA notified of wild pheasant mortalities. Most likely date of infection in domestic chickens.
Day 2	Day 12	27/10/21	Start of high risk spread tracing window for disease in chickens (source +24h). Further wild pheasants found dead, many carcasses were estimated to be 3-5 days old). N.B. considerable uncertainty. 5 pheasant carcasses submitted under wild bird survey.
Day 1	Day 13	28/10/21	Further dead wild pheasants found.
	Day 14	29/10/21	Further dead wild pheasants found. 5 chickens died suddenly. Precautionary onset of clinical signs in chickens.
	Day 15	30/10/21	Notification of suspicion of disease to APHA during epi investigation following detection of H5N1 in wild pheasant carcasses. Deaths of chickens on 29/10/21 reported. APHA report case investigation and sampling (DPR 2021/46). Restrictions served.
	Day 16	31/10/21	
	Day 17	01/11/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021/08.
	Day 18	02/11/21	HPAI H5N1 confirmed by CVO Preliminary C&D completed.
	Day 19	03/11/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

53 premises with poultry holding between 1-92 birds (3 premises with 50 or more birds).

SZ (3-10 km)

47 premises with poultry holding between 2-219,120 birds (10 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

The only tracings identified were of eggs for private consumption, which have been destroyed and movements of the game keeper between the infected pheasants and chickens.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild pheasants.

Assessment and evidence base for the likely source

The chickens had direct contact with infected wild pheasant carcasses on 27/10/2021, when these were gathered for sampling in the yard where the chickens ranged. The chickens were tended by the gamekeeper looking after infected pheasants. No biosecurity measures were taken so indirect contact is also likely.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/09, In the Angus constituency, Scotland

Description of the premises

Overview of the premises and the wider business

This was a non-commercial flock with a total of 48 birds of 3 species.

Species and number of each present

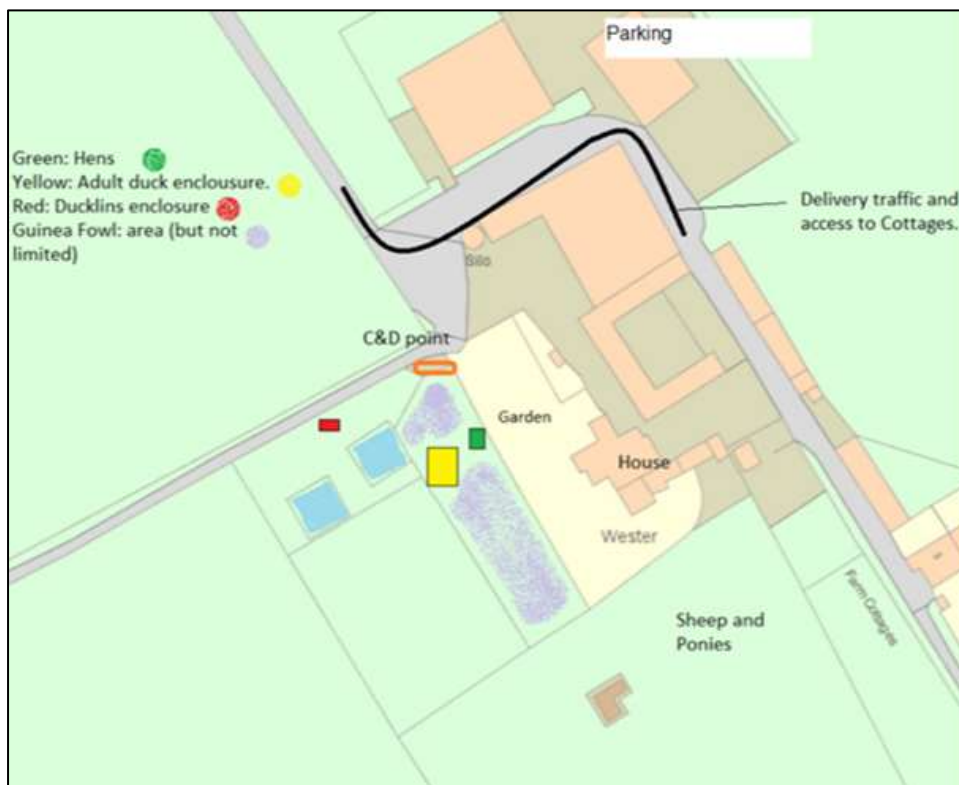
20 guinea fowl, 16 chickens and 12 ducks.

Description of the housing

Each species had separate overnight housing, but shared an outside area during the day which allowed wild bird access.

Plan of the infected premises

Figure 33: Plan of AIV 2021/09

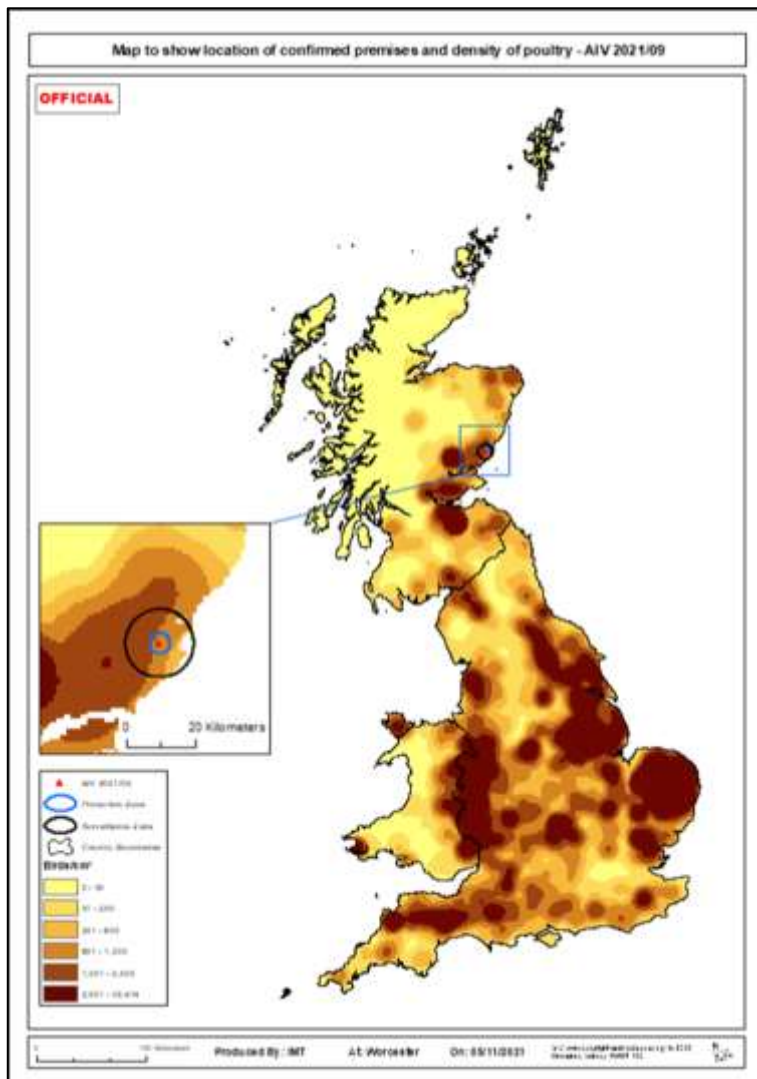


Overview of biosecurity

There were no biosecurity measures in place.

Map with location in Great Britain and poultry density

Figure 34: Location of AIV 2021/09 and poultry density



Overview of the surrounding area

The IP was surrounded by farmland in an area of low poultry density and was approximately 6 km from the seas and 8 km southwest of a site that supported many migrating and resident waterfowl. Geese had been seen on the fields around the area recently.

Two pig farms were within the 3 km Restriction Zone, and a third one was 4 km away. Two were outdoor weaner breeder farms and the third was an indoor finishing unit.

Ornithological assessment:

Desktop ornithological assessment: Not conducted.

Local intelligence: The IP was approximately 6 km from the sea on the east coast and 8 km southwest of a site that supported many migrating and resident waterfowl. Geese had been seen on the fields around the area recently. The mallard ducks flew away from the site for a few days before returning, and these were considered to be the likely source of introduction of infection

Clinical picture

30/10/2021 – One hen was found dead.

01/11/2021 – Suspicion of avian notifiable disease was reported following the deaths of four more hens and two guinea fowl, and samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	27/10/2021 to 29/10/2021
Likely:	16/10/2021 to 26/10/2021
Precautionary:	11/10/2021 to 15/10/2021

Spread tracings window:

High-risk:	28/10/2021 to 01/11/2021
Likely:	17/10/2021 to 27/10/2021
Precautionary:	12/10/2021 to 16/10/2021

Most likely date of infection: 27/10/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 35: Source and spread timeline for AIV 2021/09

Source Tracing Window	Spread Tracing Window	Date	
Day 19		11/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		12/10/21	Start of precautionary spread tracing window (source + 24h).
Day 17		13/10/21	
Day 16		14/10/21	
Day 15		15/10/21	
Day 14		16/10/21	Start of likely source tracing window (-14d).
Day 13	Day 1	17/10/21	Start of likely spread tracing window (source tracing window (source +24h).
Day 12	Day 2	18/10/21	
Day 11	Day 3	19/10/21	
Day 10	Day 4	20/10/21	Nine domestic mallard ducks flew away
Day 9	Day 5	21/10/21	
Day 8	Day 6	22/10/21	
Day 7	Day 7	23/10/21	
Day 6	Day 8	24/10/21	Return of nine mallard ducks that had flown away a few days previously. (Exact date not known.) Likely introduction of virus event to the holding.
Day 5	Day 9	25/10/21	
Day 4	Day 10	26/10/21	
Day 3	Day 11	27/10/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak based on clinical signs in Galiformes
Day 2	Day 12	28/10/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	29/10/21	
	Day 14	30/10/21	Initial mortality noted in hens and guinea Fowl. Precautionary onset of clinical signs.
	Day 15	31/10/21	
	Day 16	01/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/47). Samples taken from Hens/Guinea Fowl and Ducks. Restrictions served.
	Day 17	02/11/21	
	Day 18	03/11/21	Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-09. All birds were PCR positive (high CT value) but sero negative. Culling commenced and completed. Preliminary C and D completed.
	Day 19	04/11/21	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

14 premises with poultry holding between 2-246 birds (2 premises with 50 or more birds)

SZ (3-10 km)

11 premises with poultry holding between 3-136,500 birds (4 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct and indirect contact with wild birds.

Assessment and evidence base for the likely source

In the flock's normal ranging area there was no means of excluding wild birds so they could mix freely with the kept birds. No routine biosecurity was practiced.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/10, Near Alcester, Bidford, Warwickshire, England

Description of the premises

Overview of the premises and the wider business

The premises held a small pedigree suckler herd, fattening turkeys for the Christmas market and chickens kept for personal egg consumption. There was a small sheep flock, two pigs and two horses.

Species and number of each present

31 turkeys and 19 chickens.

60 cattle, 18 sheep, 2 horses and 2 pigs.

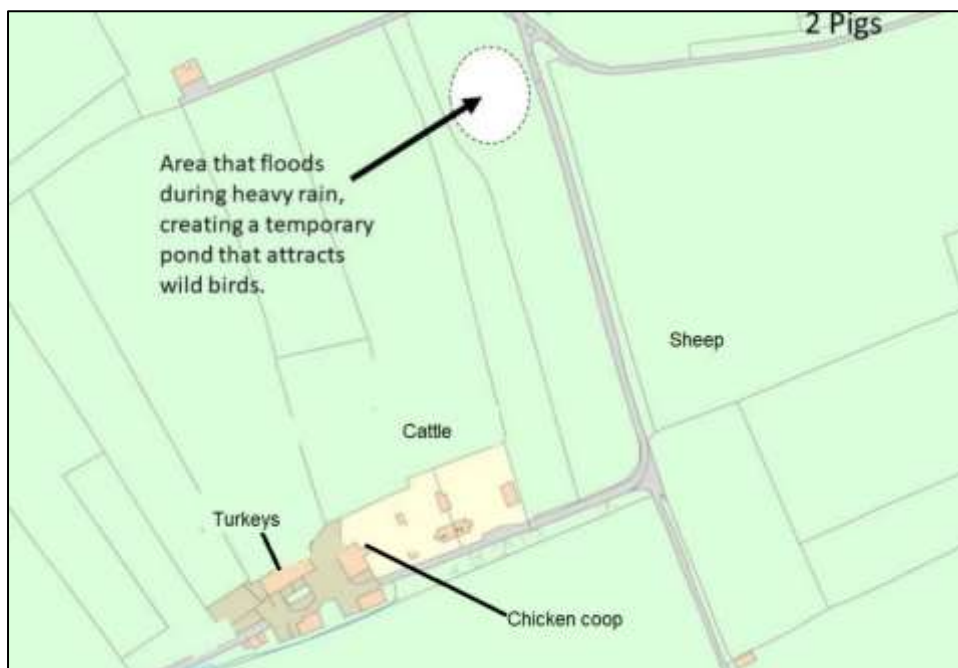
Description of the housing

The turkeys were housed in a pen of metal grids and a gate, located in a corner of a large barn. The barn also contained a separate feed room and overnight stabling for the horses. The turkeys were not allowed to free range; however, the barn was open at the front allowing wild bird access to the turkeys' housing, food and water.

The chicken coop was about 20 m from the barn and the chickens had been free ranging until 03/11/2021 when housing restrictions came into force.

Plan of the infected premises

Figure 36: Plan of AIV 2021/10

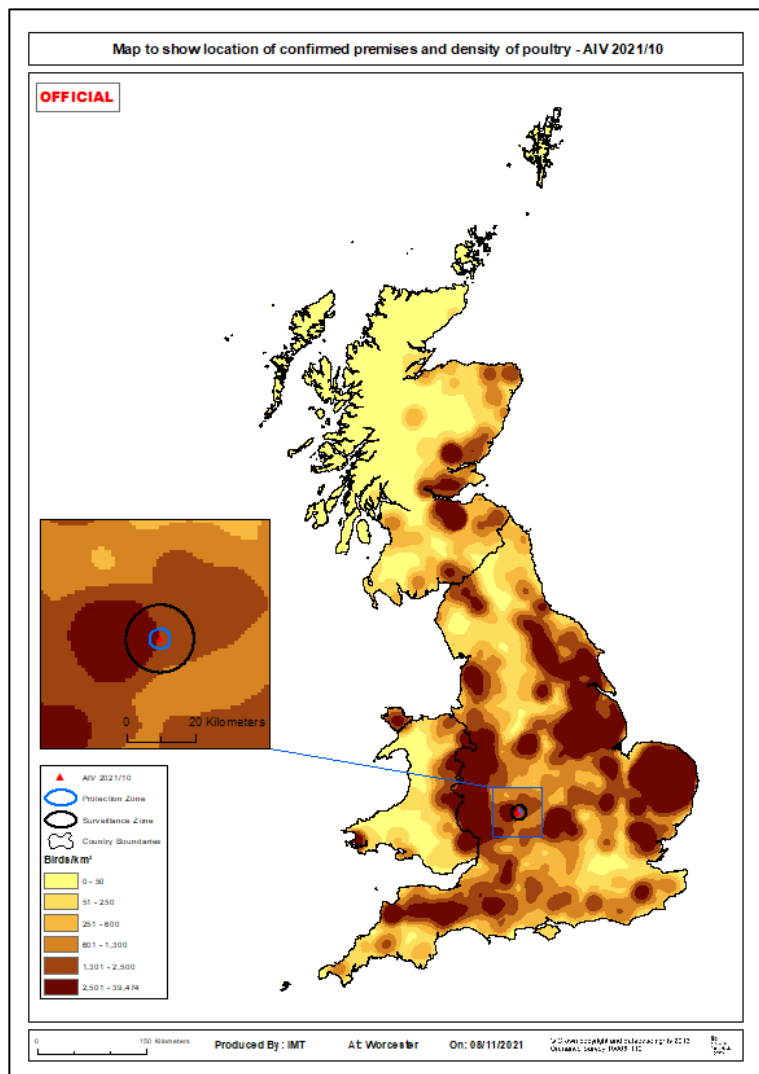


Overview of biosecurity

When the housing restrictions came into force on 03/11/2021, the owner housed the chickens and put disinfectant foot baths at the entrance of the turkey and chicken sheds. Prior to this the chickens had been free ranging.

Map with location in Great Britain and poultry density

Figure 37: Location of AIV 2021/10 and poultry density



Overview of the surrounding area

The IP was set in a lowland landscape dominated by a large river and numerous pools and lakes. There was a mix of land use including pasture, arable crops and an aerodrome, all of which may have encouraged a range of relevant wild species to forage in the area.

Ornithological assessment:

Desktop ornithological assessment: An assessment was carried out for this IP indicating that a number of waterbodies nearby were large enough to attract wild

birds. These were also close enough to the premises to encourage wildfowl to graze agricultural land directly contaminating the farm.

Local intelligence: The farm was situated less than a mile from the river Avon, where HPAI H5N1 had been confirmed in wild birds. There was a ditch running alongside the farm that filled with water when it rained. One of the fields also filled with water during heavy rain, creating a pond, and this attracted ducks and other wild birds.

Thousands of pheasants had been released for shoots and were roaming in the area.

Clinical picture

02/11/2021 – One turkey was found dead, followed by a further two the following day. Some had shown neurological signs and all were starting to show lethargy and reduced food and water intake.

04/11/2021 – Two more turkeys died and suspicion of disease was reported. This report was initially negated, as the chickens were healthy; however, suspicion was reported again following post-mortem sampling on 05/11/2021.

05/11/2021 – At the official APHA investigation, a further 21 turkeys had died and one of the remaining five was showing neurological signs and the others were lethargic. Three of these died overnight.

07/11/2021 – H5N1 HPAI was confirmed in the turkeys and the 19 chickens all remained healthy. The chickens were PCR negative for HPAI, but did have a low seropositivity that was considered due to a previous LPAI exposure. The pigs were tested for HPAI with negative results.

Tracings windows

Source tracings window:

High-risk:	30/10/2021 to 01/11/2021
Likely:	19/10/2021 to 29/10/2021
Precautionary:	14/10/2021 to 18/10/2021

Spread tracings window:

High-risk:	31/10/2021 to 05/11/2021
Likely:	20/10/2021 to 30/10/2021
Precautionary:	15/10/2021 to 19/10/2021

Most likely date of infection: 30/10/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 38: Source and spread timeline for AIV 2021/10

Source Tracing Window	Spread Tracing Window	Date	
Day 19		14/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		15/10/21	Start of precautionary spread tracing window (source + 24h).
Day 17		16/10/21	
Day 16		17/10/21	
Day 15		18/10/21	
Day 14		19/10/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	20/10/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	21/10/21	
Day 11	Day 3	22/10/21	
Day 10	Day 4	23/10/21	
Day 9	Day 5	24/10/21	
Day 8	Day 6	25/10/21	
Day 7	Day 7	26/10/21	
Day 6	Day 8	27/10/21	
Day 5	Day 9	28/10/21	
Day 4	Day 10	29/10/21	
Day 3	Day 11	30/10/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	31/10/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	01/11/21	
	Day 14	02/11/21	Precautionary onset of clinical signs - first turkey death in the evening.
	Day 15	03/11/21	Chickens housed following declaration of AIPZ.
	Day 16	04/11/21	
	Day 17	05/11/21	APHA investigation and sampling (DPR 2021/50). Restrictions served.
	Day 18	06/11/21	
	Day 19	07/11/21	H5N1 confirmed (AIV 2021/10). Culling completed. Preliminary C&D completed.
	Day 20	08/11/21	Preliminary C&D considered effective. Pathogenicity confirmed as HPAI H5N1.
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

75 premises with poultry holding between 1-17,513 birds (3 premises with 50 or more birds).

SZ (3-10 km)

86 premises with poultry holding between 1-210,000 birds (16 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct and/or indirect contact with wild birds.

Assessment and evidence base for the likely source

The ornithological assessment supported an infection pressure from wild birds. Heavy rain during the source tracing window filled the ditch running alongside the

farm and created a pond in a nearby field. This attracted wildfowl even closer to the farm. Pheasants, released for shoots nearby, were also abundant.

All other investigations related to other possible sources of infection concluded a very low or negligible likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk was not higher than the background risk.

All other spread pathways were assessed as being very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty

AIV 2021/11, Near Frinton-on-Sea, Tendring, Essex, England

Description of the premises

Overview of the premises and the wider business

This was a non-commercial flock, with several poultry species and part of a small animal rescue centre. No eggs or other products were sold.

Species and number of each present

14 guinea fowl, 20 chickens, 10 geese.

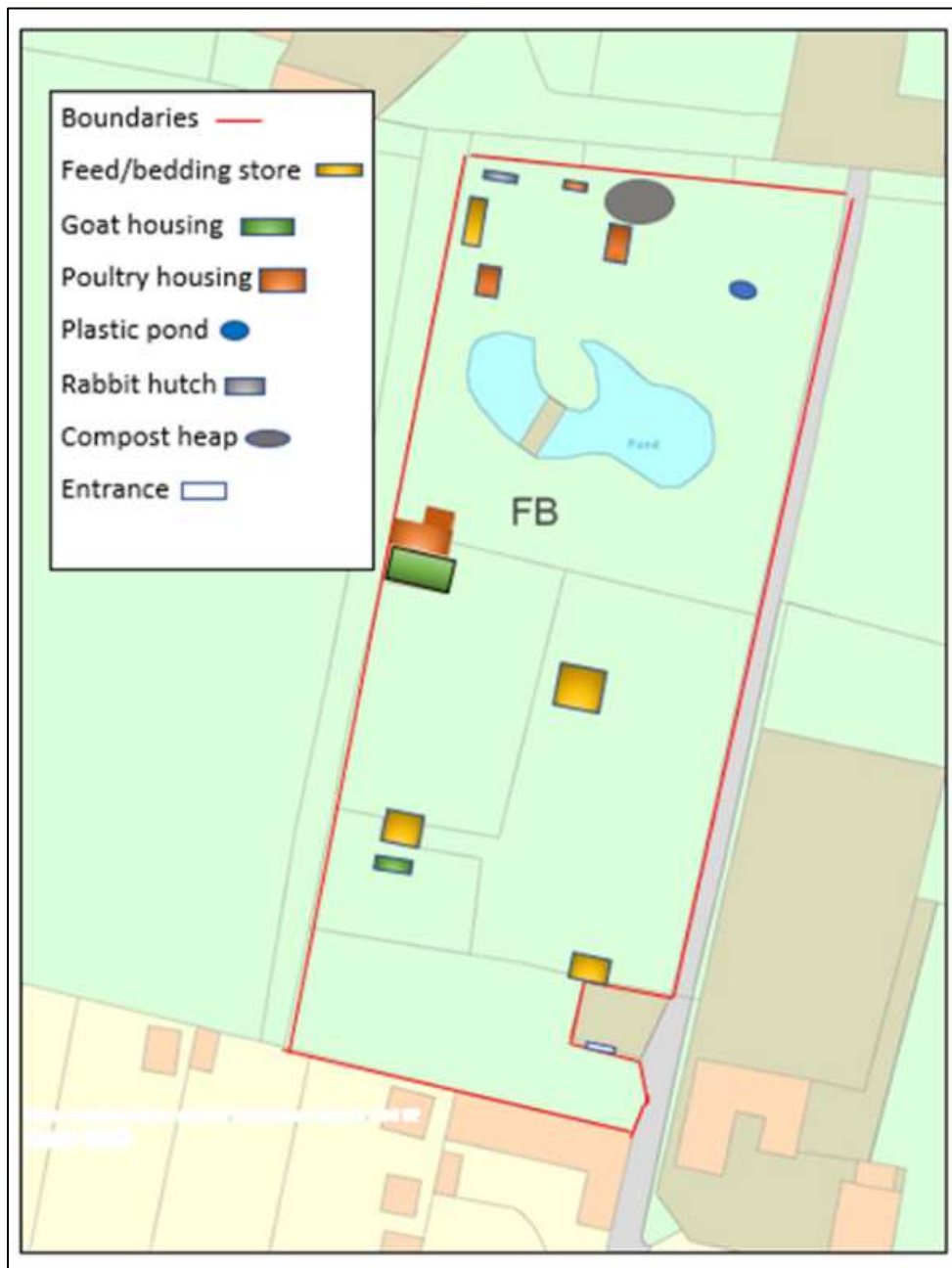
3 goats, 1 guinea pig, 1 rabbit

Description of the housing

There were three wooden poultry hutches, one rabbit hutch and two goats' sheds, located on a parcel of land that measured 8000 m² and included ponds. Poultry feed, water and accommodation were accessible by wild birds.

Plan of the infected premises

Figure 39: Plan of AIV 2021/11



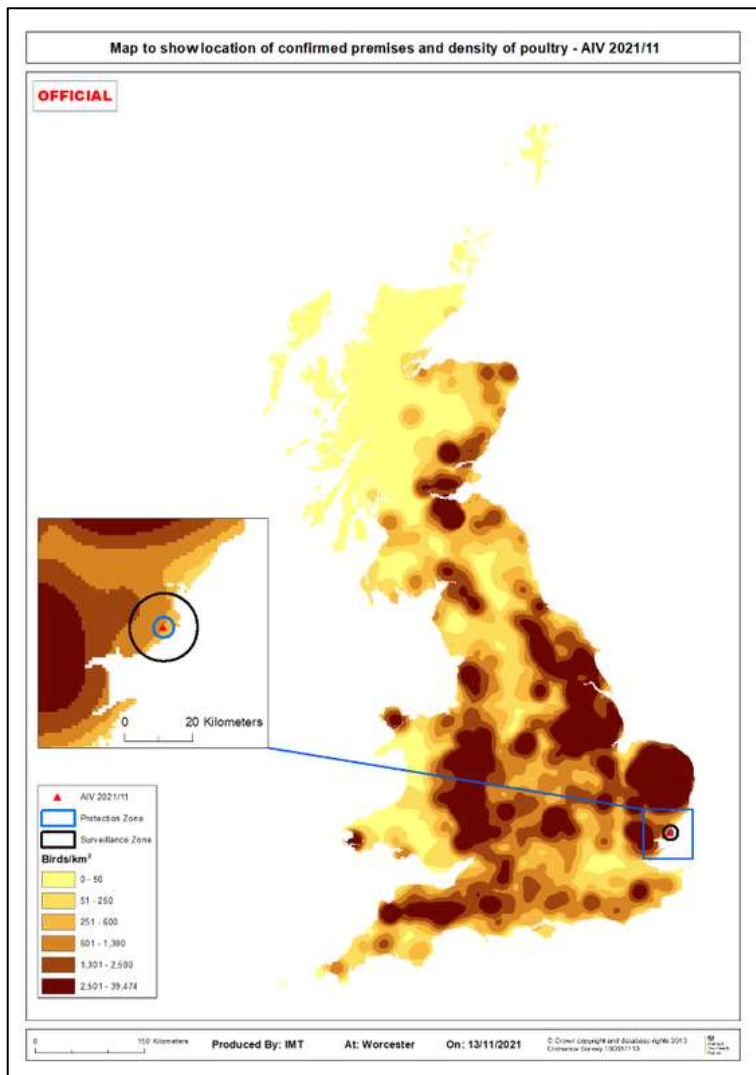
Overview of biosecurity

There were no biosecurity measures in place, and no written protocols existed.

Eight volunteers from the local community visited the sanctuary on a weekly basis to look after the animals.

Map with location in Great Britain and poultry density

Figure 40: Location of IP and poultry density.



Overview of the surrounding area

The infected premises was situated at the back of dwelling houses.

The sanctuary's pond was a natural habitat for wild ducks that had made nests by the pond and spent all day with the resident poultry. They had access to their feed, water and accommodation, offering many opportunities for direct and indirect contact. Approximately 24 wild mallard ducks were seen on the day of the investigation.

The IP was in an area of medium-low poultry density

Ornithological assessment:

Desktop ornithological assessment: An assessment indicated that wild birds represented an "obvious substantial source of infection pressure".

Local intelligence: Wild waterfowl were present semi-permanently on site, centred around the large pond and mingled with the resident birds, sharing food and nesting in pens.

Clinical picture

31/10/2021 – First death in a guinea fowl.

03/11/2021 – One chicken died.

04/11/2021 – One chicken and one goose died.

5/11/2021 – A further chicken and goose died

7/11/2021 – Two chickens died and nine guinea fowl were assumed to have died during this period, but no carcasses were located.

9/11/2021 – Suspicion of avian notifiable disease was reported and at the APHA veterinary inquiry, a male goose was seen to be lethargic and anorexic with head tremor, torticollis and incoordination. No respiratory signs.

One chicken was lethargic with diarrhoea. One was dead and had cyanotic comb and wattles and one could not be located.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/10/2021 to 30/10/2021
Likely:	07/10/2021 to 27/10/2021
Precautionary:	Within likely risk window due to late notification of suspicion

Spread tracings window:

High-risk:	29/10/2021 to 09/11/2021
Likely:	18/10/2021 to 28/10/2021
Precautionary:	Within likely risk window due to late notification of suspicion

Most likely date of infection: 28/10/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 41: Source and spread timeline for AIV 2021/11

Source Tracing Window	Spread Tracing Window	Date	
Day 14		17/10/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/10/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	19/10/21	Precautionary source tracing window (-21d from notification of suspicion to APHA)
Day 11	Day 3	20/10/21	Precautionary spread tracing window (source tracing window +24h).
Day 10	Day 4	21/10/21	
Day 9	Day 5	22/10/21	
Day 8	Day 6	23/10/21	
Day 7	Day 7	24/10/21	
Day 6	Day 8	25/10/21	
Day 5	Day 9	26/10/21	
Day 4	Day 10	27/10/21	
Day 3	Day 11	28/10/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak. One chicken sample taken 9/11/21 positive for H5 antibodies consistent with this date.
Day 2	Day 12	29/10/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/10/21	
	Day 14	31/10/21	Precautionary onset of clinical signs. Death of first guineafowl
	Day 15	01/11/21	
	Day 16	02/11/21	
	Day 17	03/11/21	Death of one chicken
	Day 18	04/11/21	
	Day 19	05/11/21	Death of goose & one chicken
	Day 20	06/11/21	Death of goose & one chicken
	Day 21	07/11/21	Death of one chicken
	Day 22	08/11/21	
	Day 23	09/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/51). Restrictions served.
	Day 24	10/11/21	
	Day 25	11/11/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-11. VFEI Investigation.
	Day 26	12/11/21	Culling completed. Preliminary C&D completed. High Path AI confirmed by CVO.
	Day 27	13/11/21	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

38 premises with poultry holding between 1-140 birds (2 premises with 50 or more birds).

SZ (3-10 km)

98 premises with poultry holding between 1-90,000 birds (10 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Wild waterfowl lived semi-permanently on site, centred around the large pond.

Biosecurity was poor and the resident birds mingled with wild waterfowl, sharing food and nesting in pens.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk was considered to be not higher than the background risk.

All other spread pathways assessed as being very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty,

AIV 2021/12, Near Salwick, Fylde, Lancashire, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a commercial mixed family run stock farm located in the northwest of England.

Species and number of each present

244 cattle (mainly dairy), 350 sheep and 1400 turkeys that were kept for the Christmas market.

Description of the housing

The birds were housed in two straw-bedded sheep sheds, each containing 700 birds. The sheds were old steel frame construction, with Yorkshire boarding, wooden clad walls and a solid steel sheeted entrance gate. Above the gate there was a gap to the roof, which was constructed of corrugated cement fibre board that was partially covered in moss.

House 1 (initially affected) and House 2 were next to each other with a small gap between them.

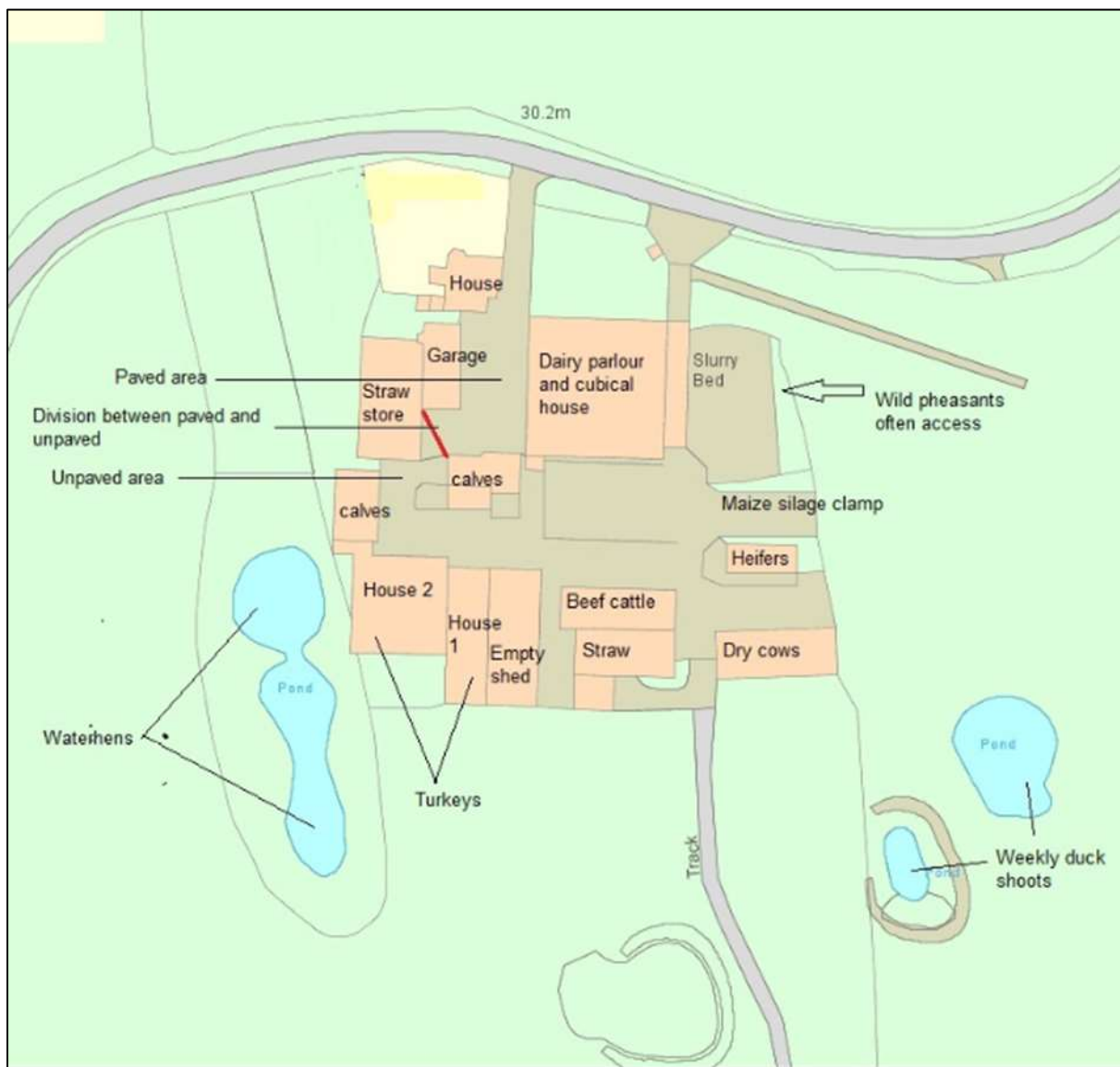
The gutters were found to be full of debris, and pooling of water was present.

Each shed had separate feed hoppers, two per shed that were filled from a feed delivery truck that reversed from the road to both turkey sheds, driving through the main farmyard. They connected to the pipes on the outside of the shed and blew the feed into the gravity fed hoppers.

Natural ventilation occurred via the open front, as well as by gaps in the Yorkshire boarding, and as a result wild bird access was highly likely.

Plan of the infected premises

Figure 42: Plan of AIV 2021/12



Overview of biosecurity

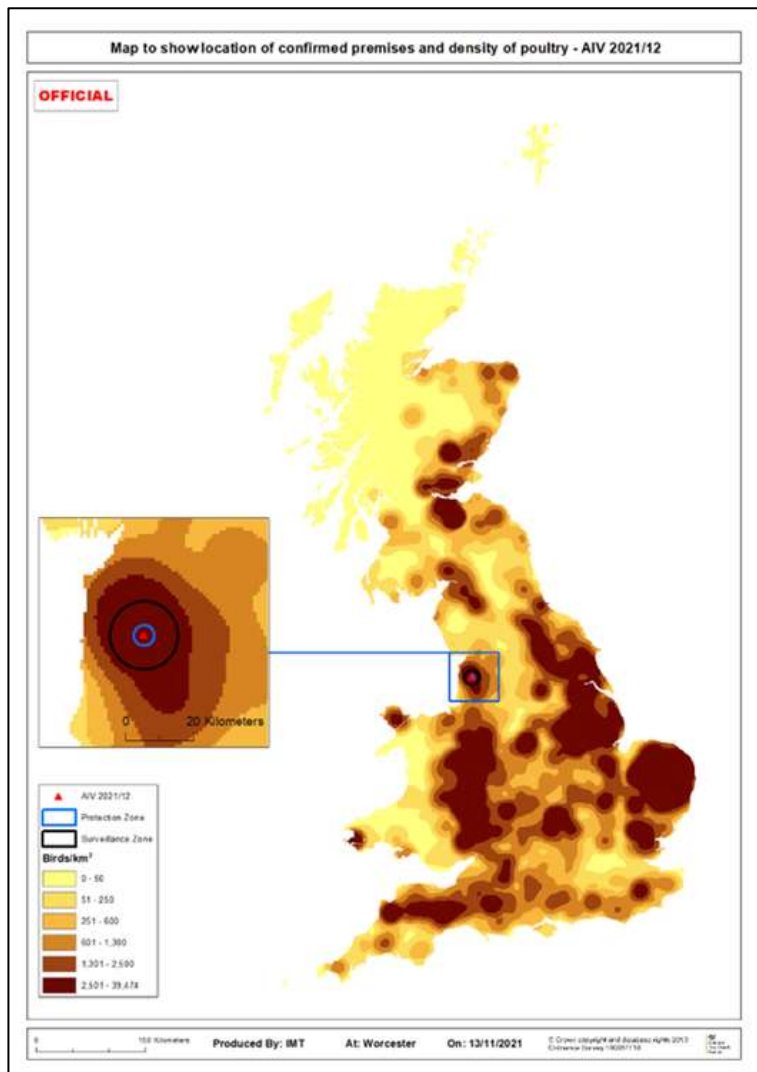
Biosecurity was poor, with only the use of foot dips, and no dedicated clothing. The sheds were open-fronted, and along with the Yorkshire boarding would allow the ingress of wild birds and vermin. There was no controlled access to the farm and no records of visitors were kept, nor were there any standard operating procedures (SOPs) that detailed the biosecurity measures required.

The entrance to the farm was open from the roadside and allowed access into the dairy parlour and cattle housing. From there visitors had to drive through the farm to arrive at the front of the turkey houses-(Figure 1)

The area in front of the dairy parlour was paved; however, the paved area did not extend to the turkey sheds where the surroundings were muddy.

Map with location in Great Britain and poultry density

Figure 43: Location of AIV 2021/12



Overview of the surrounding area

The farm was located in a landscape pock-marked with ponds, and was situated southeast of the river Wyre, east of the Lancaster Canal and north of the river Ribble. Immediately surrounding the farm steading were several ponds where waterfowl were known to congregate and on which organised duck shoots occurred on a weekly basis. The area was susceptible to flooding, given the proximity to the Lancaster canal and at the time of the investigation the surrounding land was waterlogged.

As detailed in Figure 2, this was a high-density poultry area.

Ornithological assessment:

Desktop ornithological assessment: This coastal IP was close to a major wetland site hosting a significant number of waterbirds. It was also set within a wider landscape, supporting substantial populations of species, which might either act as a source of

infection or constitute a risk pathway of infection directly onto the site. Of significance here were extensive estuarine and saltmarsh habitats associated with the river Ribble, the unusual number of small ponds scattered across this largely wet pastoral landscape, and the likelihood that here, all groups of waterbirds would move between the two habitats.

Wildfowl were abundant. The species present, including substantial populations of migrants of Eurasian origin may have produced a potential introduction site for AIV, as well as one where infection may have been amplified to act as a source of infection in the landscape. Furthermore, the mixing of migrant birds with abundant populations of resident species, most likely to exploit the pools and pasture around the IP represented a potential source of infection pressure. Here wildfowl were unlikely to be responsible for direct infection pathways but may have promoted indirect pathways.

Waders and other waterbirds were likely to be abundant in this landscape and unusually may have provided a more significant source of infection pressure here than elsewhere, with some likely to move from the estuarine and saltmarsh habitats directly onto fields around the IP.

Gulls were abundant in this landscape and corvids were likely to be common. Both groups of bridge species produced additional likely infection risk pathways onto the IP, with gulls perhaps producing the greatest threat where they might scavenge carcasses on the coast or at sea.

Wild passerines might have supported an indirect infection pathway from water birds, acquiring infection at any one of the many small ponds close to the IP. However, this risk seemed less likely than others suggested here.

Local intelligence: Wild birds were seen around the farm, pheasants, corvids, and water birds; given the structure of the shed, direct access was possible.

Clinical picture

On Tuesday 09/11/2021, the farmer found one dead turkey in House 1. On Wednesday 10/11/2021 an additional 10 dead turkeys were found in the morning, and over the night of the 10/11/2021 to 11/11/2021 a further 34 birds died. In addition, the whole flock in House 1 appeared depressed and water intake was reduced by 50% , whilst feed intake appeared to be reduced by at least 50%.

The private veterinary surgeon (PVS) was called by the owner on the morning of 11/11/2021. Post-mortem examination (PME) by the PVS disclosed mild cyanotic combs, moderate splenomegaly with white pin prick foci, severe pneumonia, pale livers, mild to moderate haemorrhages in the caecal tonsils and all birds examined had food in their crops as well as litter. After clinical inspection and PME, the PVS was unable to rule out notifiable avian disease (NAD) and reported the case to APHA. House 2 at the time of the report was unaffected

During the APHA disease investigation, at 15:00 the same day, the birds in House 1 were noticeably quiet, depressed, recumbent and none were observed eating or drinking.

Clinical examination of 20 birds revealed temperatures of more than 40.6 °C with up to 43 °C commonly seen. Birds were uncoordinated, heads flopping to the floor and twisting back (torticollis). Some birds were flapping violently, gasping, falling over and dying during examination.

No oedema of the head or nasal discharges were noted, however, some showed mild cyanosis of the head. One bird was noted to have a bloody discharge from the mouth shortly after death.

Disease could not be ruled out and samples were taken and submitted for testing from House 1.

By the time of the veterinary epidemiological investigation, on 13/11/2021, disease had progressed rapidly in House 1, and only 17 birds remained alive.

Timeline

Tracings windows

Source tracings window:

High-risk:	06/11/2021 to 08/11/2021
Likely:	26/10/2021 to 05/11/2021
Precautionary:	21/10/2021 to 25/10/2021

Spread tracings window:

High-risk:	07/11/2021 to 11/11/2021
Likely:	27/10/2021 to 06/11/2021
Precautionary:	22/10/2021 to 26/10/2021

Most likely date of infection: 06/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 44: Timeline for AIV 2021/12

Source Tracing Window	Spread Tracing Window	Date	
Day 19		21/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		22/10/21	Start of precautionary spread tracing window (source + 24h).
Day 17		23/10/21	
Day 16		24/10/21	
Day 15		25/10/21	
Day 14		26/10/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	27/10/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	28/10/21	
Day 11	Day 3	29/10/21	
Day 10	Day 4	30/10/21	
Day 9	Day 5	31/10/21	
Day 8	Day 6	01/11/21	
Day 7	Day 7	02/11/21	
Day 6	Day 8	03/11/21	
Day 5	Day 9	04/11/21	
Day 4	Day 10	05/11/21	
Day 3	Day 11	06/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	07/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	08/11/21	
	Day 14	09/11/21	Precautionary onset of clinical signs. 1 turkeys found dead
	Day 15	10/11/21	Further 10 turkeys found dead
	Day 16	11/11/21	Further 50 birds dead. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/53). Restrictions served.
	Day 17	12/11/21	Approx 80 -100 more died overnight. CVO confirmed H5N1 reference no AIV2021/12. Pathogenicity to follow.
	Day 18	13/11/21	Only 17 birds alive in Shed 1 at time of Veterinary Field Epidemiological Investigation. 6 -8 deaths in shed 2 and a decrease in water intake noted
	Day 19	14/11/21	Cleavage site sequence denotes HPAI. CVO confirmed case AIV 2021 / 12 as HPAI H5N1. Culling completed. Preliminary C and D completed.
	Day 20	15/11/21	
	Day 21	16/11/21	
	Day 22	17/11/21	Repeat of preliminary C and D due to failure to C and D Matbro bucket that was used to store dead stock.
	Day 23	18/11/21	Preliminary C and D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

56 premises with poultry holding between 1-16,000 birds (13 premises with 50 or more birds).

SZ (3-10 km)

198 premises with poultry holding between 1-300,000 birds (45 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct and/or indirect contact with wild birds.

Assessment and evidence base for the likely source

This assessment was based on the following key pieces of evidence:

Direct contact with wild birds: buildings were not bio-secure and were easily accessible to wild birds. Food was available and easily accessible which would have encouraged wild bird access.

Indirect contact with wild birds: biosecurity on site was poor and there was evidence of active vermin activity.

Spread investigations: Assessment of potential and likelihood of spread

Spread tracings were identified and prioritised on a risk basis as follows:

A relief milker, who also worked on another turkey farm, was identified and had contact in the high-risk spread and source windows. Tracing inquiries confirmed that there was no evidence of disease spread by this route.

Risk of transmission from the IP, through wild birds to other poultry premises will be no higher than the background risk from wild birds.

Remaining uncertainty

There is no remaining uncertainty.

AIV 2021/13, Near Leeming Bar, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

This was an independent commercial free range egg producer. The premises comprised two sites (West and East). The poultry buildings were separated by approximately 500 metres, but the boundaries of the outdoor ranges were closer together.

There were two long barns at each farm and within each barn (split down the middle) there were two houses with approximately 16,000 birds in each.

The birds had been placed at 16 weeks of age and at the time of the disease report were 52 weeks old. Depopulation at end of lay would normally have occurred when the birds were around 76 weeks of age.

Eggs were collected three times a week and transported to a packing centre in Lincoln.

Species and number of each present

128,000 laying hens. There were no other livestock or other enterprises on the site.

Description of the housing

The East farm comprised houses 1,2,3 and 4 and the West farm had houses 5, 6, 7 and 8. Both sites were constructed in 2017 and they were in a very good state of repair. There were no roof leaks or structural damage and they were secure against the ingress of wild birds.

Each house was divided into four pens with approximately 4,000 birds per pen.

Houses within the same barn shared a common airspace due to the egg belt running from the end of the barn to the entrance of the opposite shed where egg packing took place. Individual pens were divided by metallic mesh, but hens had direct contact with hens in adjoining pens and were able to jump over gates into the central corridor or between pens.

Each house had an outdoor range area, but these were not completely enclosed and birds could on occasion move between ranges and thus enter other sheds. Foxes were known to move between the ranges on the site.

There was a communal reception area at the entrance of each barn. One area was shared between houses 7 and 8 and another area was shared between houses 5 and 6 where the egg packing area was located. There was an egg conveyor system that ran between barns to the egg packing area.

The sheds were mucked out every four days with the manure being transported through a conveyor into an elevator and then onto a trailer which transported it to be

spread on arable land. This operation was carried out by the farm staff with no use of external contractors.

Plan of the infected premises

Figure 45: Plan of AIV 2021/13 showing relationship of the units

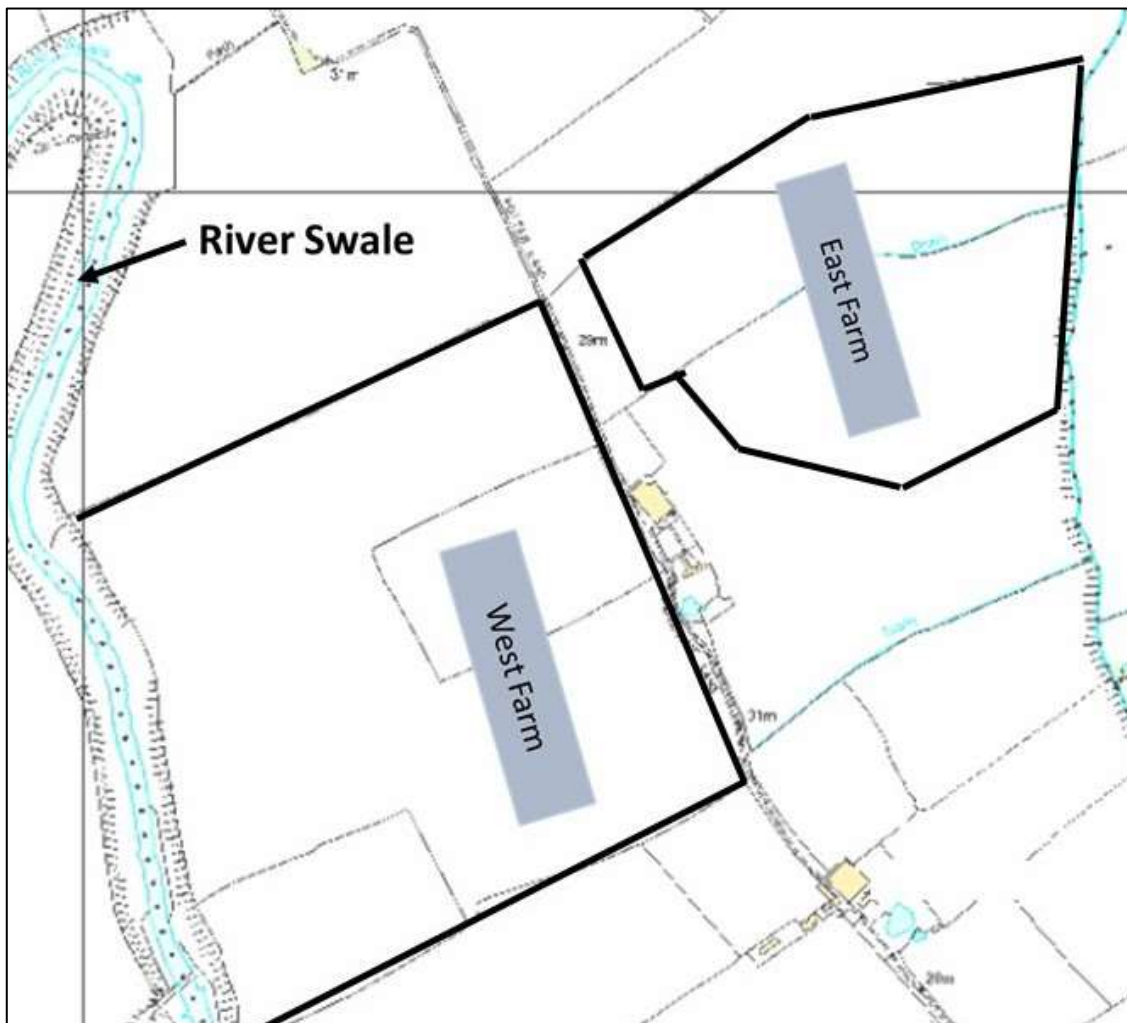


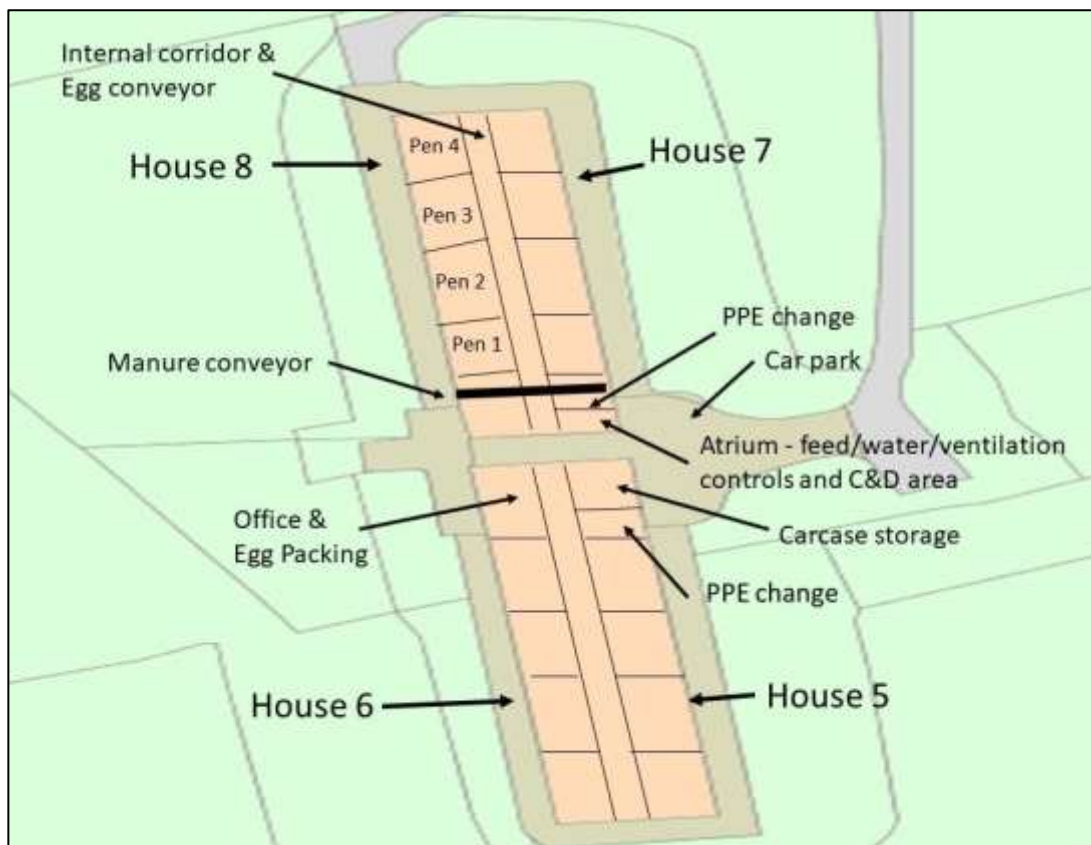
Figure 46: West farm and poultry ranges



Figure 47: East farm and poultry ranges



Figure 48: More detailed plan of West farm



Overview of biosecurity

Biosecurity measures on the IP were found to be good.

At the entrance to each farm there were sprayers for disinfecting vehicles and each site had dedicated PPE (overalls, wellingtons, and plastic slippers).

Before entering the atrium of each of the barns there was a foot dip disinfectant tray. Access to the hen houses was through a door which, once opened gave access to a

small area to change into dedicated internal footwear for each of the two houses in each barn. There were also dedicated disposable gloves in each shed.

The disinfectant used on site was Bio VX (Defra approved) and the foot dip trays were replenished every other day.

There was a total of eight farm staff and none kept poultry/other birds at home or had any other contact with other poultry sites.

Staff normally worked in teams dedicated to each side of the farm (West team and East team) although there was occasionally some crossover for holiday coverage.

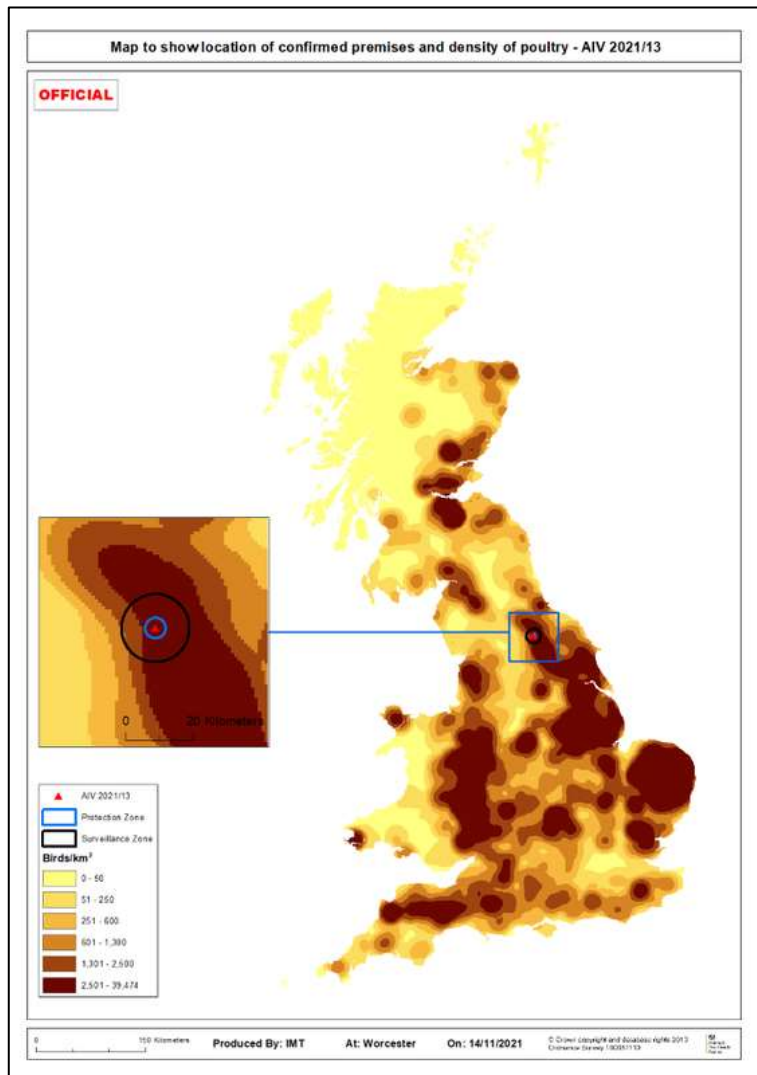
There was a visitor record book provided for each side of the farm.

Pest control was carried out by an external contractor monthly and no evidence of rodent issues was noted at the time of the APHA visit.

Carcases of any dead birds were placed into a freezer at the entrance of Houses 5/6 and once it was full the carcases were transported to the entrance at the perimeter of the site for collection by the ABP disposal contractor.

Map with location in Great Britain and poultry density

Figure 49: Location of IP and poultry density



Overview of the surrounding area

The IP was located in an area of high poultry density.

The ranging areas were reasonably close to another poultry unit that was subsequently confirmed as AIV 2021/22, with the distance between the two closest sections of ranging areas being approximately 1 km.

No direct contact was possible between birds on the two sites and no other susceptible poultry species were identified in the immediate area. A track was shared between the two sites.

There were no commercial poultry sites contiguous to the IP but there was a turkey site in the area within a 3 kilometre radius of this premises which had been an IP in the 2020 to 2021 AI season.

The river Swale ran approximately 50 metres from the range boundaries of sheds 8 and 6.

There were reports of fox predation around the ranges.

Ornithological assessment

Desktop assessment: This lowland and rural IP was set inland in an intensively managed agricultural landscape within the floodplain of the river Swale. The extensive pasture (poultry range) surrounding this free-range unit was adjacent to the river and provided foraging opportunities for wild birds well separated from its buildings. Whilst no large waterbodies existed nearby, those at distance were known to host significant aggregations of wintering water birds.

Wildfowl were likely to be generally common though it was not clear if any sites close to the IP hosted dense aggregations likely to have produced a source of infection pressure. If one of the small waterbodies local to the IP did become a source, it was possible that grazing wildfowl might exploit the ranges at this IP.

Waders and other waterbirds were likely to be generally common in this landscape and unusually may have provided a more substantial source of infection pressure here, being able to move from the river and its riparian habitats directly onto the range at the IP whilst maintaining a substantial distance to the buildings

Bridge species were considered likely to be common and appeared to be another likely infection pathway onto the IP with both gulls and corvids likely to have exploited the range.

Wild passerines were not considered to have supported a likely infection pathway or produced any substantial infection pressure as there was no likely source from which they might acquire infection.

Local intelligence: Wild birds (geese, swans, ducks, crows, pigeons) had been observed near the poultry ranges and nearby watercourses.

Clinical picture

10/11/2021 – 11 birds were found dead on but this was initially attributed to stress resulting from fox predation.

11/11/2021 – House 8 on the West Farm site reported increasing mortality and suspicion of notifiable avian disease was reported. No change in egg production was observed and feed and water intake appeared to be at normal levels. PME conducted by the PVS showed no significant lesions.

During the APHA inspection the same day, 1% of the birds in House 8 were lethargic with reddened combs and slightly swollen eyes and combs. Some of the birds also presented with nasal discharge and head shaking. No respiratory (panting or gasping) or nervous signs were observed. PMEs of two fresh carcasses showed no significant lesions.

At the time of the inspection, 293 birds had died and by the following day mortality in House 8 was increasing exponentially. Other houses on the West site appeared clinically unaffected, as did all the houses on the East site. Samples were submitted.

Mortality in House 8 continued to increase at an exponential rate and clinical signs started to become apparent in other houses on the West site. The East site continued to appear clinically unaffected but a reduction in egg production was noted on 14/11/2021 and by 18/11/2021 Houses 1 and 2 had begun to show clinical signs.

Tracings windows

Source tracings window:

High-risk:	04/11/2021 to 06/11/2021
Likely:	24/10/2021 to 03/11/2021
Precautionary:	21/10/2021 to 23/10/2021

Spread tracings window:

High-risk:	05/11/2021 to 11/11/2021
Likely:	25/10/2021 to 04/11/2021
Precautionary:	22/10/2021 to 24/10/2021

Most likely date of infection: 04/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 50: Source and spread timeline for AIV 2021/13

Source Tracing Window	Spread Tracing Window	Date	
Day 17		21/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		22/10/21	Start of precautionary spread tracing window (source + 24h).
Day 15		23/10/21	
Day 14		24/10/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	25/10/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	26/10/21	
Day 11	Day 3	27/10/21	
Day 10	Day 4	28/10/21	
Day 9	Day 5	29/10/21	
Day 8	Day 6	30/10/21	
Day 7	Day 7	31/10/21	
Day 6	Day 8	01/11/21	
Day 5	Day 9	02/11/21	
Day 4	Day 10	03/11/21	
Day 3	Day 11	04/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	05/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	06/11/21	
	Day 14	07/11/21	Precautionary onset of clinical signs based on analysis of production records.
	Day 15	08/11/21	
	Day 16	09/11/21	
	Day 17	10/11/21	Increasing mortality noted on West site, Shed 4, house 8.
	Day 18	11/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/54). Restrictions served.
	Day 19	12/11/21	
	Day 20	13/11/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021/13.
	Day 21	14/11/21	Confirmed as HPAI H5N1.
	Day 22	15/11/21	Culling commenced.
	Day 23	16/11/21	
	Day 24	17/11/21	
	Day 25	18/11/21	
	Day 26	19/11/21	
	Day 27	20/11/21	
	Day 28	21/11/21	Culling completed.
	Day 29	22/11/21	
	Day 30	23/11/21	Preliminary C&D completed.
	Day 31	24/11/21	Preliminary C&D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

27 premises with poultry holding between 1-128,000 birds (3 premises with 50 or more birds).

SZ (3-1 km)

165 premises with poultry holding between 1-262,300 birds (24 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for carcasses sent to the private veterinary practice, feed deliveries, ABP collection and table eggs sent to an egg packing centre.

The packing centre was visited and after their biosecurity and egg disposal procedures were verified, the tracing was assessed as being very low risk and closed.

No other poultry contacts were identified for the private veterinary practice, feed deliveries and ABP collection; these tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds (high likelihood with low uncertainty).

Assessment and evidence base for the likely source

The disease was likely to have been introduced into the farm via birds in shed 8 – the range from shed 8 extended close to the river Swale.

There were multiple outbreaks on farms along this section of river, and one of the previous IPs from 2020 (AIV 2020 06) was also located near the River Swale. Some small ponds were also located nearby. Environmental contamination of the range would be likely even in the absence of direct contact with wild birds per se.

Birds had access to the outdoor ranges up until 10/11/2021 – this was after the high-risk source window (04/11/2021 to 06/11/2021).

Wild birds (geese, swans, ducks, crows, pigeons) had been seen near to the ranges and nearby watercourses.

H5N1 had been detected in wild birds in this area of North Yorkshire.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission via wildlife (wild birds and/or other vermin) was assessed as medium likelihood with high uncertainty; there was a known fox predation problem and foxes could potentially move between the ranges on the two sites and either act as mechanical vectors or facilitate fomite spread via movement of predated chicken carcasses.

Manure from the poultry sheds was removed every four days and transported to be spread onto arable land.

All other potential spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

Whether virus could have been transferred from this IP, via any spread pathway, to the nearby subsequently confirmed AIV 2021/22. No direct pathways were identified and risk mitigating actions had been taken on 2021/22 with the birds being housed on 12/22/2021 and movements onto the poultry site rerouted via its associated pig unit, to minimise the risk of fomites from AIV 2021/13 entering the farm.

AIV 2021/14, Near Kirkham, Fylde, Lancashire, England

Description of the premises

Overview of the premises and the wider business

The premises was a non-commercial premises, with domestic poultry and waterfowl together with wild birds on an ornamental pond. The eggs were produced only for the owner's consumption.

There were also pet ponies, sheep, pigs (sampled, without clinical signs), dogs and cats on the farm.

Species and number of each present

30 chickens, 48 ducks, 4 geese and 20-30 wild ducks.

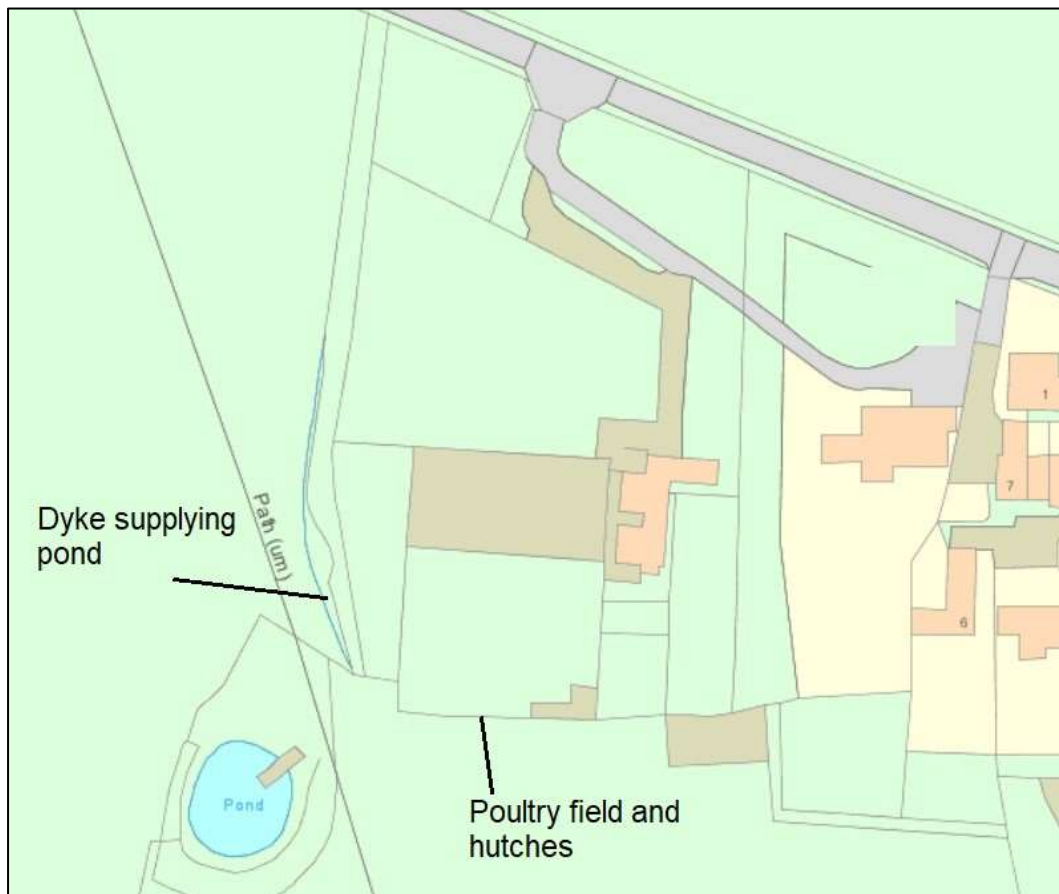
5 ponies, 2 sheep, 2 pigs, 3 dogs and 3 cats.

Description of the housing

The poultry field had a hard standing area at the bottom with a chicken coop and 3 small hutches next to it. The ducks shared the pond on the farm with approximately 30 wild ducks that had settled there and were fed by the owners. Although there were some wooden fences with netting between the field and the pond area, domestic birds had easy access to the pond. A small dike supplied the pond with water.

Plan of the infected premises

Figure 51: Plan of AIV 2021/14

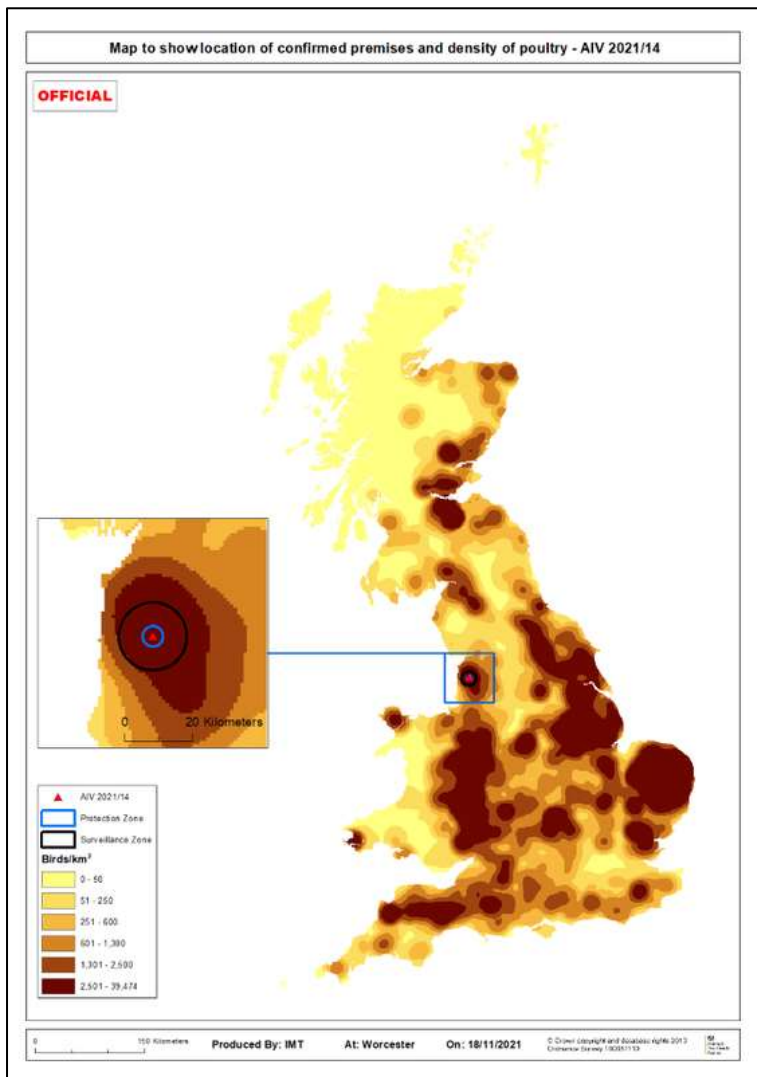


Overview of biosecurity

No biosecurity measures were in place and all the animals were in co-located in fields where they could mix together.

Map with location in Great Britain and poultry density

Figure 52: Location of IP and poultry density



Overview of the surrounding area

The premises was situated southeast of the river Wyre, east of the Lancaster Canal and north of the river Ribble and the landscape has many ponds. It was in an area of high poultry density and within the protection zone of AIV 2021/12.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Immediately surrounding the premises were several ponds where waterfowl were known to congregate. On the premises there was a pond for the domestic ducks where wild birds had also settled. These wild birds were fed by the owners together with the domestic birds.

Clinical picture

12/11/2021 – One chicken was unwell and stopped eating.

14/11/2021 – Another two chickens were lethargic, not eating, unable to walk and showing some neurological signs. One had cyanotic comb and wattles. No respiratory signs or diarrhoea were seen. Suspicion of avian notifiable disease was reported and one chicken died the same day.

15/11/2021 – The other two sick chickens died and the remainder of the chickens and ducks were healthy, bright, alert and responsive. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	09/11/2021 to 11/11/2021
Likely:	29/10/2021 to 08/11/2021
Precautionary:	24/10/2021 to 28/10/2021

Spread tracings window:

High-risk:	10/11/2021 to 14/11/2021
Likely:	30/10/2021 to 09/11/2021
Precautionary:	25/10/2021 to 29/10/2021

Most likely date of infection: 09/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 53: Source and spread timeline for AIV 2021/14

Source Tracing Window	Spread Tracing Window	Date	
Day 19		24/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		25/10/21	Start of precautionary spread tracing window (source + 24h).
Day 17		26/10/21	
Day 16		27/10/21	
Day 15		28/10/21	
Day 14		29/10/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	30/10/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	31/10/21	
Day 11	Day 3	01/11/21	
Day 10	Day 4	02/11/21	
Day 9	Day 5	03/11/21	
Day 8	Day 6	04/11/21	
Day 7	Day 7	05/11/21	
Day 6	Day 8	06/11/21	
Day 5	Day 9	07/11/21	
Day 4	Day 10	08/11/21	
Day 3	Day 11	09/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	10/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	11/11/21	
	Day 14	12/11/21	Precautionary onset of clinical signs: one chicken showing signs
	Day 15	13/11/21	
	Day 16	14/11/21	Two more chickens showing signs. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/55). Restrictions served.
	Day 17	15/11/21	
	Day 18	16/11/21	H5N1 confirmed by CVO (AIV 2021/14)
	Day 19	17/11/21	Cull started
	Day 20	18/11/21	Cull and preliminary C & D complete
	Day 21	19/11/21	Preliminary C & D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

39 premises with poultry holding between 1-2000 birds (5 premises with 50 or more birds).

SZ (3-10 km)

170 premises with poultry holding between 1-300,000 birds (48 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There were two ponds on the premises, which attracted wild ducks and waterfowl.

All the domestic birds on the premises had potential direct contact with the wild birds.

There were no biosecurity precautions or separation, which allowed all animals to have direct and/or indirect contact with wild birds

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: The risk was not higher than the background risk.

All other spread pathways were assessed as being very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/15, Near Willington, South Derbyshire, Derbyshire, England

Description of the premises

Overview of the premises and the wider business

The IP was a commercial turkey fattening premises which was a fully housed all in/all out system.

The turkey stags were moved on from the brooding farm aged 40 days on 04/10/2021 and 05/10/2021. There had been no movements of birds on or off the site since.

There were no other livestock present on the holding, except for 10-15 sheep (belonging to a neighbour) kept in a fenced-off, grassy field, just opposite the sheds.

Species and number of each present

17,100 turkeys kept in three houses with 5,700 80-day-old turkeys in each.

Description of the housing

The buildings had metal walls and roofs and appeared to be well maintained and in very good condition with no structural issues such as holes, cracks, or water leakages noted.

Each house had a double-door system and separate biosecurity facilities. Ventilation was provided via a mix of fans plus natural ventilation, with side adjustable windows and netted ceiling vents.

Each house was considered to constitute a separate epidemiological group with no contact between houses.

Plan of the infected premises

Figure 54: Plan of AIV 2021/15



Overview of biosecurity

The IP was a secure farm with a perimeter fence and electric gates and the gates and buildings were kept locked at all times. Signage was in place to prevent entry by unauthorised visitors. Anyone entering the facility was required to adhere to all biosecurity procedures and sign the visitor book. There were good quality visitor records available.

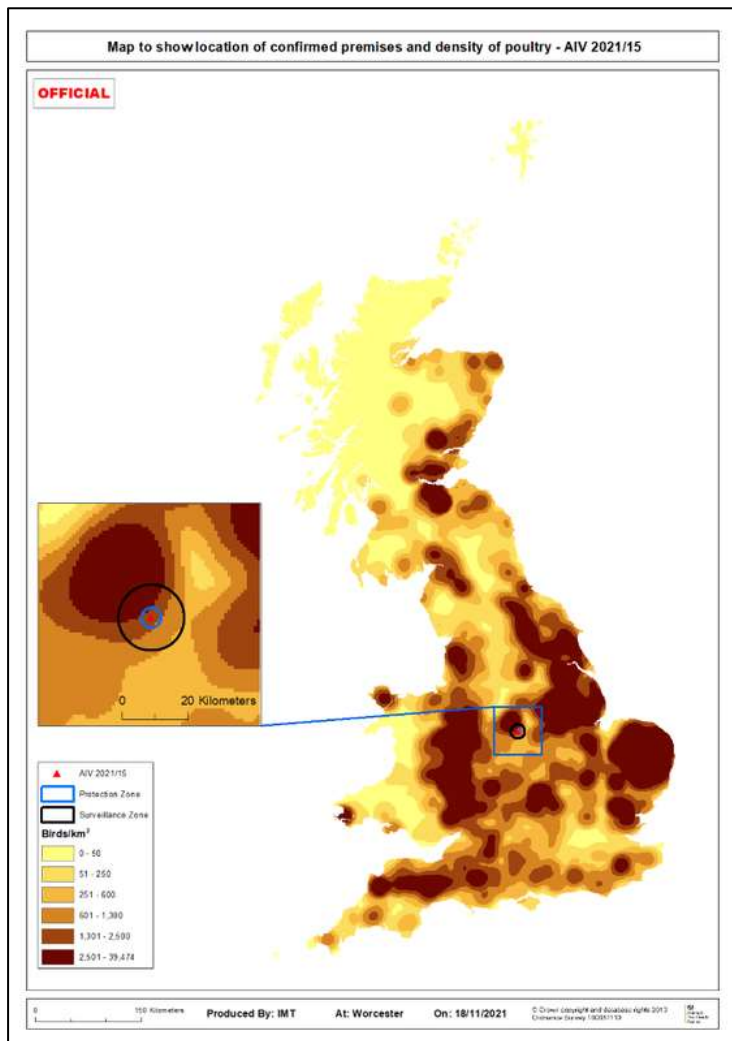
There was a vehicle disinfection area at the gate entering the facility, with automatically triggered jets in the road to disinfect vehicles passing over and there was a well-maintained concrete apron all around the site and buildings. The site was generally tidy, with well-maintained and neatly mown grassy areas between the poultry houses, free from overgrown or overhanging vegetation. The buildings appeared in very good condition with no structural issues noticed as holes, cracks, leakages etc.

There was a recorded pest control plan in place, undertaken by the owner who was trained in rodent control. No evidence of rodent activity was observed during the APHA visit but bait boxes were seen placed near the poultry houses.

However, there were some concerns that small wild birds or rodents could potentially have entered the houses, via the unnetted wall side air vents. The last time the owner saw a wild bird inside one of the poultry houses was three years ago.

Map with location in Great Britain and poultry density

Figure 55: Location of IP and poultry density



Overview of the surrounding area

The IP was located in an area of medium poultry density in the floodplain of the river Trent. Close by was the river itself, many substantial waterbodies associated with the river, extensive areas of floodplain pasture often close to the waterbodies, and some areas of natural and semi-natural habitats, all favourable for many water birds.

Across the road from the IP (approximately 100 m away) there was a small holding with ducks and geese – this was subsequently confirmed as AIV 2021/52 (on 11/12/2021). Numerous ponds were present in the immediate vicinity.

Ornithological assessment

Desktop assessment: Wildfowl were likely to be generally common. Whilst substantial aggregations of wildfowl were not recorded around this IP, records suggested moderate counts at waters close to the site and it was likely that sources

of infection occurred nearby. It was less clear whether wildfowl would regularly have contaminated the farm directly, although there was the potential for this.

Waders and other waterbirds were likely to be generally common in this landscape though it was less clear if this included the locale around the IP or whether these species would regularly have accessed the farm site.

Bridge species were considered likely to be common and appeared to be the most likely infection pathway onto the IP with both gulls and corvids likely to have exploited either the range or opportunistic access to poultry food or poultry waste around houses.

Wild passerines may have produced an infection pathway and potentially contributed some infection pressure in this case. This was suggested by the potential for nearby waterbodies to become contaminated and act a source for these species, and their ability to subsequently enter poultry houses.

Overall, there was a likely infection pressure from wild birds.

Local intelligence: Nothing further to add.

Clinical picture

14/11/2021 – sudden mortality started in house 2 when 4 turkeys died.

15/11/2021 – 12 birds died.

16/11/2021 – 80 birds died and many birds were reported to be coughing and gasping, not drinking and showing nervous signs. Suspicion of notifiable avian disease was reported.

During the APHA investigation the same day, approximately 50% of turkeys in House 2 were reported to be affected showing clinical signs of recumbency, panting, gasping and torticollis (twisting of the necks) followed by death. Some cyanosis (discolouration) of the wattles was observed. The remaining birds were dull/weak. Some greenish watery diarrhoea was observed and a slightly reduced water intake was reported.

PME findings performed by the PVS included bruising to sinuses, petechiae, mild sacculitis, and congested intestines. Estimated mortality was 10% and estimated morbidity 70-80% in House 2.

Houses 1 and 3 were clinically unaffected.

Timeline

Tracings windows

Source tracings window:

High-risk: 09/11/2021 to 11/11/2021
 Likely: 29/10/2021 to 08/11/2021
 Precautionary: 26/10/2021 to 28/10/2021

Spread tracings window:

High-risk: 10/11/2021 to 16/11/2021
 Likely: 30/10/2021 to 09/11/2021
 Precautionary: 27/10/2021 to 29/10/2021

Most likely date of infection: 09/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 56: Source and spread timeline for AIV 2021/15

Source Tracing Window	Spread Tracing Window	Date	
Day 17		26/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		27/10/21	Start of precautionary spread tracing window (+24h).
Day 15		28/10/21	
Day 14		29/10/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	30/10/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	31/10/21	
Day 11	Day 3	01/11/21	
Day 10	Day 4	02/11/21	
Day 9	Day 5	03/11/21	
Day 8	Day 6	04/11/21	
Day 7	Day 7	05/11/21	
Day 6	Day 8	06/11/21	
Day 5	Day 9	07/11/21	
Day 4	Day 10	08/11/21	
Day 3	Day 11	09/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	10/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	11/11/21	
	Day 14	12/11/21	Precautionary onset of clinical signs based on production data.
	Day 15	13/11/21	
	Day 16	14/11/21	
	Day 17	15/11/21	
	Day 18	16/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/57). Restrictions served.
	Day 19	17/11/21	Avian Influenza H5N1 confirmed by PCR (AIV 2021/15).
	Day 20	18/11/21	
	Day 21	19/11/21	Confirmed as HPAI. Culling commenced.
	Day 22	20/11/21	
	Day 23	21/11/21	
	Day 24	22/11/21	Culling completed.
	Day 25	23/11/21	Preliminary C&D completed.
	Day 26	24/11/21	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

50 premises with poultry holding between 1-78,000 birds (8 premises with 50 or more birds).

SZ (3-10 km)

293 premises with poultry holding between 1-80,000 birds (24 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were initiated for workers, electricians, feed deliveries, animal by-product (ABP) collections and a private vet. These resulted in two visits to premises visited by the same ABP collector. All were deemed very low risk and subsequently closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct and/or indirect contact with wild birds.

Assessment and evidence base for the likely source

The operator reported concerns that birds or rodents could potentially enter the houses via the unnetted side air intakes. The side window shutters had been open for about a week in the affected house (House 2).

Likely high infection pressure from wild birds as detailed in the ornithological assessment.

Spread investigations: Assessment of potential and likelihood of spread

Airborne spread (dust/feathers) to the closely adjacent (approximately 100 m) neighbouring AIV 2021/52 was considered but of lower likelihood due lack of overlap of the disease timelines. The estimated most likely infection date on AIV 2021/52 was 26/11/2021 based on lab results but culling on AIV 2021/15 was completed on 22/11/2021 with preliminary C&D being considered effective on 24/11/2021.

Potential fomite spread from the site by wildlife to the neighbouring AIV 2021/52.

Likelihood of onward transmission through wildlife not higher than the background risk in wild birds.

Tracing investigations showed that all other potential spread pathways were of very low or negligible likelihood.

Remaining uncertainty

The precise pathway for introduction of infection onto a generally bio secure site and whether virus was subsequently transferred to AIV 2021/52 or whether both IPs had

independent introductions via a common wild bird source due to their close proximity.

AIV 2021/16, Near Pokesdown, Bournemouth, Christchurch & Poole, England

Description of the premises

Overview of the premises and the wider business

The premises was a private house in a residential area, one mile from the sea, keeping a flock of ducks in an enclosure in the garden. The ducks were hatched from fertilised eggs bought from a local supplier and were kept as one group looked after by the owners. The eggs laid by the ducks were used for private consumption, or placed in an honesty box at the front of the house where members of the public, whose identities were unknown, left money in return.

Species and number of each present

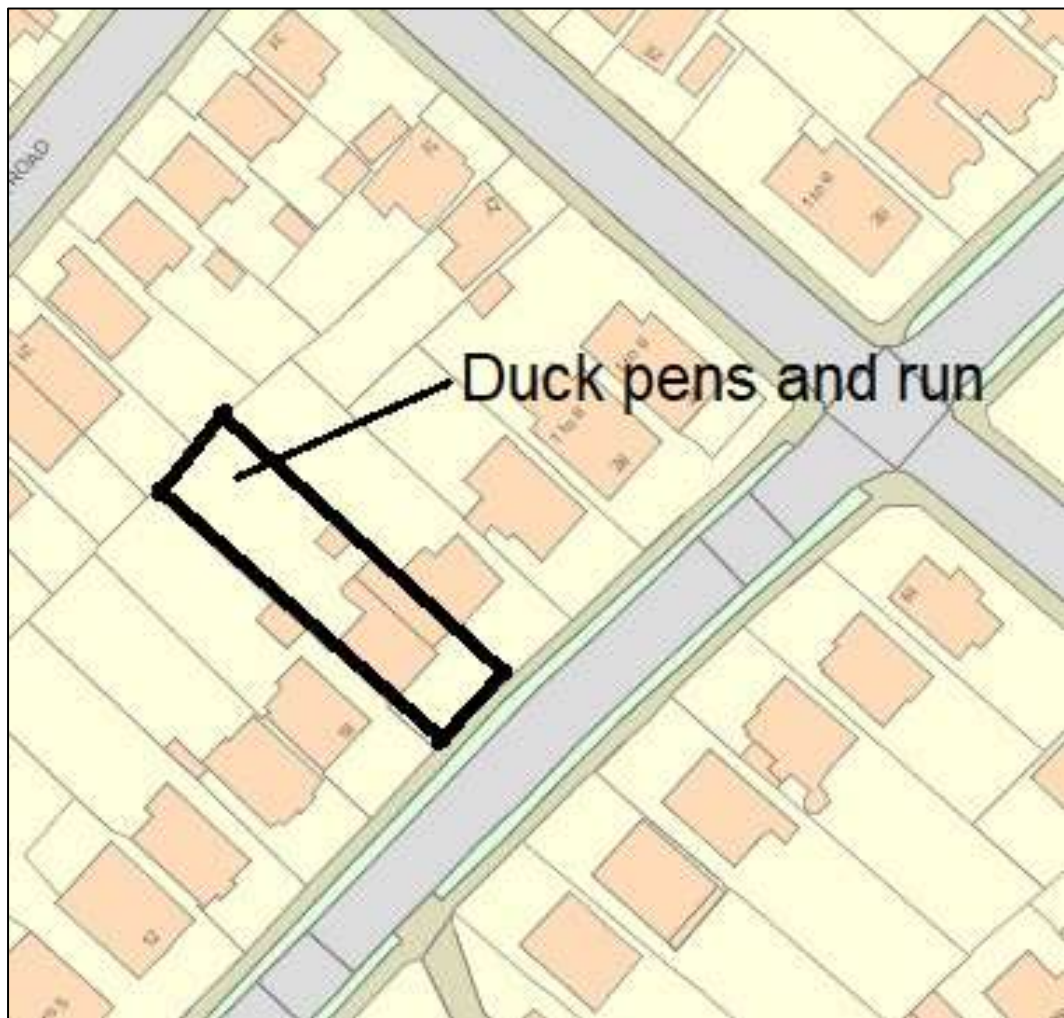
38 mixed breed ducks aged between six months and six years old.

Description of the housing

The ducks were kept in an outside meshed, but uncovered enclosure, to the rear of the garden, with a dedicated access path. They were housed at night but had access to the enclosure during the day. The enclosure contained two water baths and three interlinked sheds.

Plan of the infected premises

Figure 57: Plan of AIV 2021/16



Overview of biosecurity

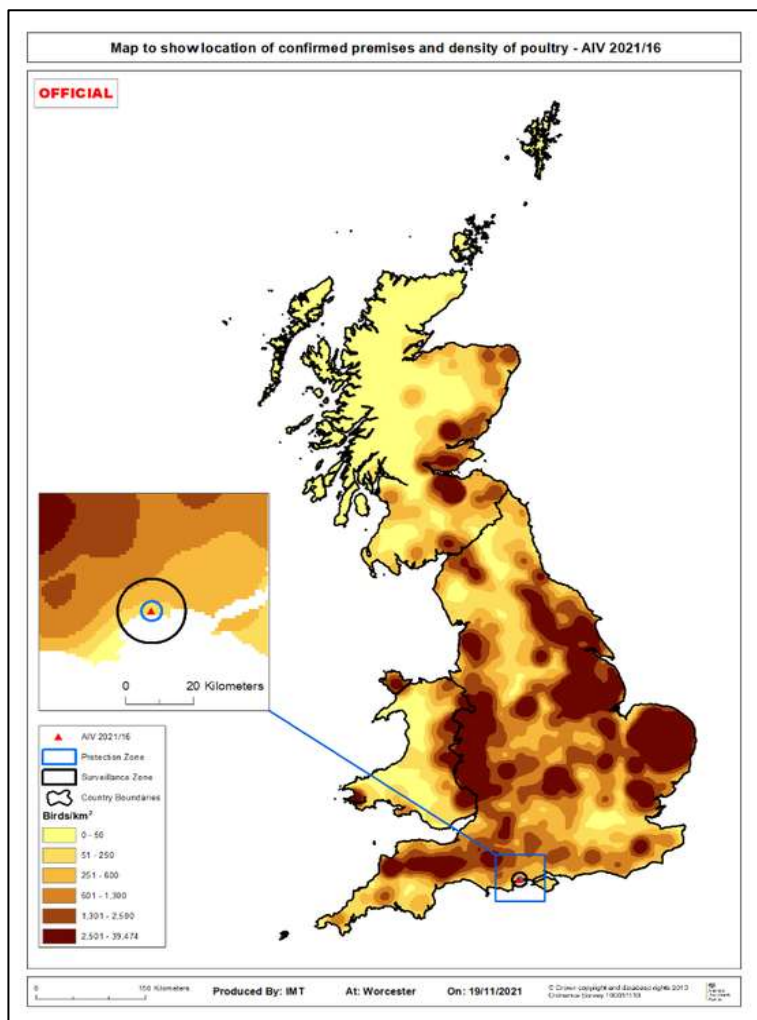
There were no specific biosecurity measures practiced and no disinfection on entry or exit to the enclosure. The owners did not have dedicated clothing for use when entering the enclosure and did routinely use the same footwear. Routine hand washing was performed after handling ducks on exiting the enclosure.

The owner reported vermin activity and used rodenticide routinely.

Several species of wild birds but not wildfowl were regularly seen in the garden, attracted to a bird feeder near the enclosure. There were ponds on site accessible to both resident birds and wild birds.

Map with location in Great Britain and poultry density

Figure 58: Location of IP and poultry density



Overview of the surrounding area

The premises was located in a densely populated residential area. Continuous hedges and walls around the garden, along with meshing around the perimeter of the enclosure kept the ducks separated from neighbouring gardens, none of which held poultry.

Ornithological assessment:

A desktop ornithological assessment was not conducted.

Local intelligence confirmed that the owner had placed a bird feeder on the exterior of the duck enclosure, which was regularly used by wild birds. No wildfowl had been seen in the garden.

Clinical picture

16/11/2021 – The ducks showed signs of lethargy and reduced food intake. They became progressively worse overnight, with reduced water intake and were reluctant to stand or move. Approximately 40% of the ducks showed torticollis and some presented with yellow diarrhoea, but none showed respiratory signs, swelling, cyanosis or tremors.

17/11/2021 – Suspicion of avian notifiable disease was reported and blood samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	13/11/2021 to 15/11/2021
Likely:	02/11/2021 to 12/11/2021
Precautionary:	27/10/2021 to 01/11/2021

Spread tracings window:

High-risk:	14/11/2021 to 17/11/2021
Likely:	03/11/2021 to 13/11/2021
Precautionary:	28/10/2021 to 02/11/2021

Most likely date of infection: 13/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 59: Source and spread timeline for AIV 2021/16

Source Tracing Window	Spread Tracing Window	Date	
Day 21		26/10/21	
Day 20		27/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		28/10/21	Start of precautionary spread tracing window (+24h).
Day 18		29/10/21	
Day 17		30/10/21	
Day 16		31/10/21	
Day 15		01/11/21	
Day 14		02/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	03/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	04/11/21	
Day 11	Day 3	05/11/21	
Day 10	Day 4	06/11/21	
Day 9	Day 5	07/11/21	
Day 8	Day 6	08/11/21	
Day 7	Day 7	09/11/21	
Day 6	Day 8	10/11/21	
Day 5	Day 9	11/11/21	
Day 4	Day 10	12/11/21	
Day 3	Day 11	13/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	14/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	15/11/21	
	Day 14	16/11/21	Precautionary onset of clinical signs.
	Day 15	17/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/58). Restrictions served.
	Day 16	18/11/21	
	Day 17	19/11/21	H5N1 confirmed by CVO (AIV 2021/16). Birds culled. Preliminary C&D completed
	Day 18	20/11/21	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

108 premises with poultry holding between 1-80 birds (3 premises with 50 or more birds).

SZ (3-10 km)

30 premises with poultry holding between 3-206 birds (7 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

The bird housing was contained in an uncovered meshed enclosure.

There were ponds on site accessible to both resident birds and wild birds.

There was poor biosecurity and a bird feeder near the duck enclosure to attract wild birds.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/17, Near Silecroft, Copeland, Cumbria, England

Description of the premises

Overview of the premises and the wider business

This premises was a commercial, free-range, table-egg, laying hen enterprise on a mixed farm with cattle and sheep present. Eggs were collected and sold by a local free-range egg packing and retail company.

Species and number of each present

12,000 Lohmann Brown chickens.

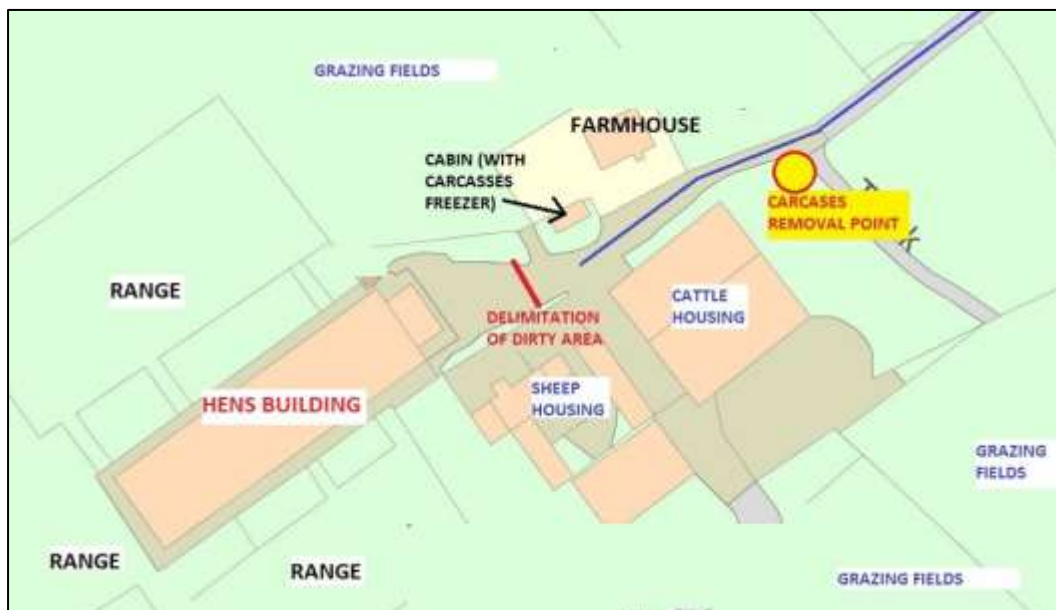
2,000 sheep and 300 cattle.

Description of the housing

The poultry were housed in a single purpose-built house less than 10 years old with an external metal skin. An egg room was located at one end of the building and received eggs via a moving collection belt from the hen accommodation. A concrete apron a few metres wide surrounded the building, and this connected to ranges of grass and small trees. For access in and out of the building, hens used twelve pop-holes distributed on each long side. The building was in good state of repair.

Plan of the infected premises

Figure 60: Plan of AIV 2021/17



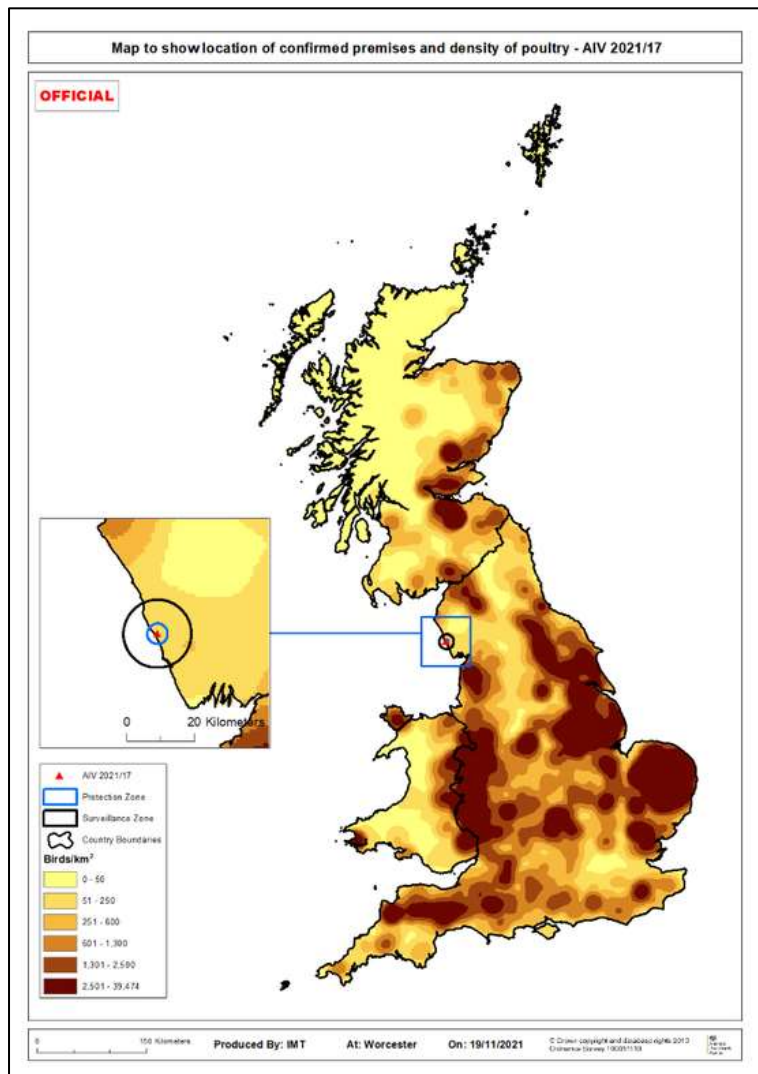
Overview of biosecurity

Signs of potentially good biosecurity were present – several covered disinfectant foot dips at entrances to the building, ranges, poultry accommodation and track to the poultry enterprise; boots for changing into on the track, into the egg room and into

the poultry accommodation; and separate overalls for entry into the poultry room. However, a small disinfectant handpump of questionable effectiveness, was located at the side of the short, metalled track to the poultry enterprise for use on wheels of vehicles, and it was uncertain what precautions egg collection and feed delivery drivers used when they visited. There was water pooling with mud at several locations. These were next to the feed silo and where delivery lorries crossed over and parked up, between the concrete and grass ranges and on adjacent fields around water troughs.

Map with location in Great Britain and poultry density

Figure 61: Location of IP and poultry density



Overview of the surrounding area

The farm was located about 0.5 km from the coast to the west, about 3 km from the nearest estuary to the south, and less than a kilometre from the nearest free-range poultry premises to the east.

Ornithological assessment:

Desktop assessment: The local wild bird assessment indicated the presence of a substantial source of infection pressure. This was carcasses on the shoreline close by that were likely to be infected, aggregations of wildfowl, and abundant waders and waterbirds foraging nearby and on the ranges. Bridge species such as gulls and corvids were the most likely infection pathway from these sources of infection to the poultry.

Local intelligence: Seagulls, jackdaws and starlings were regularly seen on the premises including on the ranges. A swan was recently seen near the ranges.

Clinical picture

17/11/2021 – 20 dead hens were discovered on the morning of increasing to 81 during the day. Clinical signs included diarrhoea, respiratory distress, nasal discharge, excessive lacrimation, head oedema and cyanosis of combs. A three percent reduction in egg output was recorded. Suspicion of notifiable avian disease was reported.

18/11/2021 – An APHA investigation found that the mortality had increased to 400 and morbidity was at least 20%. Samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk:	12/11/2021 to 14/11/2021
Likely:	01/11/2021 to 11/11/2021
Precautionary:	27/10/2021 to 31/10/2021

Spread tracings window:

High-risk:	13/11/2021 to 18/11/2021
Likely:	02/11/2021 to 12/11/2021
Precautionary:	28/10/2021 to 01/11/2021

Most likely date of infection: 12/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 62: Source and spread timeline for AIV 2021/17

Source Tracing Window	Spread Tracing Window	Date	
Day 21		25/10/21	
Day 20		26/10/21	
Day 19		27/10/21	Start of precautionary source tracing window (-21d from notification).
Day 18		28/10/21	Start of precautionary spread tracing window (source + 24h).
Day 17		29/10/21	
Day 16		30/10/21	
Day 15		31/10/21	
Day 14		01/11/21	Start of likely source tracing window (-14d).
Day 13	Day 1	02/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	03/11/21	
Day 11	Day 3	04/11/21	
Day 10	Day 4	05/11/21	
Day 9	Day 5	06/11/21	
Day 8	Day 6	07/11/21	
Day 7	Day 7	08/11/21	
Day 6	Day 8	09/11/21	
Day 5	Day 9	10/11/21	
Day 4	Day 10	11/11/21	
Day 3	Day 11	12/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	13/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	14/11/21	
	Day 14	15/11/21	Precautionary onset of clinical signs - start of mortalities and slight egg drop deviating from normal baseline production data for this premises.
	Day 15	16/11/21	
	Day 16	17/11/21	First noticeable deaths - 81 hens and obvious clinical signs. Notification of suspicion - Verbal restrictions served.
	Day 17	18/11/21	APHA investigation and sampling (DPR 2021/59)
	Day 18	19/11/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-17. VFEI investigation
	Day 19	20/11/21	Welfare culling commenced.
	Day 20	21/11/21	Completion of culling. Cleavage site sequencing confirmed high pathogenicity - CVO confirmed HPAI H5N1.
	Day 21	22/11/21	
	Day 22	23/11/21	
	Day 23	24/11/21	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

6 premises with poultry holding between 3-10 birds (0 premises with 50 or more birds).

SZ (3-10 km)

13 premises with poultry holding between 1-118 birds (1 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the IP owner, one temporary worker, two family members who visited the premises, feed deliveries, movement of livestock and table eggs sent to an egg packing centre.

The packing centre was visited and after their biosecurity and egg disposal procedures were verified, the tracing was assessed as being very low risk and closed. In addition, one poultry premises was identified that had been visited by the egg collection vehicle immediately after collecting from the IP during the high-risk spread window. This resulted in an immediate tracing visit and a 21-day post-contact tracing visits to this premises to inspect the birds. In both visits no sign of notifiable disease was observed and restrictions were lifted as the likelihood of spread was assessed as very low, and tracings closed.

No other poultry contacts were identified for the IP owner, temporary worker, two family members, feed deliveries and movement of livestock; these tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

The birds were free ranging birds with their range accessible to wild birds.

The biosecurity was assessed as moderate with water pooling in areas where lorries crossed over.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk was not higher than the background risk.

All other spread pathways were assessed as being very low likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/18, Near Mouldsworth, Cheshire West and Chester, Cheshire, England

Description of the premises

Overview of the premises and the wider business

This infected premises was a turkey breeder site owned by a large poultry breeding company supplying both the domestic and international market.

The breeding stock originated from the company hatchery. After hatching the birds were sent to company rearing sites and when the turkeys were 29 weeks old, they were placed at a breeding site where they were kept for breeding for 22 weeks before being sent to slaughter.

There was a gap of 2-3 weeks between 'crops' before restocking to allow for thorough cleansing and disinfection. At the time of the visit the stags were around 37 weeks old and the hens 35-36 weeks old.

Approximately 4000 eggs per day were produced which were dispatched 3 times a week to the company hatchery.

ABP dead stock was kept in freezers and disposed once the houses were depopulated. Feed and bedding was sourced from regular suppliers.

Species and number of each present

Approximately 8000 x 35-38 weeks old birds in seven houses.

House 1: 961 hens and 20 stags,

House 2: 1259 hens,

House 3: 1343 hens,

House 4: 1488 hens,

House 5: 1510 hens,

House 6: (Pedigree Shed): 968 hens and 46 stags, and

House 7: (Stag House) 580.

Description of the housing

The buildings were made of a concrete/wood frame with metal roofs and concrete floor and were well maintained. The unit was four turkey houses all joined by a linking corridor, effectively separated into seven sheds. Turkeys were permanently housed. Sheds were in good condition and feed silos and water tank were secure.

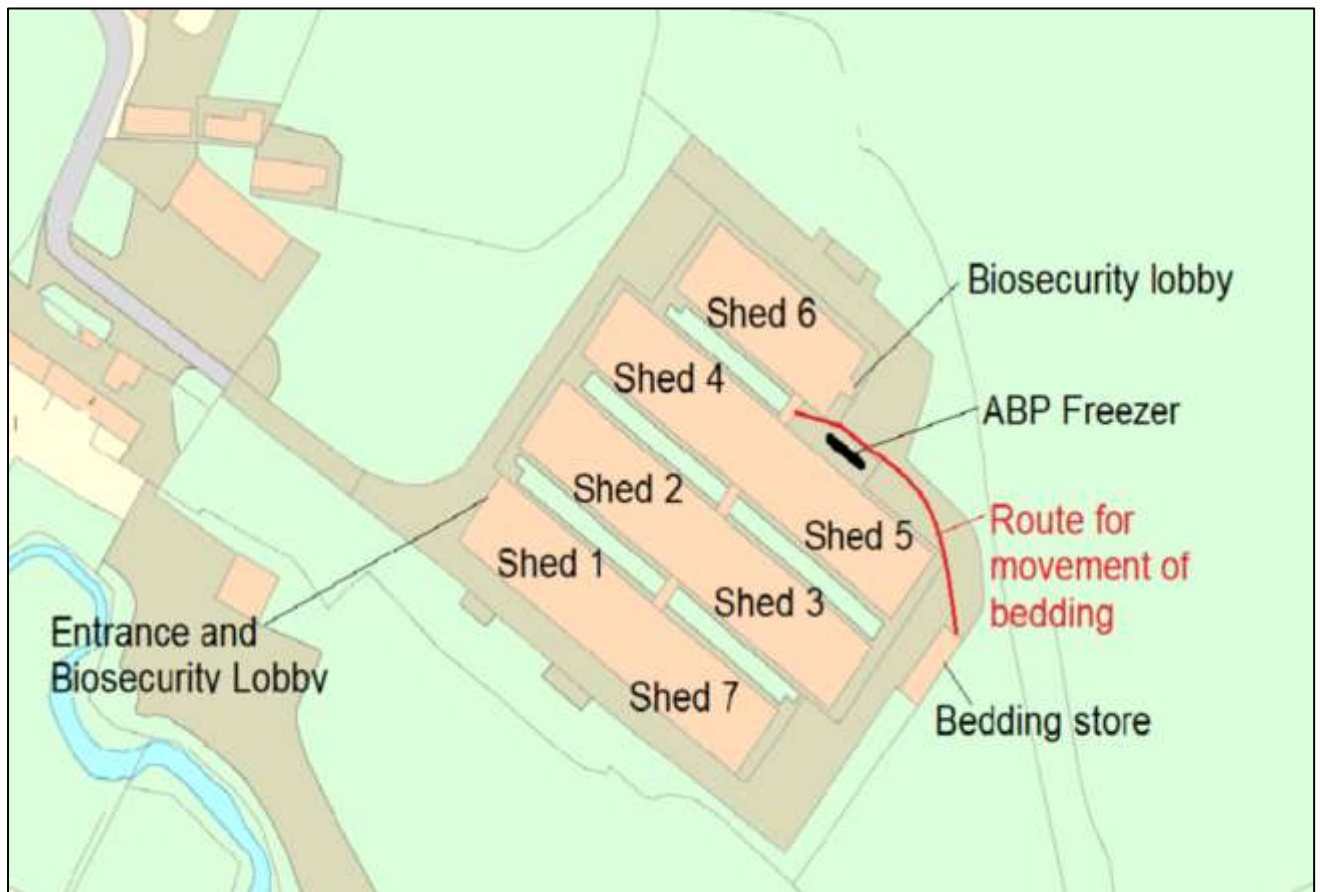
There was an independent automatic ventilation system and temperature control system for each shed. Six of the sheds had both artificial and natural lighting with house 7 only having artificial lighting. The windows had mesh present on both sides. Circular automatic drinkers were used throughout, and feed troughs were either

automatic or manual. Nests were located either in the central passageway or on the sides of the sheds.

Bedding was topped up throughout the crop and removed after depopulation by the companies own staff. It should be noted that bedding was continually added throughout the crop and the access route was via a hatch in the central corridor that linked shed 5 to shed 6.

Plan of the infected premises

Figure 63: Plan of AIV 2021/18



Overview of biosecurity

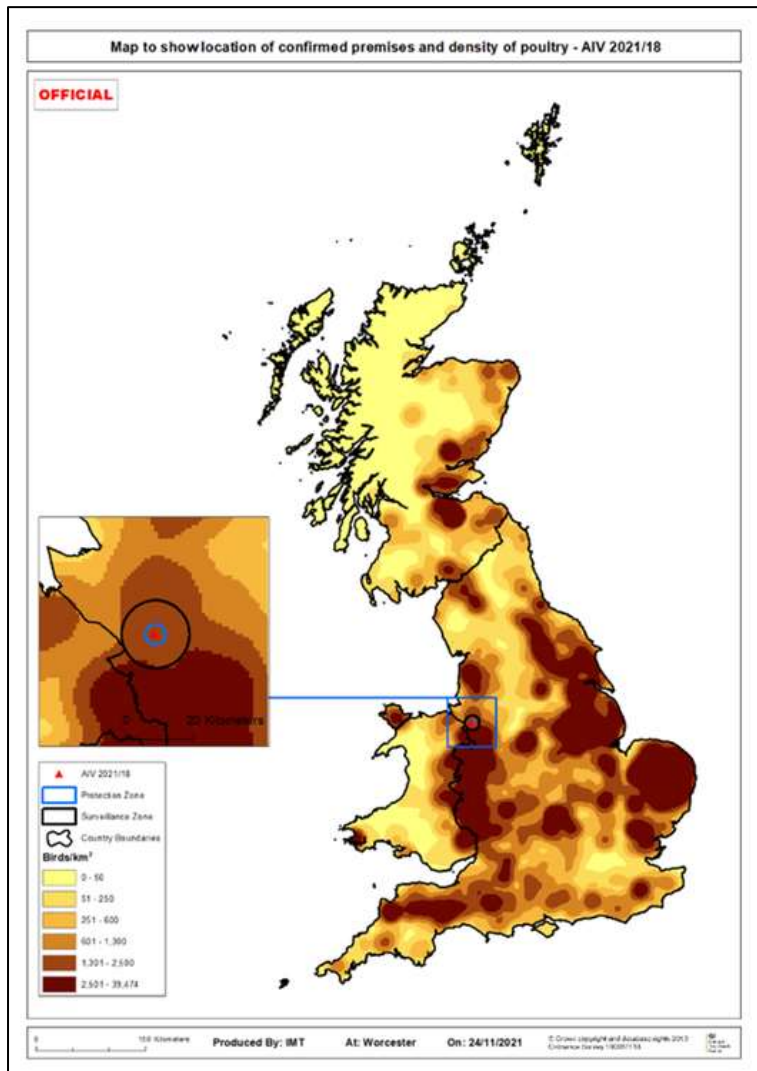
The site had a secure gate, a visitor's book for signing in/out located at the shower block and shower in and out was mandatory. Designated clothing and footwear were provided after showering in. Clothing and footwear were not changed between sheds. If staff were working outside, separate footwear and outside overalls were worn that were changed on entry to the sheds.

Virkon LSP (1:100 dilution) and Virkon S (1:100 dilution) were used at both the gate and boot dips on entry to the main building. Good biosecurity was observed, though a breach of the outer hard-shell biosecurity at the first point of entry could have caused major issues as there were no disinfectant boot dips on entry to the individual sheds or linking corridors.

There were some additional biosecurity weaknesses with bedding being continually added to the site throughout the crop via an access hatch between houses 5 and 6. The bedding was plastic wrapped and stored in an outside sealed shed. The bales were disinfected prior to being manually passed though the hatch from outside to inside. Unless great care was taken this could have provided a likely route of entry for the virus.

Map with location in Great Britain and poultry density

Figure 64: Location of IP and poultry density



Overview of the surrounding area

This rural and lowland IP was situated in a high-density poultry area and located between two small rivers close to the coast and was set in a mixed agricultural landscape typical of an inland setting.

Ornithological assessment:

Desktop assessment: The IP was associated with an estuarine site hosting substantial population of waterbirds. As well as providing a substantial source of

infection in the wider landscape, features here may have encouraged waterbirds to forage across wet fields close to the IP and produce infection pathways. This included many small ponds scattered across this wet low-lying landscape and the proximity to the coast allowed us to anticipate the movement of estuarine waterbirds close to the IP.

Wildfowl were abundant. The species present, including substantial populations of migrants of Eurasian origin may have produced both a potential introduction site for the IP, as well as amplifying infection to have acted as a source of infection in the landscape. Here wildfowl were unlikely to have been responsible for direct infection pathways but may have promoted indirect pathways.

Waders and other waterbirds were likely to have been abundant close the IP. These may have produced a source of infection in the wider landscape, or alternatively may have produced some infection pressure on fields close to the IP. They were unlikely to use the IP directly.

Gulls were abundant in this landscape and corvids were likely to be common. Both groups of bridge species produced the most significant infection pathways, with gulls perhaps producing the greatest pressure where they move considerable distances between coastal/estuarine habitats, settlements and farmland, as well as scavenging infected carcasses from the coast or at sea.

Wild passerines might have supported an indirect infection pathway from water birds, acquiring infection at any one of the many small ponds close to the IP. However, this risk seemed less likely.

Local intelligence: Geese had been noted flying around the site.

Clinical picture

17/11/2021 – a carcass was sent for PME to the company run veterinary laboratory and *E. coli* was isolated, but no further concerns were expressed by the company vet. Water and feed intake and egg production were reported as normal. Blood samples were taken and sent for testing (ELISA) to the company veterinary laboratory and found negative for avian influenza.

18/11/2021 to 19/11/2021 – overnight over 100 birds died in pen 51 in house 5. The birds alive in that pen appeared lethargic (19/11/2021).

The other birds in house 5 and the rest of the houses showed no symptoms when APHA received notification of suspicion of disease. By the time APHA visited the site house 7 also had slightly increased mortality with 19 dead turkeys in the afternoon of 19/11/2021.

Respiratory signs were observed (gasping/ difficulty breathing). Some birds were noted with discoloration of the head, but no ocular or nasal discharges. Birds were eating, drinking and had no signs of diarrhoea. No changes in the quality of eggshell, intake of feed or water. Most of the dead turkeys died without showing any clinical signs. This resulted in a strong suspicion of avian notifiable disease and official samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	13/11/2021 to 15/01/2021
Likely:	01/11/2021 to 12/11/2021
Precautionary:	29/10/2021 to 01/11/2021

Spread tracings window:

High-risk:	14/11/2021 to 19/11/2021
Likely:	03/11/2021 to 13/11/2021
Precautionary:	30/10/2021 to 02/11/2021

Most likely date of infection: 13/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 65: Source and spread timeline for AIV 2021/18

Source Tracing Window	Spread Tracing Window	Date	
Day 18		29/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		30/10/21	Start of precautionary spread tracing window (+24h).
Day 16		31/10/21	
Day 15		01/11/21	
Day 14		02/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	03/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	04/11/21	
Day 11	Day 3	05/11/21	
Day 10	Day 4	06/11/21	
Day 9	Day 5	07/11/21	
Day 8	Day 6	08/11/21	
Day 7	Day 7	09/11/21	
Day 6	Day 8	10/11/21	
Day 5	Day 9	11/11/21	
Day 4	Day 10	12/11/21	
Day 3	Day 11	13/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	14/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	15/11/21	
	Day 14	16/11/21	Precautionary onset of clinical signs - based on production records
	Day 15	17/11/21	
	Day 16	18/11/21	
	Day 17	19/11/21	Death of 100 birds overnight in pen 51 of house 5. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/61). Remaining birds in affected pen lethargic. Restrictions served and samples submitted
	Day 18	20/11/21	H5N1 confirmed confirmed by CVO following PCR testing (AIV 2021/18).
	Day 19	21/11/21	Cleavage site sequencing has confirmed the virus to be of high pathogenicity. The UKCVO has confirmed HPAI H5N1 on the premises.
	Day 20	22/11/21	Cull started
	Day 21	23/11/21	
	Day 22	24/11/21	Cull complete
	Day 23	25/11/21	Preliminary C and D completed
	Day 24	26/11/21	Preliminary C and D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these		

Surveillance activity

PZ (0-3 km)

44 premises with poultry holding between 1-6,250 birds (2 premises with 50 or more birds).

SZ (3-10 km)

244 premises with poultry holding between 1-289,000 birds (21 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the samples sent to the private veterinary practice, feed deliveries, an electrician, and the eggs collection to the company hatchery.

The hatchery was visited and after their biosecurity arrangements were assessed and egg disposal procedures were verified, the tracing was assessed as being very low risk and closed. The eggs that produced the birds on this site were hatched in the company hatchery and were from eggs that were laid in the USA, but the timing of infection meant this risk pathway was assessed as negligible likelihood with low uncertainty.

On enquiries, it was confirmed the feed delivery had not occurred in the high-risk tracing windows, no further action was required, and the tracing was closed.

No other poultry contacts were identified for the private veterinary practice and electrician; these tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was via indirect transmission from a wild bird source of virus via a breach in the biosecurity practiced at this site.

Assessment and evidence base for the likely source

Direct contact was assessed as negligible as the site was constructed and operated in such a manner that wild animal/bird incursion was effectively prevented.

Indirect contact was assessed as high likelihood with a medium uncertainty. Biosecurity on this site was described as good and SOPs surrounding the movement of top up bedding into the unit from a secure shavings store would seem to mitigate against virus incursion however the timings of the events and the location of the transfer in the corridor next to the shed where clinical signs were first noted suggest that this was the likely entry point for the virus. Bedding was introduced into the site on the 14/11/2021 via a hatch in the central corridor that linked house 5 to house 7. This bedding was stored in the sheds and in the corridors. Pen 51, house 5 received top up bedding on the 18/11/2021 the day before disease was suspected. Pen 52 which is the other pen in that house received bedding on the 15/11/2021 of November.

Bedding from that intake was also used in the pedigree house (house 6) and house 4, however no bedding from that intake was used in the Stag house (house 7) which was also badly affected by disease.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife was assessed as very low with low uncertainty due to the level of biosecurity at this site.

Onward transmission through international trade was assessed as negligible with low uncertainty. This was supported by a veterinary risk assessment on the company hatchery.

All other spread pathways were assessed as being very low or negligible likelihood.

Remaining uncertainty

The exact route of indirect access of the virus into this site.

AIV 2021/19, Near North Fambridge, Maldon, Essex, England

Description of the premises

Overview of the premises and the wider business

This was a small, mixed flock of elderly birds kept as pets. Chicken eggs were used for personal consumption or gifted to friends. Duck eggs had been sold to a farm shop prior to June 2021.

Species and number of each present

Six chickens, three geese and four ducks.

Description of the housing

The geese were free-ranging in the garden with access to a pond, which was also accessible to wild birds. They were housed in a brick stable overnight.

The ducks and chickens were kept in wooden poultry houses with wired enclosures within a separate barn, about 30 m from the stable. They did not free range or have access to the pond.

Plan of the infected premises

Figure 66: Plan of AIV 2021/19

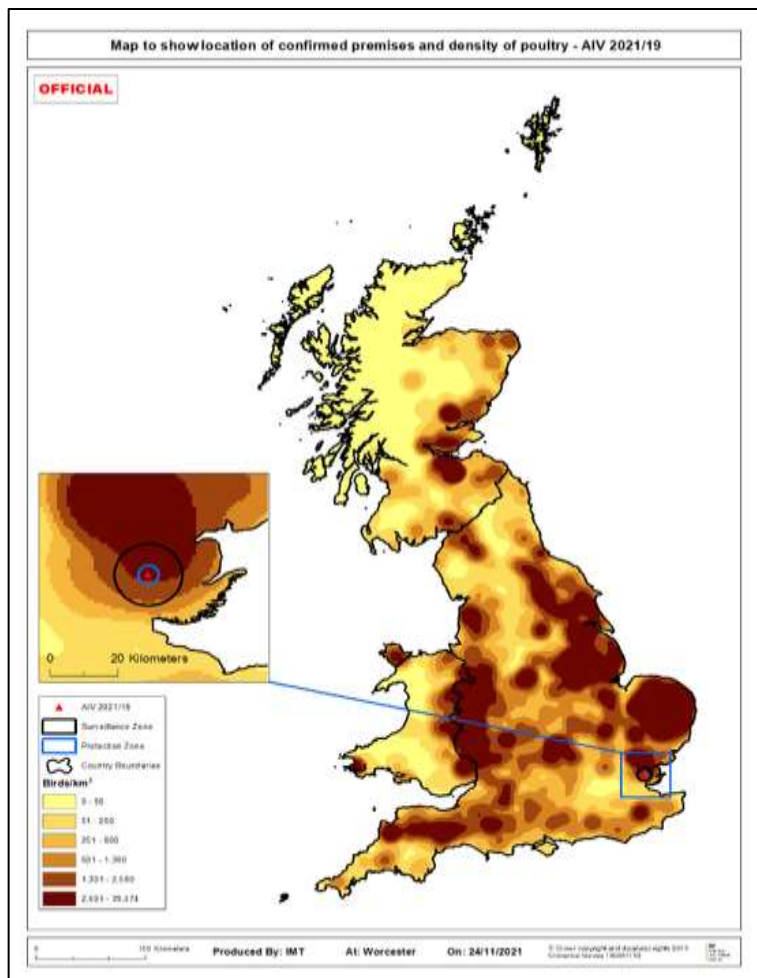


Overview of biosecurity

There were no biosecurity measures in place and no written protocols. No personal protective equipment was used. There were no cleaning and disinfection points on site.

Map with location in Great Britain and poultry density

Figure 67: Location of IP and poultry density



Overview of the surrounding area

The infected premises was situated in the back yard of a private house surrounded by other houses, pasture and arable lands. Waterbodies nearby attracted wildfowl.

Ornithological assessment:

An ornithological desktop assessment was not conducted.

Local intelligence indicated that the infected premises was less than a kilometre away from estuaries of the river Crouch, which attracted wildfowl and was also within a coastal HPAI High-Risk Area.

Clinical picture

18/11/2021 – One goose was found recumbent and was culled by the owner. The other two geese were more quiet than normal.

19/11/2021 – Two sick geese and one duck were found dead, at which point, suspicion of avian notifiable disease was reported. The remaining birds showed no clinical signs. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	15/11/2021 to 17/11/2021
Likely:	04/11/2021 to 14/11/2021
Precautionary:	29/10/2021 to 03/11/2021

Spread tracings window:

High-risk:	16/11/2021 to 19/11/2021
Likely:	05/11/2021 to 15/11/2021
Precautionary:	30/10/2021 to 04/11/2021

Most likely date of infection: 15/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 68: Source and spread timeline for AIV 2021/19

Source Tracing Window	Spread Tracing Window	Date	
Day 21		28/10/21	
Day 20		29/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19	Day 1	30/10/21	Start of precautionary spread tracing window (source + 24h).
Day 18	Day 2	31/10/21	
Day 17	Day 3	01/11/21	
Day 16	Day 4	02/11/21	
Day 15	Day 5	03/11/21	
Day 14	Day 6	04/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 7	05/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 8	06/11/21	
Day 11	Day 9	07/11/21	
Day 10	Day 10	08/11/21	
Day 9	Day 11	09/11/21	
Day 8	Day 12	10/11/21	
Day 7	Day 13	11/11/21	
Day 6	Day 14	12/11/21	
Day 5	Day 15	13/11/21	
Day 4	Day 16	14/11/21	
Day 3	Day 17	15/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 18	16/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 19	17/11/21	
	Day 20	18/11/21	Precautionary onset of clinical signs. One goose with overt clinical signs and two quieter than normal.
	Day 21	19/11/21	Two geese and one duck dead. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/60) - epi investigation incl. Restrictions served.
	Day 22	20/11/21	
	Day 23	21/11/21	Avian Influenza HPAI H5N1 confirmed by CVO designated AIV2021-19. Culling completed.
	Day 24	22/11/21	Preliminary C&D completed.
	Day 25	23/11/21	Preliminary C&D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these		

Surveillance activity

PZ (0-3 km)

26 premises with poultry, holding between 1-2,000 birds (1 premises with 50 or more birds).

SZ (3-10 km)

90 premises with poultry, holding between 1-115,875 birds (31 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct and/or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

The geese were free range and had access to the cottage's pond, which attracted wild birds.

The chickens and the ducks did not have access to that pond.

The IP was within a kilometre from the estuaries of the river Crouch, which attracted wildfowl.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife – the risk was not considered to be higher than the background risk.

All other spread pathways were assessed as being very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/20, Near Wells-next-the-Sea, North Norfolk, Norfolk, England

Description of the premises

Overview of the premises and the wider business

This was a small, non-commercial, mixed poultry premises in a private garden. Eggs were used for home consumption, but none had been laid for the past month.

Species and number of each present

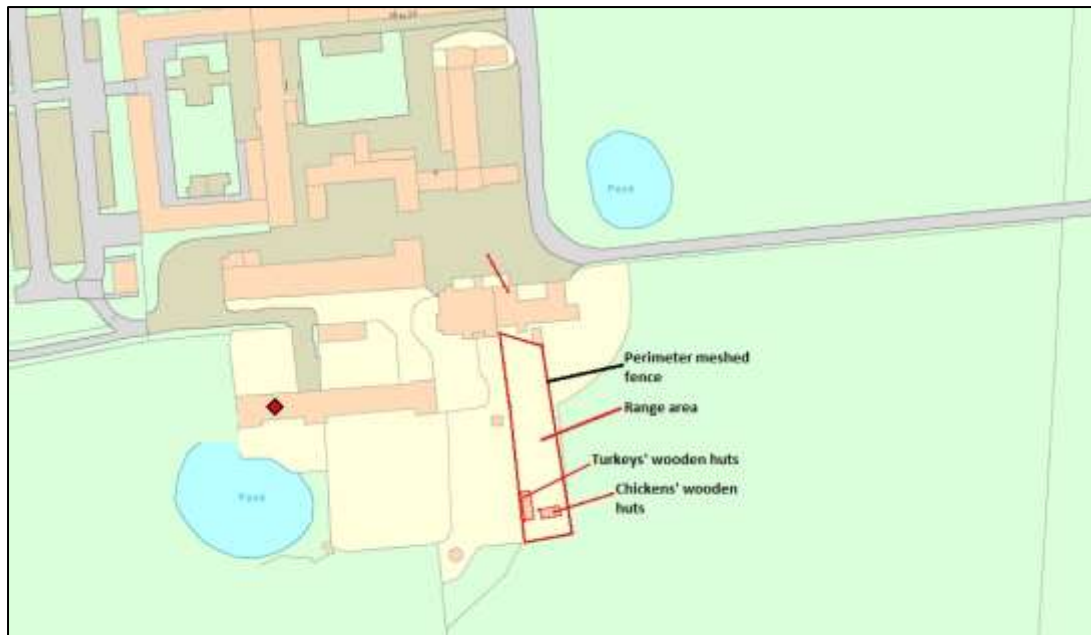
Four turkeys and four chickens.

Description of the housing

The birds were housed during the night in wooden huts, each with an associated outdoor pen. During the day, the birds would range in the back garden where they mixed. The turkeys occasionally escaped into the wider garden area near the ponds.

Plan of the infected premises

Figure 69: Plan of AIV 2021/20

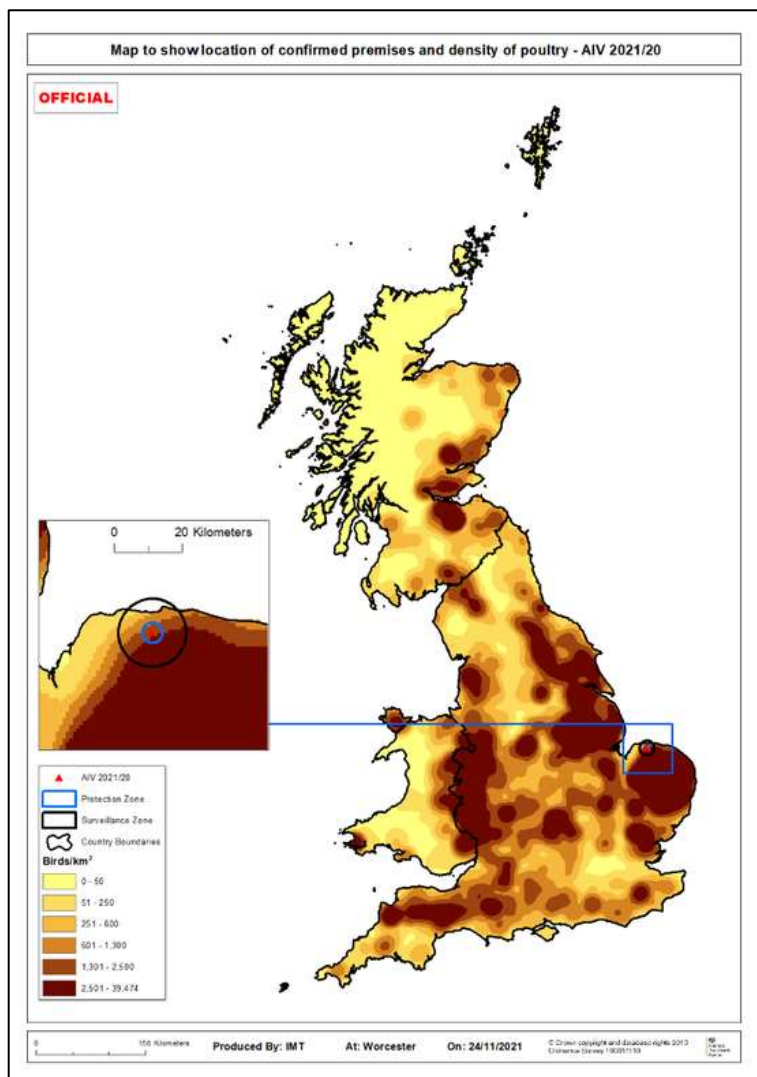


Overview of biosecurity

Biosecurity was poor, with no foot dips or any other biosecurity measures in place. The birds were looked after by the family members with no other visitors.

Map with location in Great Britain and poultry density

Figure 70: Location of IP and poultry density



Overview of the surrounding area

There was a river 1.5 miles away and the coast about 3.5 miles away.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: There were two ponds within 60 m, which attracted wildfowl that were seen to mix with the poultry.

Clinical picture

15/11/2021 – One chicken seen to be ill.

16/11/2021 – The chicken died and one of the turkeys was listless and not eating or drinking. It also had an uncoordinated walk. Two more chickens were ill.

18/11/2021 – The sick turkey and two chickens died.

19/11/2021 – A second turkey developed similar clinical signs and suspicion of avian notifiable disease was reported.

20/11/2021 – APHA carried out an investigation by which time only two turkeys and one chicken remained alive.

Timeline

Tracings windows

Source tracings window:

High-risk:	12/11/2021 to 14/11/2021
Likely:	01/11/2021 to 11/11/2021
Precautionary:	29/10/2021 to 31/10/2021

Spread tracings window:

High-risk:	13/11/2021 to 19/11/2021
Likely:	02/11/2021 to 12/11/2021
Precautionary:	30/10/2021 to 01/11/2021

Most likely date of infection: 12/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 71: Source and spread timeline for AIV 2121/20

Source Tracing Window	Spread Tracing Window	Date	
Day 21		25/10/21	
Day 20		26/10/21	
Day 19		27/10/21	
Day 18		28/10/21	
Day 17		29/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		30/10/21	Start of precautionary spread tracing window (source + 24h).
Day 15		31/10/21	
Day 14		01/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	02/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	03/11/21	
Day 11	Day 3	04/11/21	
Day 10	Day 4	05/11/21	
Day 9	Day 5	06/11/21	
Day 8	Day 6	07/11/21	
Day 7	Day 7	08/11/21	
Day 6	Day 8	09/11/21	
Day 5	Day 9	10/11/21	
Day 4	Day 10	11/11/21	
Day 3	Day 11	12/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	13/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	14/11/21	
	Day 14	15/11/21	Precautionary onset of clinical signs.
	Day 15	16/11/21	First chicken death.
	Day 16	17/11/21	One chicken died.
	Day 17	18/11/21	One chicken and one turkey died.
	Day 18	19/11/21	Notification of suspicion of disease to APHA (DPR 2021/62). Restrictions served.
	Day 19	20/11/21	APHA investigation and sampling.
	Day 20	21/11/21	H5N1 confirmed by CVO and given case reference AIV2021 20.
	Day 21	22/11/21	Culling and preliminary C&D completed. HPAI H5N1 confirmed by CVO.
	Day 22	23/11/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

10 premises with poultry holding between 3-110 birds (2 premises with 50 or more birds).

SZ (3-10 km)

13 with poultry holding between 2-32,500 birds (3 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There were 2 ponds on the ranging area, which attracted wild birds into contact with poultry.

Wild birds/vermin had access to the poultry feeding stations.

There were no biosecurity measures in place.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as being very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2021/21, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a commercial unit containing turkeys for the Christmas market. The unit was one of five located on a disused airfield in North Yorkshire. Three of the other units had also been populated with turkeys and the remaining one contained broilers. All subsequently became IPs. These five units were owned by a large fully integrated poultry company, which had many turkey and broiler rearing and breeding sites across the UK.

The site also included a green waste composting plant, a biomass enterprise, land for storing logs and some buildings of WW2 significance. Each unit had two biomass boilers associated with it.

Species and number of each present

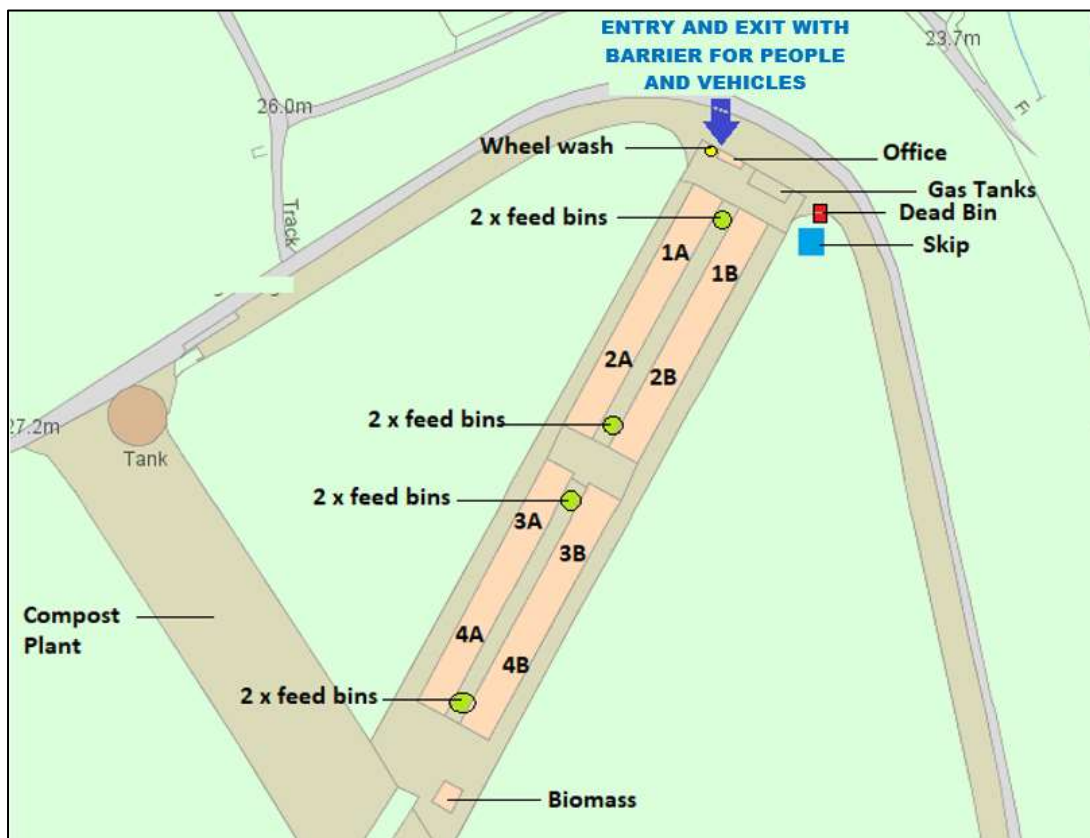
Approximately 36,988 turkeys had been placed across four houses, each of which had two separate airspace sections. Thinning had taken place from sections 1A and 1B on 16/11/2021. At the time of the report case, there were approximately 30,000 turkeys remaining and they were 75 -79 days old.

Description of the housing

The unit comprised four wooden houses that were approximately 11 years old. Each house was divided into two sections with separate airspaces. The two sections were separated by a management area. The houses were generally well-maintained, although there was evidence of some on-going repairs. Wild birds could not enter the houses, but vermin had been seen inside.

Plan of the infected premises

Figure 72: Plan of AIV 2021/21



Overview of biosecurity

On the whole, the unit was considered to have good biosecurity and this was reflected across all the units on this site. A series of standard operating procedures were in place, and there was a system of continual staff training. There were two members of staff dedicated to the unit and company protocol prohibited them from keeping poultry at home. A visitors' book was maintained in the office, although routine staff were not required to sign in.

PERSONNEL: There was a boot dip prior to entry to the office. Once in the office, staff changed into unit dedicated wellingtons and sometimes also unit dedicated overalls. There was a further foot dip for entry to the bird houses. Once inside the houses, there was a barrier system for entering each separate section. At this point, wellingtons were swapped for a different pair which were only used inside the bird areas. Plastic boot covers may have been used for visitors if there were not enough wellingtons. Provision of a further foot dip prior to entry to the bird areas was variable. Apart from wellingtons and boot covers, other clothing was not changed when moving between bird areas. The reverse process was carried out to leave the unit.

HOUSING: The housing was generally well maintained, although some repairs were in progress. Wild birds would not be able to enter.

DELIVERY VEHICLES: Vehicles such as feed wagons had to enter through a barrier. There were facilities for wheel cleansing and disinfection. Drivers were required to wear boot covers.

FEED: Feed was supplied by the company's own mill. It was blown into bins which were located on concrete alleyways between houses. Although there was no spillage, feed dust was observed, together with wild bird faeces.

BEDDING: Wood shavings for the next flock were brought once cleansing and disinfection was complete following depopulation. Additional bales of shavings were wrapped in plastic and stacked on a pallet. The whole pallet was wrapped in a further layer of plastic and stored outside. From five weeks of age, top up shavings were added daily. The process described for this involved one person remaining outside and passing the bales manually to another person standing inside the shed. There were conflicting reports about whether each bale was disinfected beforehand. Once the outer layer of plastic had been breached, the whole pallet would either be used or discarded.

WATER: Mains supply with storage in covered header tanks.

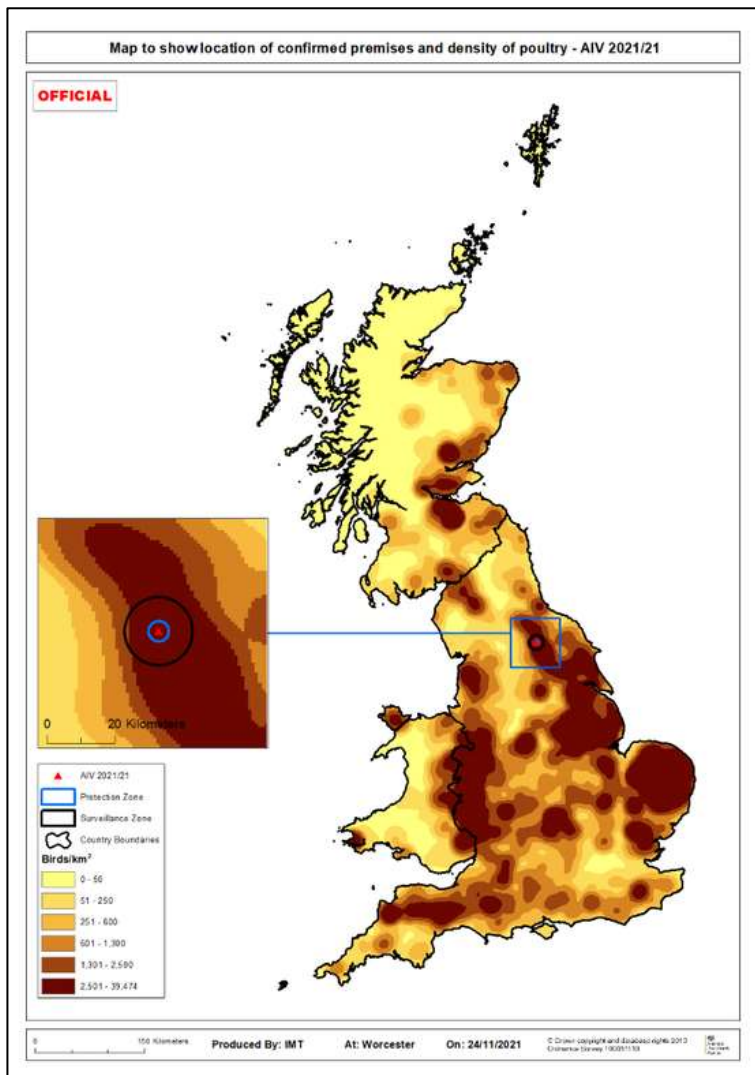
ABP: Dead birds were stored in a freezer and once this was full, frozen carcasses were transferred in a loader bucket into a bin which was outside the boundary of the unit. Collection was carried out monthly.

VERMIN: Rodent activity had been observed around the unit, including mice inside the houses. Pest control was carried out routinely and records were available.

OTHER: This unit and specifically, the first house to become affected was directly adjacent to the composting site and this may have attracted vermin and wild birds. Accumulation of wild bird faeces was noted on the concrete skirt of this house but was not seen around the other houses.

Map with location in Great Britain and poultry density

Figure 73: Location of AIV 2021/21 and poultry density



Overview of the surrounding area

The unit was in a high poultry density area and there was also a significant amount of pig production. There were four other poultry units on the airfield site, all within 1 km of each other. There was an unrelated laying unit within 1 km of the airfield site which subsequently became an IP. There was a pig unit and a pet crematorium contiguous to the site. More widely, there was arable ground and a river to the west. There were various gamebird shoots nearby.

Ornithological assessment:

Desktop assessment: Bridge species were considered likely to be common and appeared to present the most likely potential wild bird infection pathway onto the site. Both gulls and corvids were likely to visit the wider airfield site and approach buildings to contaminate surfaces. Although wildfowl, waders and other water birds

were likely to be generally common in the landscape, it was not thought that they would pose significant infection pressure on this IP. Passerines were not thought to be significant here.

Local intelligence: A small group of partridges was seen on the site at the time of the investigation and pheasants had been seen near the unit recently. Large numbers of geese had been seen flying overhead within the last two weeks preceding the onset of disease.

Clinical picture

On 20/11/2021, 20 birds were found dead at the morning check of section 4A. This was above recent normal fluctuations. The private vet was called and found that the birds were having seizures and subsequently dying quickly. Avian influenza could not be ruled out and thus, it was reported to APHA and a consultation case was initiated on the same day.

APHA found that 150 birds had now died in section 4A. Clinical signs recorded included lethargy, dullness, gasping, discolouration of the throat, recumbency and seizures quickly followed by death. Post-mortem findings included haemorrhages of head and neck area, congestion of throat and lungs and petechial haemorrhages of abdominal organs. Deaths continued and approximately 300 birds had died by mid-afternoon.

With regard to the initial 20 birds found dead, it is likely that some of them died overnight on 19/11/2021. Further review of mortality data shows that three mortalities were recorded on 19/11/2021 and three on 18/11/2021. Although 3 deaths would not be considered outside of normal fluctuations, a precautionary approach was taken and the onset of clinical signs was considered to be 18/11/2021.

Other houses did not become affected until at least two days later.

Timeline

Tracings windows

Source tracings window:

High-risk:	15/11/2021 to 17/11/2021
Likely:	04/11/2021 to 14/11/2021
Precautionary:	30/10/2021 to 03/11/2021

Spread tracings window:

High-risk:	16/11/2021 to 20/11/2021
Likely:	05/11/2021 to 15/11/2021
Precautionary:	31/10/2021 to 04/11/2021

Most likely date of infection: 15/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 74: Source and spread timeline for AIV 2021/21

Source Tracing Window	Spread Tracing Window	Date	
		29/10/21	
Day 19		30/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		31/10/21	Start of precautionary spread tracing window (+24h).
Day 17		01/11/21	
Day 16		02/11/21	
Day 15		03/11/21	
Day 14		04/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	05/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	06/11/21	
Day 11	Day 3	07/11/21	
Day 10	Day 4	08/11/21	
Day 9	Day 5	09/11/21	
Day 8	Day 6	10/11/21	
Day 7	Day 7	11/11/21	
Day 6	Day 8	12/11/21	
Day 5	Day 9	13/11/21	
Day 4	Day 10	14/11/21	
Day 3	Day 11	15/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	16/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	17/11/21	
	Day 14	18/11/21	Precautionary onset of clinical signs. 3 birds found dead
	Day 15	19/11/21	3 birds found dead
	Day 16	20/11/21	20 birds found dead at morning check (died overnight). Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021 63). Restrictions served.
		21/11/21	H5N1 confirmed by CVO and given case reference AIV2021 21
		22/11/21	VFEI Investigation. Culling commenced
		23/11/21	
		24/11/21	HPAI H5N1 confirmed by CVO
		25/11/21	
		26/11/21	
		27/11/21	Culling completed
		28/11/21	
		29/11/21	
		30/11/21	Preliminary C&D completed
		01/12/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

38 premises with poultry holding between 2-128,400 birds (10 premises with 50 or more birds).

SZ (3-10 km)

195 premises with poultry holding between 1-240,000 birds (30 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were instructed for a pest controller, a catching gang, two private vets and feed deliveries. These resulted in two visits to other poultry premises associated with the pest controller and catching gang. All tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds; this was attributed a high likelihood assessment with low uncertainty.

Assessment and evidence base for the likely source

Tracing investigations had not identified any likely lateral transmission pathways onto this unit. All pathways assessed were found to be low, very low or negligible likelihood. Biosecurity protocols for visiting personnel and vehicles were generally considered to be good.

Although biosecurity for regular personnel and routine management was generally also good, there were a few aspects which could increase the likelihood of virus entering the bird area. These included: (i) storage of bedding outside and the daily addition of bedding into the houses (ii) evidence that mice could enter the houses (iii) specifically with regard to section 4A, the proximity to the compost site which may have increased wild bird (and vermin) presence, together with evidence of accumulation of wild bird droppings around this house which wasn't evident around the other houses.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk. Tracing investigations have shown that all other potential spread pathways are low, very low or negligible likelihood with low uncertainty.

Remaining uncertainty

There is no remaining uncertainty.

AIV 2021/22, Near Leeming Bar, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The infected premise was a free-range layer unit. Bovans Brown laying hens had been placed in April 2021 as approximately 16-week-old pullets. The birds had been housed since 12/11/2021 following disclosure of AIV 2021/13. The site was part of the British Egg Industry Council Lion Code and RSPCA Freedom Food assurance schemes.

The unit was a satellite development of a main gathering of farm buildings that included an indoor pig unit kept under the same CPH, as well as a feed mill and stores. The pig unit was run as a separate business.

Feed was milled on the main site and delivered to feed bins on the poultry unit. The site was managed by the owner of the pig unit and his wife.

Eggs were collected by conveyer belts in each building, with an external covered section of conveyer belt transferring the eggs from Houses 2 & 3 to the on-farm egg packaging room in the anteroom of House 1. Eggs were sold under contract to an AI designated egg packing station that arranged collection. The farm had previously had farm gate sales of eggs however these had last been restocked on 13/11/2021 and no further sales were made from 15/11/2021, following disclosure of avian influenza at AIV 2021/13.

The use of bedding was limited due to the design of the sheds; two pallets of Easichick wood fibre bedding were placed in the anteroom of House 2 for storage when the batch of birds was placed. This was then distributed throughout the sheds periodically. The last use of the bedding was at the end of October, approximately one month prior to disease suspicion. The bedding was stored undercover within the house and the only opportunity for exposure would have been when some was manually carried over for use in House 1.

Land parcels to the north of the main farm buildings were being used for sheep grazing and were rented out to a neighbour. At the time of the visit, daily checks of the sheep were being undertaken by the farm owners' father to prevent any movement on by the owner of the sheep.

Species and number of each present

The infected premise (IP) was a 38 000 bird free range layer unit. The site is also a weaner /finisher pig unit and grazing was rented out to a local sheep farmer at the time of disease incursion.

Description of the housing

The poultry housing consisted of two buildings to the south-west of the main farm steading (figure 1), one of which was flat decked (House 1, built in 2007) housing

12,000 birds. The other was a multi-tiered system. Both were described as being in a good state of repair. The multi-tiered building was split into two houses internally, House 2 housing 10,000 birds and House 3 housing 16,000 birds. Each building also had internal divisions, separating the sheds into sections (figure 2). The buildings were surrounded by a concrete apron, which was kept visibly clean.

The washings drained into a subterranean storage tank, which was emptied as required. The ranging areas extended east, south and west from the housing (figure 3) and had been described by APHA staff familiar with the unit as being well used by the hens.

Plan of the infected premises

Figure 75: Plan of AIV 2021/22

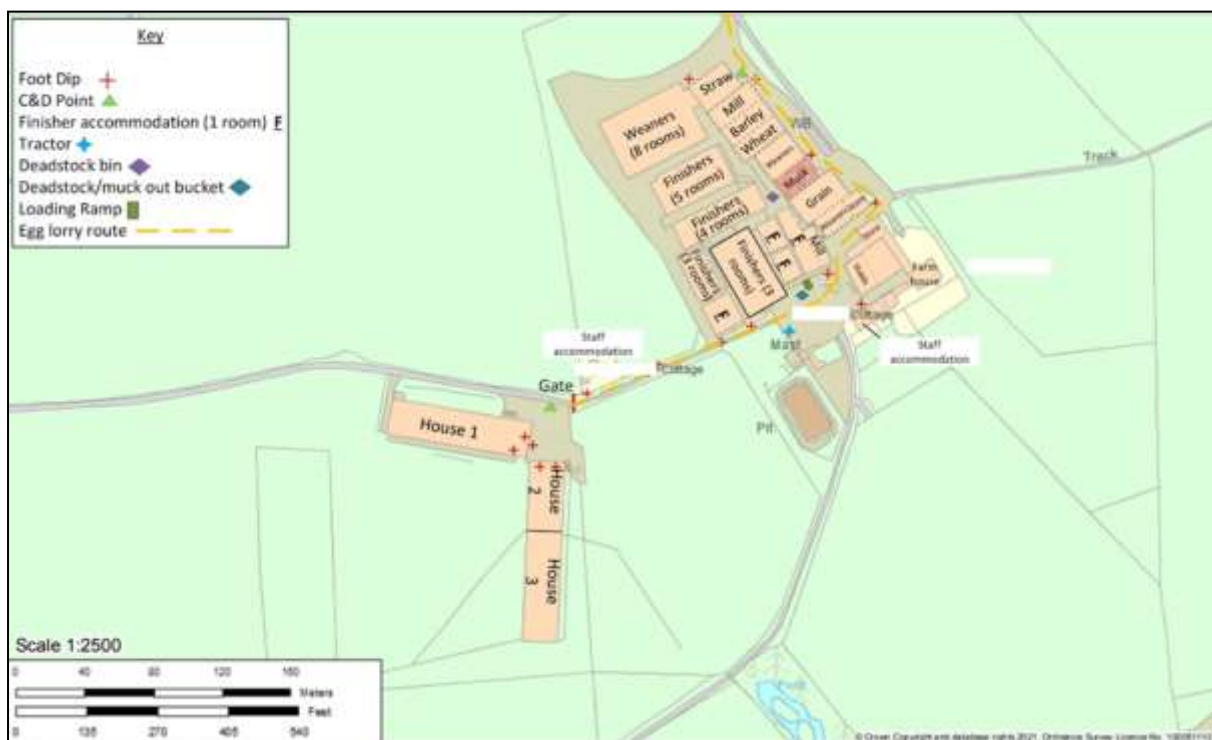


Figure 76: Detailed plan of bird accommodation

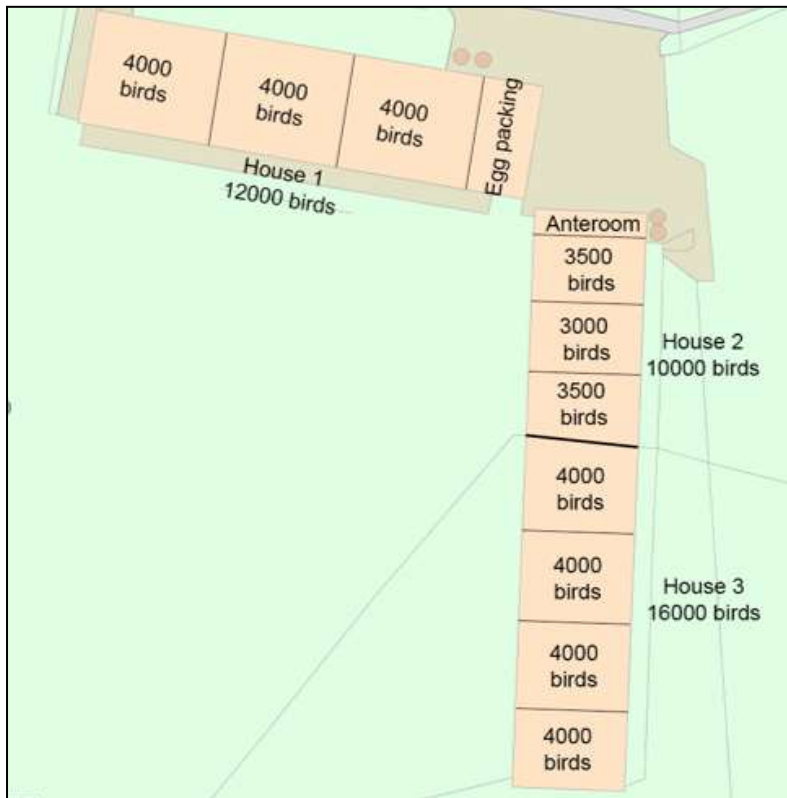
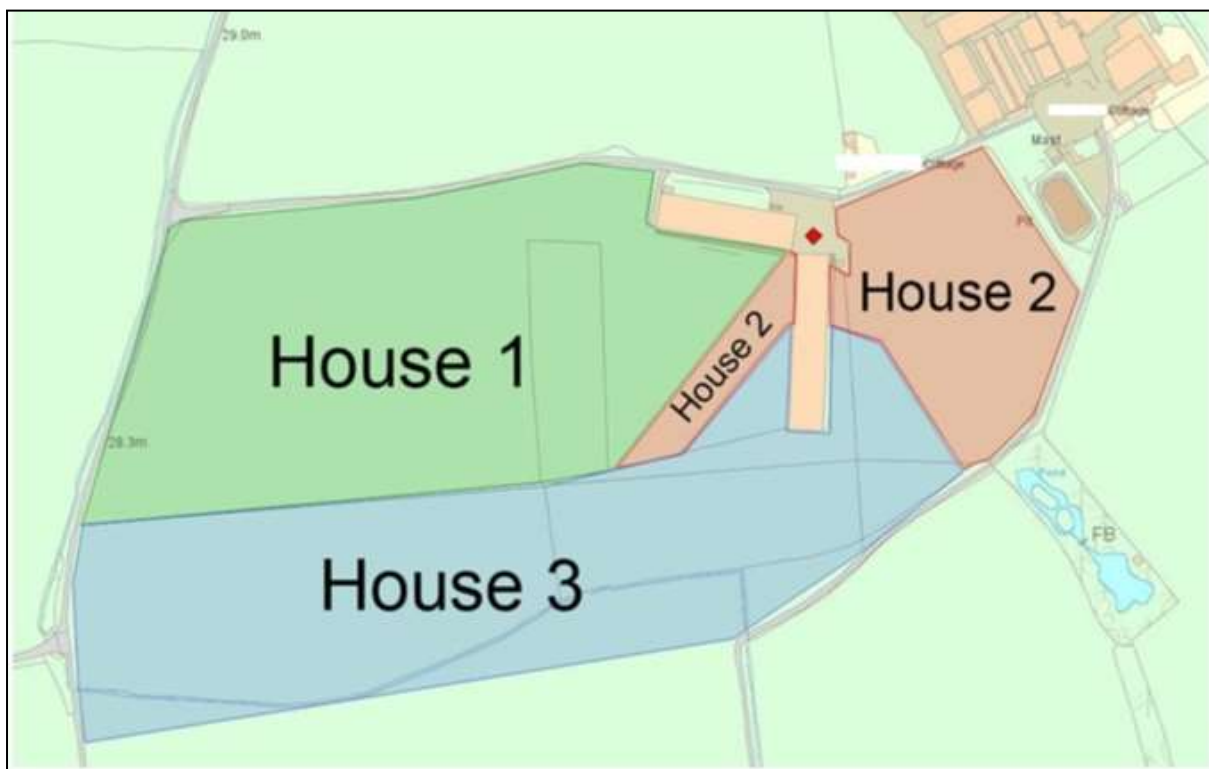


Figure 77: Plan showing the bird ranging areas.



Overview of biosecurity

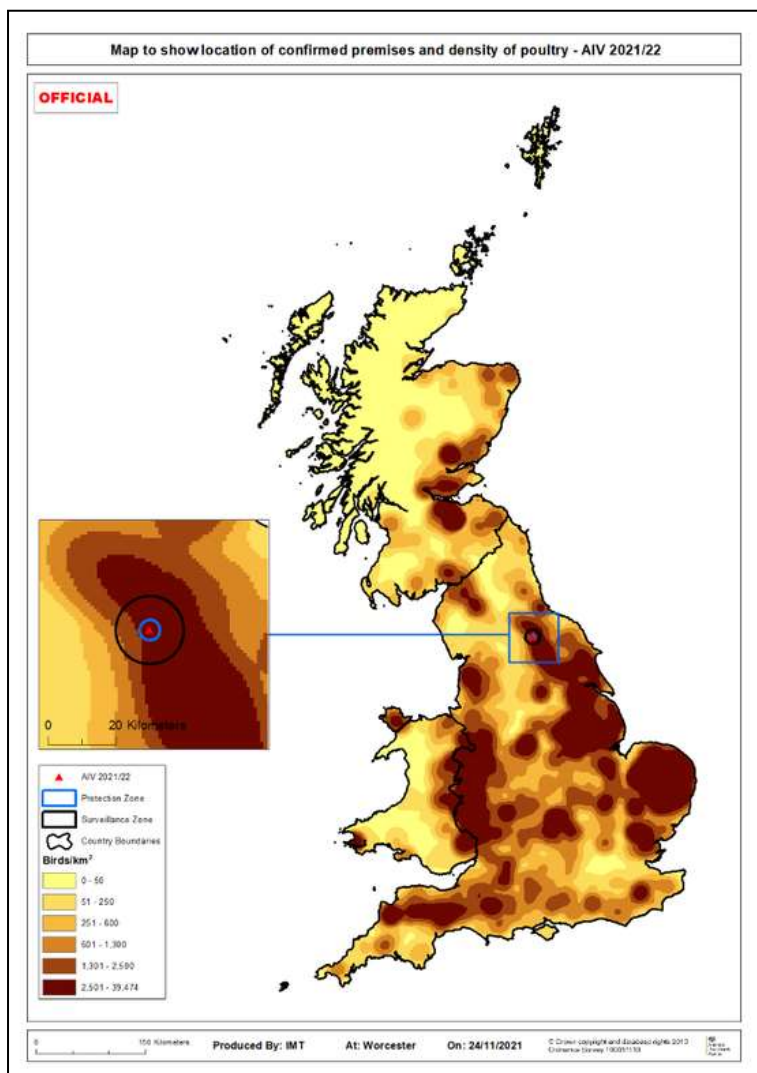
Biosecurity was assessed as good at this site, as it was known that the pig unit had previously had a salmonella infection that had never been spread into the poultry sheds.

Staff were prohibited from working with, or owning, other poultry. The owner would shower and change his clothing before moving from the pigs to the poultry. The poultry staff had site specific clothing that was washed at 90 °C when visibly soiled and site-specific wellingtons were used. C and D points were present at the access points to the sheds.

Birds were housed on the 12/11/2021 because of AIV 2021/13 being disclosed approximately 1.5 km distant.

Map with location in Great Britain and poultry density

Figure 78: Location of IP and poultry density



Overview of the surrounding area

The poultry unit was a satellite site to a larger more extensive group of buildings including an 8000 weaner-finisher pig unit. A veterinary risk assessment was completed to assess the risk of transfer of virus from the poultry unit to the pig unit, and it was concluded that the overall risk was very low.

The unit was situated in the Vale of Mowbray and was within the protection zone of AIV 2021/13. It was close to the River Swale, where it had been noticed during the investigation on AIV 2021/13 that there had been significant wild bird activity. Alongside this, there was also a small pond to the south-east of the ranging area of House 2, separated from the ranging area by a track.

The ranging areas were close to AIV 2021/13, with the distance between the two closest sections of ranging area being approximately 1 km. No direct contact was possible between susceptible stock, and no other susceptible species were identified in the immediate area. A track was shared between AIV 2021/13 and the poultry unit and so following disclosure of AIV 2021/13, any movements onto the poultry site were rerouted via the pig unit, to minimise the risk of fomites from AIV 2021/13 entering the farm.

Ornithological assessment:

Desktop assessment: This lowland and rural IP was set inland in an intensively managed agricultural landscape within the floodplain of the river Swale. The pasture (poultry range) surrounding this free-range unit was close to the river and provided foraging opportunities for wild birds. Whilst no large waterbodies existed nearby, those at distance were known to host significant aggregations of wintering water birds.

Wildfowl were likely to be generally common though it was not clear if any sites close to the IP hosted dense aggregations likely to produce a source of infection pressure. If one of the small waterbodies local to the IP did become a source, it would have been likely that grazing wildfowl might exploit the ranges at the IP.

Waders and other waterbirds were likely to be generally common in this landscape though it was less clear if this includes the locale around the IP or whether these species would regularly use the ranges at this site.

Bridge species were considered likely to be common and appeared to be the most likely infection pathway onto the IP with both gulls and corvids likely to have exploited the range.

Wild passerines were not considered to support a likely infection pathway or have produced any substantial infection pressure as there was no likely source from which they might acquire infection.

Local intelligence: Nothing further.

Clinical picture

The unit had no significant history of disease. Weekly mortality figures for the unit in the period prior to infection showed mortality rates consistently below 0.1% in House 1, and between 0.04%-0.13% for Houses 2 & 3, which ran at slightly higher mortality levels than House 1. Cumulative mortality for the crop at week 47 were around 1.20% for House 1, and 1.43% for Houses 2 & 3. Other performance figures for the flock were good. The flock was vaccinated against infectious bursitis and had not been receiving any medication recently. The birds were described as having been stressed by housing but were otherwise well.

21/11/2021 – At the morning check, approximately 60 hens were found dead in the first section of the bird area in House 1. No other clinical signs were reported. This was over a five-fold increase on the usual weekly mortality figures for the shed.

The owner contacted the private veterinary surgeon, who advised reporting suspicion of avian influenza based on the clinical picture and the proximity to AIV 2021/13. The APHA Veterinary Officer visited on 21/11/2021 and found only a few birds were lethargic. Clinical examinations found no respiratory or neurological signs, good condition litter, and cloacal temperatures taken from five birds were: 41.3 °C, 41.5 °C, 40.5 °C, 41.7 °C, 42.5 °C.

Post-mortem examination of two carcasses found no significant lesions other than congested lungs. Samples were submitted.

22/11/2021 – mortality had increased dramatically, with approximately 315 birds collected from the first section of House 1. Birds were seen to be very lethargic and depressed, had decreased appetite and water intake, decreased egg production, and had diarrhoea.

23/11/2021 – mortality had further increased with approximately 30% of the birds in the first section of House 1 dead, with deaths in the other two sections of House 1. Houses 2 & 3 had some birds reportedly clinically affected, and the end section of House 3 had 40 birds found dead. It was likely that the presence of infection in House 3 reflected spread via staff from House 1, most likely on their boiler suits, which were worn in all houses.

Timeline

Tracings windows

Source tracings window:

High-risk:	17/11/2021 to 20/11/2021
Likely:	06/11/2021 to 12/11/2021
Precautionary:	31/10/2021 to 05/11/2021

Spread tracings window:

High-risk:	18/11/2021 to 21/11/2021
Likely:	07/11/2021 to 17/11/2021
Precautionary:	31/10/2021 to 06/11/2021

Most likely date of infection: 17/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 79: Source and spread timeline for AIV 2021/22

Source Tracing Window	Spread Tracing Window	Date	
Day 21		30/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 20		31/10/21	Start of precautionary spread tracing window (source + 24h).
Day 19		01/11/21	
Day 18		02/11/21	
Day 17		03/11/21	
Day 16		04/11/21	
Day 15		05/11/21	
Day 14		06/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	07/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	08/11/21	
Day 11	Day 3	09/11/21	
Day 10	Day 4	10/11/21	
Day 9	Day 5	11/11/21	
Day 8	Day 6	12/11/21	
Day 7	Day 7	13/11/21	
Day 6	Day 8	14/11/21	
Day 5	Day 9	15/11/21	
Day 4	Day 10	16/11/21	
Day 3	Day 11	17/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	18/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	19/11/21	
Day 0	Day 14	20/11/21	Precautionary onset of clinical signs as initial deaths spotted on 21/11/21 early morning
	Day 15	21/11/21	60 hens found dead in the morning in house 1. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/64). Restrictions served.
	Day 16	22/11/21	Avian Influenza H5N1 HPAI confirmed by CVO based on PCR results with case reference AIV2021-22. Culling commenced.
	Day 17	23/11/21	Veterinary Field Epidemiological Investigation including a veterinary risk assessment regards separation between pigs and poultry.
	Day 18	24/11/21	
	Day 19	25/11/21	
	Day 20	26/11/21	Culling completed
	Day 21	27/11/21	
	Day 22	28/11/21	
	Day 23	29/11/21	
	Day 24	30/11/21	
	Day 25	01/12/21	Preliminary C and D completed
	Day 26	02/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

27 premises with poultry holding between 1-262,300 birds (3 premises with 50 or more birds).

SZ (3-10 km)

152 premises with poultry holding between 1-56,000 birds (18 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for two weekend employees, one visitor delivering tower lights and collection of table eggs to the egg packing centre.

The packing centre was visited, and their biosecurity and egg disposal procedures were verified. No eggs moved within the high-risk window and the tracing was assessed as being very low risk and closed.

No other poultry contacts were identified for the employees and visitor; these tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds

Assessment and evidence base for the likely source

Indirect contact with wild birds either from mechanical transmission by rodents (low level of rodent activity identified on site) or potential contamination from staff boiler suits was considered to be a high likelihood with low uncertainty.

Direct contact with a wild animal source was assessed as a low likelihood with low uncertainty as the laying flock was housed on 12/11/2021 prior to the start of the high-risk source tracing window so reducing the likelihood of direct contact with wild birds.

Indirect introduction from a domestic flock with known or unknown infection was assessed as low with a medium uncertainty due to connections via egg collections however no tracing identified any link. The closest infected premise was AIV 2021/13 which was 1.5 kilometres distant this geographical association increased the assessed uncertainty level. A track was shared between AIV 2021/13 and the poultry unit and so following disclosure of AIV 2021/13, any movements onto the poultry site were rerouted via the pig unit, to minimise the risk of fomites from AIV 2021/13 entering the farm.

Spread investigations: Assessment of potential and likelihood of spread

Given the biosecurity on the site spread from this IP via wildlife was assessed as a low likelihood with low uncertainty and certainly no higher than the likelihood from the background infection in wild birds.

All other spread pathways were assessed as being very low likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/23, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a commercial unit containing turkeys for the Christmas market. The unit was one of five located on a disused airfield in North Yorkshire. Three of the other units had also been populated with turkeys and the remaining one contained broilers. This unit was the second one on the airfield site to become an IP. The remaining three also subsequently became IPs. All five units were owned by a large fully integrated poultry company that had many turkey and broiler rearing and breeding sites across the UK.

The site also included a green waste composting plant, a biomass enterprise, land for storing logs and some buildings of historical significance from the Second World War. Each unit had an office and two biomass boilers associated with it.

Species and number of each present

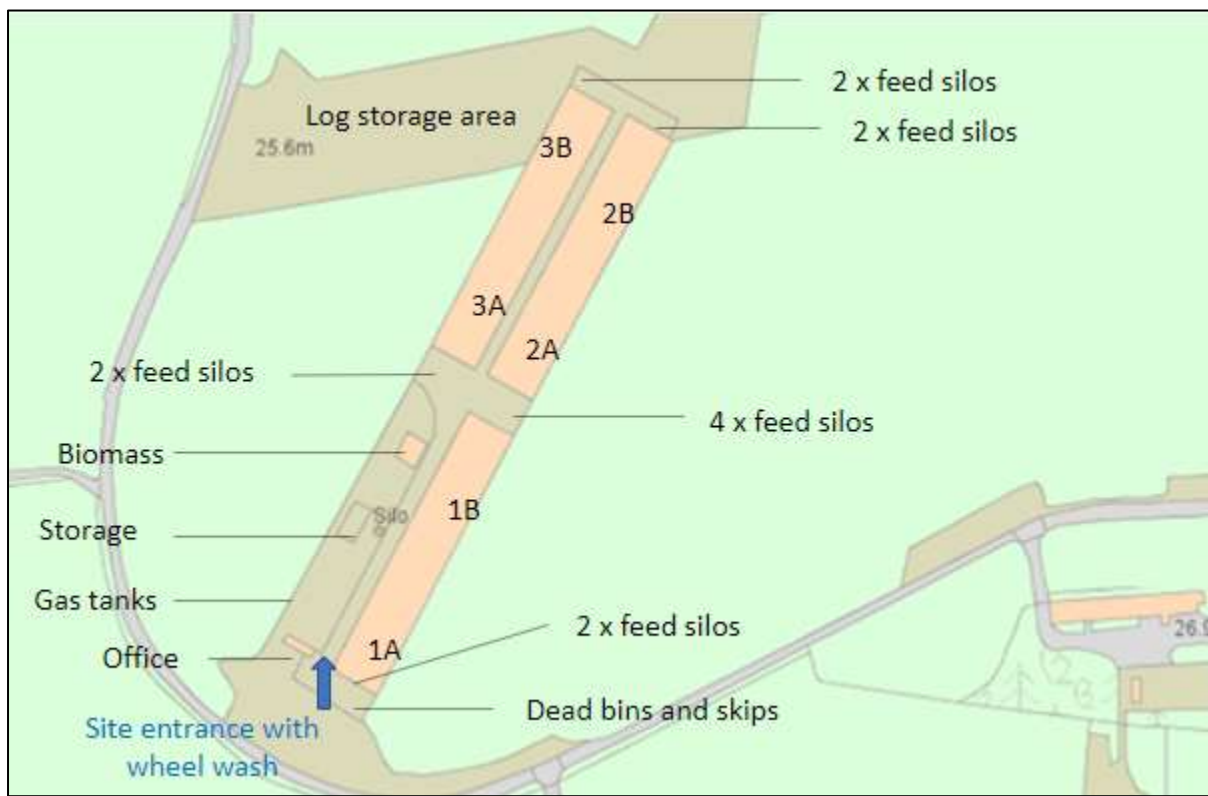
Approximately 33,000 turkeys were placed across three houses, each of which had two separate airspace sections. At the time of the report case, there were approximately 24,000 birds remaining and they were 96 days old.

Description of the housing

The unit comprised three houses of metal construction, which were approximately 4 to 5 years old. Each house was divided into two sections with separate airspaces. The two sections were separated by a management area. The houses were in excellent condition and wild birds would not have been able to enter. Vermin had not been seen inside, but the air intake vents were close enough to the ground that entry through them may have been possible.

Plan of the infected premises

Figure 80: Plan of AIV 2021/23



Overview of biosecurity

On the whole, the unit was considered to have good biosecurity and this was reflected across all the units on this site. A series of standard operating procedures were in place and there was a system of continual staff training. Usually there were two members of staff dedicated to the unit; however, there may have been some recent deviation from this. The company protocol prohibited staff from keeping poultry at home. A visitors' book was maintained in the office, although routine staff were not required to sign in.

PERSONNEL: There was a boot dip prior to entry to the office. Once in the office, staff changed into unit dedicated wellingtons and sometimes also unit dedicated overalls. If there were not enough wellingtons, boot covers would be used. There were further boot dips for entry to the houses. Once inside the houses, there was a step-over barrier for entering each separate section. At this point, wellingtons were swapped for a different pair which were only used inside the bird areas. Plastic boot covers may have been used for visitors if there were not enough wellingtons. Provision of a further boot dip prior to entry to the bird areas was variable. Apart from wellingtons and boot covers, other clothing was not changed when moving between bird areas. The reverse process was carried out to leave the unit.

HOUSING: The housing was relatively new and in excellent condition. Wild birds would not have been able to enter.

DELIVERY VEHICLES: Vehicles such as feed wagons had to enter through a barrier. There were facilities for wheel washing and disinfection, Drivers were required to wear boot covers.

FEED: Feed was supplied by the company's own mill. It was blown into bins located on the concrete areas around the houses. Feed deliveries had to come close to the sheds on the curtilage surrounding the buildings.

BEDDING: Wood shavings for the next flock were brought in after cleansing and disinfection was complete, following depopulation. Additional bales of shavings were wrapped in plastic and stacked on a pallet. The whole pallet was wrapped in a further layer of plastic and stored outside. For birds of 5 weeks of age, top up shavings were added daily. The process described for this involved one person remaining outside and passing the bales manually to another person standing inside the shed. There were conflicting reports about whether each bale was disinfected beforehand. Once the outer layer of plastic had been breached, it was reported that the whole pallet would either be used or discarded.

WATER: Mains supply with storage in covered header tanks

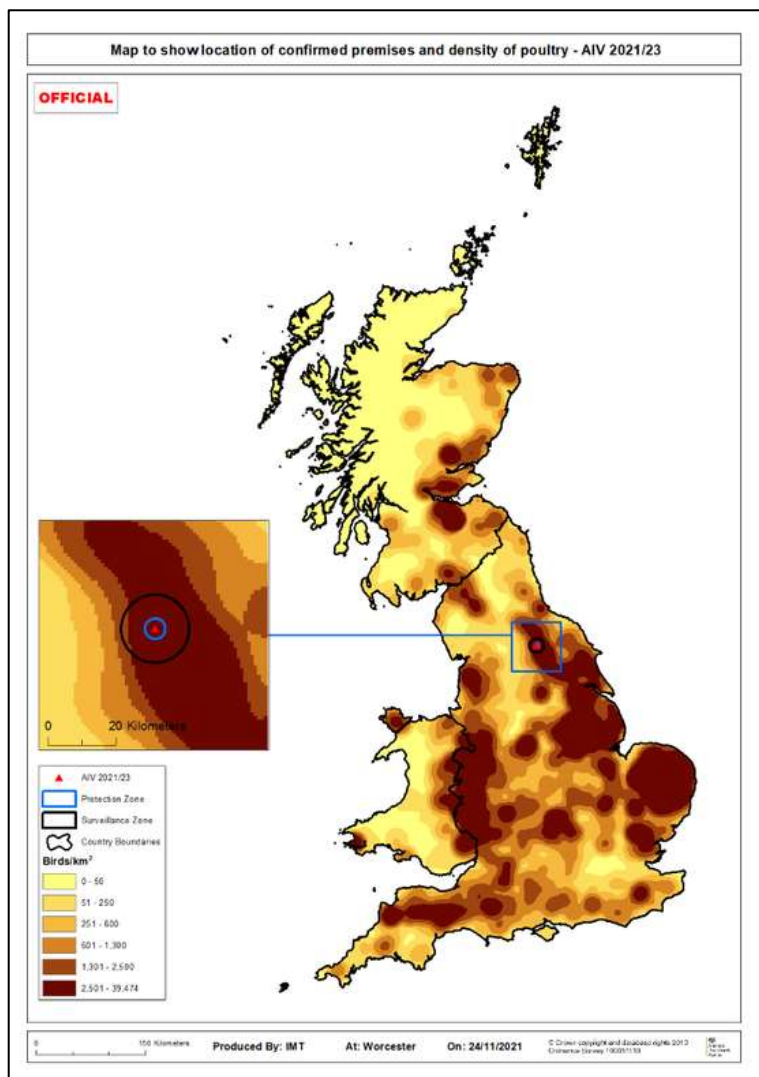
ANIMAL BY-PRODUCTS: Dead birds were stored in a freezer and once this was full, frozen carcasses were transferred in a loader bucket into a bin which was outside the boundary of the unit. Collection usually took place from all the units on the airfield on a pre-arranged date and time.

VERMIN: Pest control was carried out routinely and records indicated that rodent activity had been observed.

OTHER: This unit and specifically, the first house to become infected was adjacent to a large log store. This area was likely to have been attractive to wild birds and vermin. Wild birds could not enter the housing, but there was potential for vermin to enter via the ventilation inlets. There was also an accumulation of organic matter (due to the direction of pressure washing) next to the house that became affected first. There was evidence that vermin had been in this area and it was reported that wild birds roosted there. The organic matter was just below the ventilation inlets also so there was potential for ingress of contaminated dust.

Map with location in Great Britain and poultry density

Figure 81: Location of IP and poultry density.



Overview of the surrounding area

The unit was in a high poultry density area and there was also a significant amount of pig production in the area. There were four other poultry units on the airfield site, all within 1 km of each other. One of these was already an IP at the time that this unit became infected. There was an unrelated laying unit within 1 km of the airfield site which subsequently became an IP. There was a pig unit and a pet crematorium contiguous to the site. More widely, there was arable ground and a river to the west. There were various gamebird shoots nearby.

Ornithological assessment:

Desktop assessment: Bridge species were considered likely to be common and appeared to present the most likely potential wild bird infection pathway onto the site

with both gulls and corvids likely to have visited the wider airfield site and approach buildings to contaminate surfaces. Although wildfowl, waders and other water birds were likely to be generally common in the landscape, it was not thought that they would have posed significant infection pressure on this IP. Passerines were not thought to be significant here.

Local intelligence: Pheasants had been seen around the airfield site recently. Large numbers of geese had been seen flying overhead within the last two weeks preceding the onset of disease.

Clinical picture

21/11/2021 – eleven birds were found dead in section 3B. The private vet investigated and found that birds were having seizures, quickly followed by death. Suspicion of notifiable avian disease was reported.

On investigation, APHA found 12.5% morbidity in section 3B. Clinical findings included neurological signs, respiratory distress, swollen heads with haemorrhages, straining to pass faeces recumbency and death. Post-mortem findings included congestion of lungs, inflammation of the liver, fluid filled crop, pericarditis and petechial haemorrhages on abdominal organs. By the evening of 21/11/2021, there had been a total of 250 deaths.

Of the initial eleven birds found dead, it was likely that some of them had died overnight on 20/11/2021. Further review of mortality data showed that there had been four deaths on 20/11/2021 and three deaths on 19/11/2021. Although these appeared to be within recent normal fluctuations, a precautionary approach was taken and the onset of clinical signs was considered to be 19/11/2021.

Other houses did not become affected until at least 2 days later.

Timeline

Tracings windows

Source tracings window:

High-risk:	16/11/2021 to 18/11/2021
Likely:	05/11/2021 to 15/11/2021
Precautionary:	31/10/2021 to 04/11/2021

Spread tracings window:

High-risk:	17/11/2021 to 21/11/2021
Likely:	06/11/2021 to 16/11/2021
Precautionary:	01/11/2021 to 05/11/2021

Most likely date of infection: 16/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 82: Source and spread timeline for AIV 2021/23

Source Tracing Window	Spread Tracing Window	Date	
Day 20		30/10/21	
Day 19		31/10/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		01/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		02/11/21	
Day 16		03/11/21	
Day 15		04/11/21	
Day 14		05/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	06/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	07/11/21	
Day 11	Day 3	08/11/21	
Day 10	Day 4	09/11/21	
Day 9	Day 5	10/11/21	
Day 8	Day 6	11/11/21	
Day 7	Day 7	12/11/21	
Day 6	Day 8	13/11/21	
Day 5	Day 9	14/11/21	
Day 4	Day 10	15/11/21	
Day 3	Day 11	16/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	17/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	18/11/21	
	Day 14	19/11/21	Precautionary onset of clinical signs. 3 birds found dead
	Day 15	20/11/21	4 birds found dead
	Day 16	21/11/21	11 birds found dead at morning check (died overnight). Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/63). Restrictions served.
		22/11/21	Avian Influenza H5N1 confirmed by CVO based on PCR results with case reference AIV2021-23.
		23/11/21	VFEI investigation.
		24/11/21	HPAI H5N1 confirmed by CVO
		25/11/21	
		26/11/21	Culling Commenced
		27/11/21	
		28/11/21	Culling Completed
		29/11/21	
		30/11/21	
		01/12/21	Preliminary C&D completed
		02/12/21	Preliminary C&D considered effective
		Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.	
		Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.	

Surveillance activity

PZ (0-3 km)

45 premises with poultry holding between 2-180,000 birds (15 premises with 50 or more birds).

SZ (3-10 km)

186 premises with poultry holding between 1-240,000 birds (26 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the private vet, one visitor for a pest control check, one visitor who delivered equipment, two visitors from a biomass company to deliver woodchip, two engineers who serviced the boiler, one electrician who checked the proxy sensor and feed deliveries.

No other poultry contacts were identified for these tracings which were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds; this was attributed a high likelihood assessment with low uncertainty.

Assessment and evidence base for the likely source

Tracings investigations had not identified any likely lateral transmission pathways onto this unit. All pathways assessed were found to be low, very low or negligible likelihood. Biosecurity protocols for visiting personnel and vehicles were generally considered to be good.

Although biosecurity for regular personnel and routine management was generally also good, there were a few aspects that could increase the likelihood of virus entering the bird area. These included

- (i) storage of bedding outside and the daily addition of bedding into the houses
- (ii) the low level ventilation inlets which could have allowed entry of rodents and or contaminated organic material
- (iii) specifically with regard to section 3B, the proximity of the log storage area and the accumulation of organic matter together with reports and evidence of wild bird and vermin activity in this area.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered to be higher than the background risk.

Tracings investigations showed that all other potential spread pathways were low or negligible likelihood with low uncertainty.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/24, Near Barrow upon Soar, Charnwood, Leicestershire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial free range laying hen site and part of a large commercial company. An all-in, all-out stocking system was employed.

All birds had been voluntarily housed and denied access to the ranges since 19/11/2021.

In addition to the IP there were a further five linked premises, three of which subsequently also became IPs:

1. The main site which contained the company head office and egg packing centre as well as a number of colony cage houses containing in excess of 200,000 laying hens.
2. A site containing approximately 30,000 free range (but housed at the time) laying hens in two houses. This site was approximately 500 metres from this premises and was subsequently confirmed as AIV 2021/40.
3. A site containing approximately 96,000 free range (but housed at the time) laying hens in six houses. This site was subsequently confirmed as AIV 2021/41.
4. A site containing a rearing unit and an organic laying unit (not populated at the time).
5. A site containing 64000 free range (but housed at the time) laying hens in two houses.
6. A site located on the opposite side of the road to the IP, related to the same overall business but separately run by the IP owner's sister containing 32,000 free range (but housed at the time) laying hens in a single house. This site was subsequently confirmed as AIV 2021/31.

There were three houses on this premises. Houses 1 and 2 were part of the same building while House 3, the largest, was located on the other side of the access road.

There was an egg vending machine situated next to the access road before the start of the paths leading to the poultry houses. The machine was filled daily and would receive between 30 – 40 visits per day by members of the public. Access to the paths to the poultry houses was denied to the general public.

The company manager and owner lived on site, as well as the families of farm workers.

Carcases and occasionally some waste eggs were double bagged and transported for disposal via an incinerator at the nearby premises which subsequently became AIV 2021/40. However, most of the waste eggs were disposed of via the egg packing centre.

Species and number of each present

26,000 free-range layers in three houses, each with its own free-range area:

House 1: 5,000 layers

House 2: 5,000 layers

House 3: 16,000 layers

The birds were 44 weeks old at the time of the disease report.

Description of the housing

Houses 1 and 2 had their own separate airspaces but were linked by the egg room and shared the same packing, storage and toilet area. Each house had its own range area but beak-to-beak-contact between the birds was possible along one fence in the free-range areas. The sheds were of wooden construction with concrete floors and contained single tier nest boxes running down the centre. Ventilation was via side inlets and extracted through roof vents.

House 3 was separated from other houses by the access driveway and was of steel construction with double tier nest boxes and natural ventilation. It had its own range and no contact with birds from the other houses was possible.

Plan of the infected premises

Figure 83: Site plan of AIV 2021/24

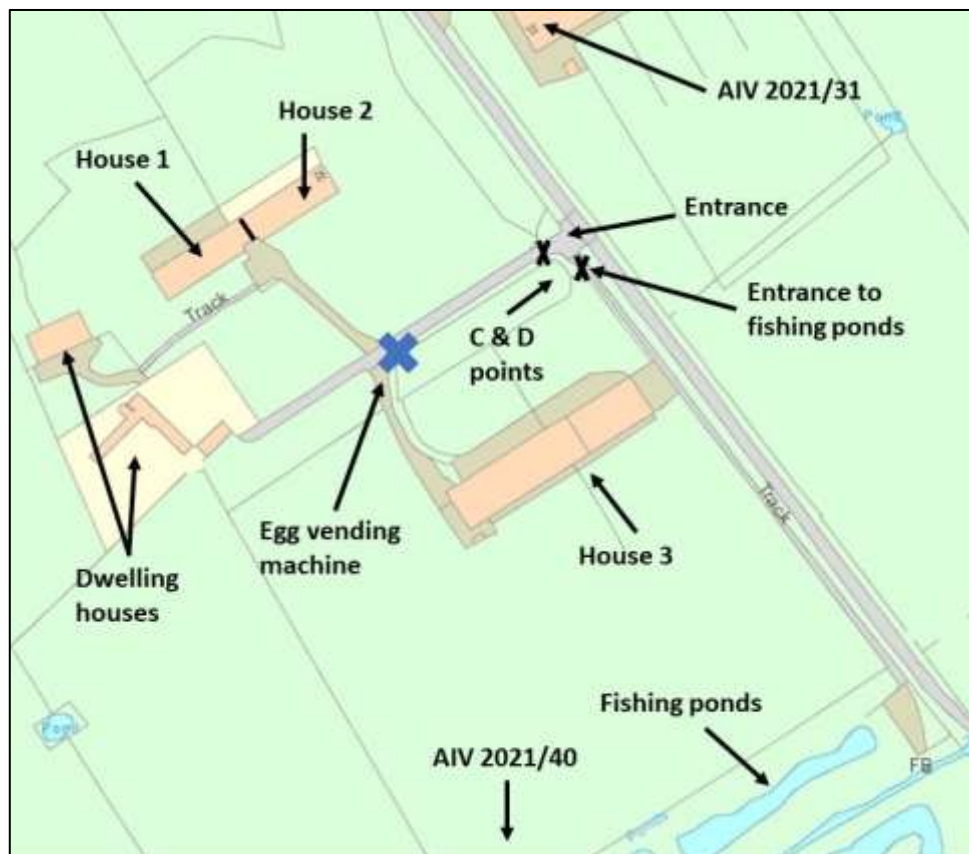
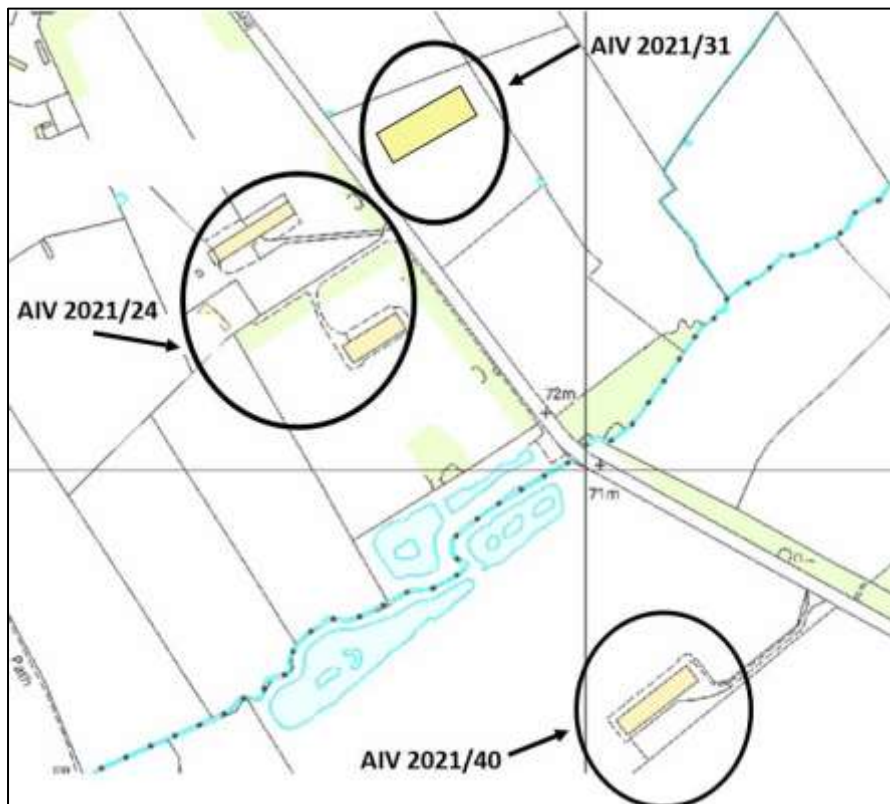


Figure 84: Plan showing the location of AIV 2021/24 in relation to other subsequent IPs and the fishing ponds



Overview of biosecurity

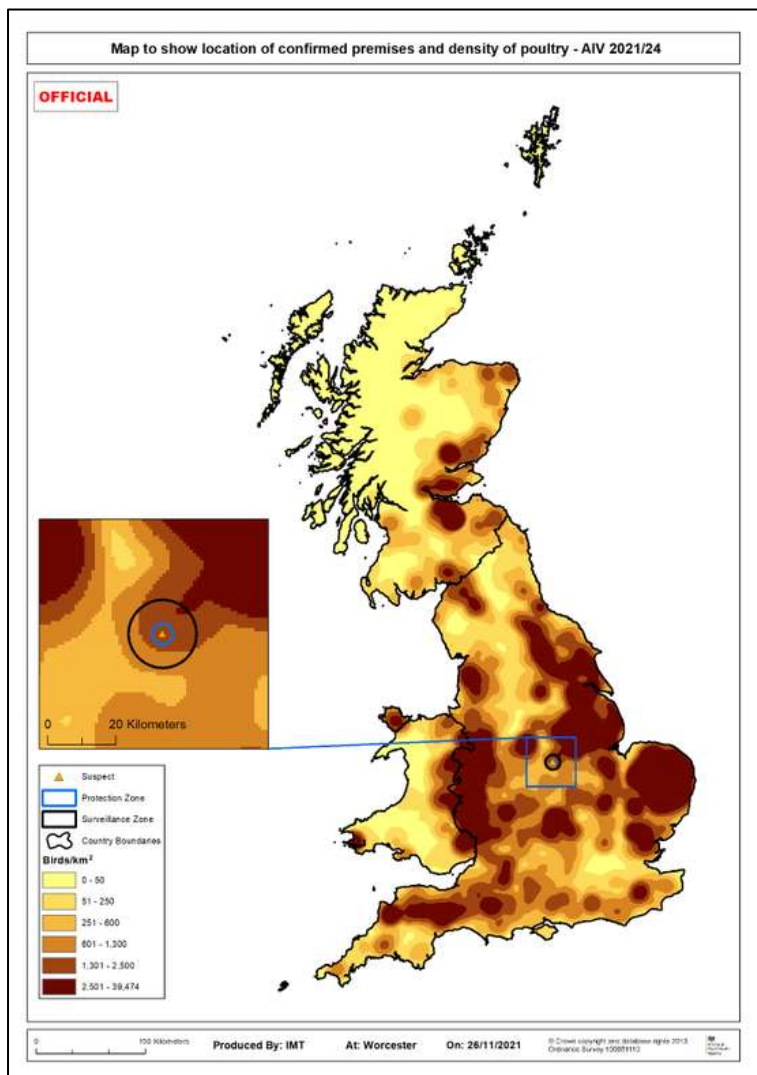
Biosecurity was assessed as good. Staff were dedicated to the site and there were disinfection points (using Bio-VX approved disinfectant) outside each house and at the entrance to the specific houses. The outside foot dips were covered and separate wellingtons were used for houses 1 and 2, and house 3 but overalls were not changed between houses.

A flock health plan was available including biosecurity information and biosecurity signage was present in each shed.

Visitors to the poultry were only permitted following agreement with the farm manager and the visitor book for signing was located in the main office.

Map with location in Great Britain and poultry density

Figure 85: Location of IP and poultry density



Overview of the surrounding area

The IP was located in an area of high poultry density.

A series of fishing ponds known to attract wild waterfowl were located nearby to the south of the site and in close proximity to the IP as well as the two subsequently confirmed IPs (AIV 2021/31 and 40).

Ornithological assessment:

Desktop assessment: This lowland and rural IP was set inland in an intensively managed agricultural landscape. The site was sufficiently close to the river Soar and a number of large waterbodies associated with its floodplain for this to affect its use by wild waterbirds.

There were also pools adjacent/close to the ranges of these free-range units.

Wildfowl were likely to be abundant on significant waterbodies and at least common local to the site. This was likely to produce a source of infection in this landscape as well as suggesting that wildfowl may also have enabled direct and indirect infection pathways by moving the very short distances from pools onto the ranges.

Waders and other waterbirds were likely to be generally common in this landscape. As well as contributing as sources of infection here, some of these species may also have exploited the ranges of the IPs and enabled indirect infection pathways by contaminating surfaces, contributing to the infection pressure at these sites.

Bridge species were considered likely to be common and appeared to present the most likely potential wild bird infection pathway onto the site with both gulls and corvids likely to have visited this cluster of potential foraging sites, producing direct and indirect infection pathways.

Wild passerines may also have contributed a number of alternative infection pathways to add to the infection pressure here.

Conclusion: An obvious substantial source of infection pressure.

Local intelligence: A fox caught a chicken on 17/11/2021, the carcass was lying around on the range and accessed by wild birds (crows, magpies).

A seagull was seen near houses 1 and 2 around 18/11/2021, the most likely date of infection for the site.

The owner had noticed a broken louvre on house 2 on the morning of 19/11/2021.

Clinical picture

22/11/2021 – 15 birds were found dead in House 2.

23/11/2021 – a further 51 were found dead and six were culled. Suspicion of notifiable avian disease was reported.

At the APHA investigation the same day, birds in Houses 1 and 3 appeared healthy with no observed signs of disease. (30 dead birds were found in the partition area of shed 3 but this event was attributed to a likely smothering incident). In House 2 an additional 25 mortalities had occurred. The birds were quiet and some were unable to move. Approximately 10% of the birds presented with cyanotic combs and wattles and conjunctivitis with swollen eyes. No changes in water consumption or egg production were noted. Samples were submitted.

Mortality in house 2 continued to increase over the subsequent days and on 27/11/2021 birds in houses 1 and 3 had started to show signs (15 mortalities found in House 1 and some birds reported as being lethargic in House 3).

Timeline

Tracings windows

Source tracings window:

High-risk:	18/11/2021 to 20/11/2021
Likely:	07/11/2021 to 17/11/2021
Precautionary:	02/11/2021 to 06/11/2021

Spread tracings window:

High-risk:	19/11/2021 to 23/11/2021
Likely:	08/11/2021 to 18/11/2021
Precautionary:	03/11/2021 to 07/11/2021

Most likely date of infection: 18/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 86: Source and spread timeline for AIV 2021/24

Source Tracing Window	Spread Tracing Window	Date	
Day 19		02/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		03/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		04/11/21	
Day 16		05/11/21	
Day 15		06/11/21	
Day 14		07/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	08/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	09/11/21	
Day 11	Day 3	10/11/21	
Day 10	Day 4	11/11/21	
Day 9	Day 5	12/11/21	
Day 8	Day 6	13/11/21	
Day 7	Day 7	14/11/21	
Day 6	Day 8	15/11/21	
Day 5	Day 9	16/11/21	
Day 4	Day 10	17/11/21	
Day 3	Day 11	18/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	19/11/21	Start of high risk spread tracing window (source +24h). Birds housed.
Day 1	Day 13	20/11/21	
	Day 14	21/11/21	Precautionary onset of clinical signs based on production records - 4 dead in House 2.
	Day 15	22/11/21	16 dead in House 2.
	Day 16	23/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/70). Restrictions served. 64 dead in House 2.
	Day 17	24/11/21	342 dead in House 2.
	Day 18	25/11/21	H5N1 confirmed on PCR results (AIV 2021/24) > 1000 dead in House 2.
	Day 19	26/11/21	Culling commenced.
	Day 20	27/11/21	
	Day 21	28/11/21	
	Day 22	29/11/21	
	Day 23	30/11/21	
	Day 24	01/12/21	
	Day 25	02/12/21	
	Day 26	03/12/21	Culling completed.
	Day 27	04/12/21	
	Day 28	05/12/21	Preliminary C&D completed.
	Day 29	06/12/21	Preliminary C&D effective.
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

65 premises with poultry holding between 1-251,000 birds (8 premises with 50 or more birds).

SZ (3-10 km)

206 premises with poultry holding between 1-273,100 birds (17 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the private vet, the IP owner, one pest control visitor, feed deliveries, ABP collected and collection of table eggs to the egg packing centre.

The packing centre was visited, and their biosecurity and egg disposal procedures were verified; the tracing was assessed as being low risk and closed. However, it also identified as part of the egg collection route, a poultry premises, not technically part of the company but with familial links and proximity, which had been visited by the same egg collection vehicle during high-risk window. This premises subsequently became a report case and AIV 2021/31.

The ABP collected was delivered to the incinerator which was co-located with another company poultry premises which became AIV 2021/40, however the last collection was outside the high-risk window. This tracing was assessed as being low risk and closed.

On enquiries, it was confirmed the feed delivery had not occurred in the high-risk tracing windows, no further action was required, and the tracing was closed.

The IP owner had visited one other company poultry premises within the high-risk window which was empty of birds. This was assessed as being very low risk and the tracing closed.

No other poultry contacts were identified for the private vet and pest control visitor; these tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds (high likelihood with low uncertainty).

Assessment and evidence base for the likely source

The birds were housed on 19/11/2021 but it is likely that they would have come into contact with infected wild birds or a contaminated environment prior to this (the most likely date of infection was 18/11/2021).

The birds were in close proximity to fishing ponds where numerous wild birds were known to congregate.

A seagull was seen near houses 1 and 2 around 18/11/2021 and crows and magpies had been observed on the ranges.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wild birds: Risk not higher than the background risk.

However, some fox predation was known to have occurred whilst the birds were still free ranging and so potential fomite transmission via translocation of carcasses could not be entirely discounted.

All other potential spread pathways were assessed as low or very low likelihood.

Remaining uncertainty

None other than previously described.

AIV 2021/25, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a commercial unit containing turkeys for the Christmas market. The unit was one of five located on a disused airfield in North Yorkshire. Three of the other units had also been populated with turkeys and the remaining one contained broilers. This was the third of the units containing turkeys to become an IP. The other two units subsequently became IPs. These five units were owned by a large fully integrated poultry company which had many turkey and broiler rearing and breeding sites across the UK.

The site also included a green waste composting plant, a biomass enterprise and land for storing logs. Each unit had two biomass boilers associated with it.

Species and number of each present

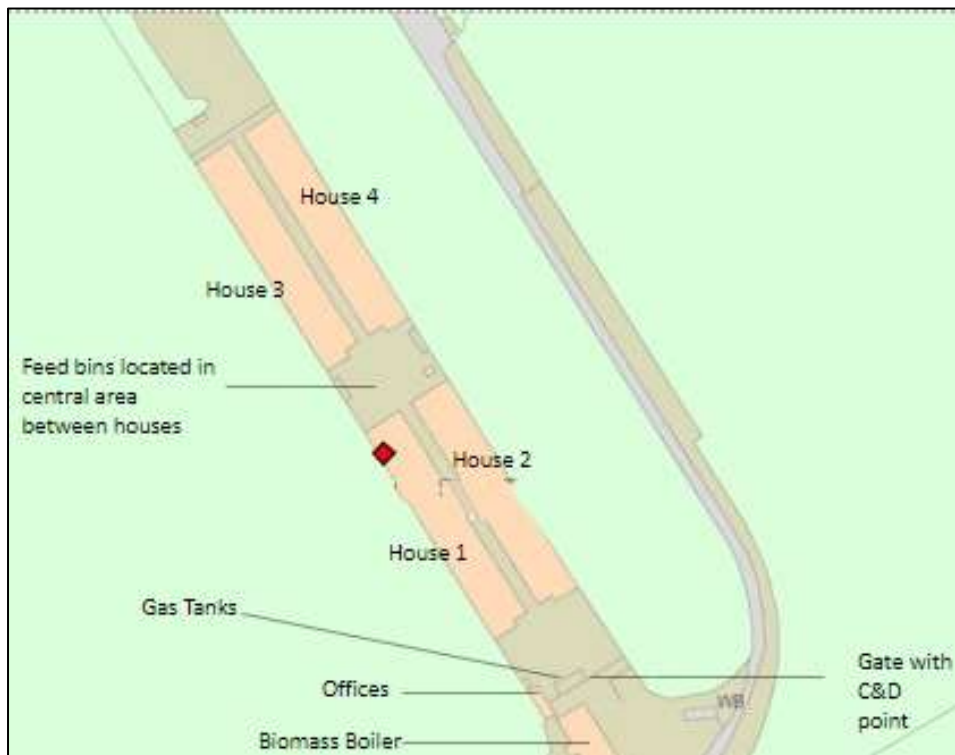
Approximately 59,000 turkeys had been placed across four houses, each of which had two separate airspace sections. An exceptional movement of turkeys to one of the other units on the site (which became an IP shortly after this one) took place on 18/10/2021, which was outside the tracing windows. Following this, there were approximately 9000 turkeys remaining in each of the houses. At the time of the report case, there were between 8,675 and 9,008 birds in each house and they were 78-82 days old.

Description of the housing

The unit comprised four houses of metal construction, which were approximately 4-5 years old. Each house was entered via an atrium. The houses were in very good condition. Wild birds could not enter the houses, but there was evidence of rodent activity around the external areas of the unit. This unit was adjacent to large piles of woodchip which were used for the biomass enterprise and it was thought that these would have encouraged wild birds and vermin. The piles of woodchip were very close to the house that was affected first (House 4).

Plan of the infected premises

Figure 87: Plan of AIV 2021/25



Overview of biosecurity

On the whole, the unit was considered to have had good biosecurity and this was reflected across all units on this site. A series of standard operating procedures were in place and there was a system of continual staff training. There were two members of staff dedicated to the unit and company protocol prohibited them from keeping poultry at home. A visitors' book was maintained in the office, although routine staff were not required to sign in.

PERSONNEL: There was a shower-in, shower-out protocol on this unit. Staff and visitors went through the shower facility prior to entering the office, however it could be easily by-passed. At this point, they changed into wellingtons and clothes dedicated to the unit. From here, they crossed the yard and there was a boot dip provided at the entrance to each house. Once inside the houses, there was a barrier system prior to entering the bird areas. Wellingtons were swapped for 'bird area dedicated wellingtons' at this point or if there were not enough wellingtons, plastic boot covers would be used instead. Provision of a further boot dip prior to entry to the bird areas was variable. The reverse process was followed to leave the unit.

HOUSING: The houses were approximately 4-5 years old. They were of metal construction and in a good state of repair. Wild birds would not have been able to enter.

DELIVERY VEHICLES: Vehicles such as feed wagons had to enter through a barrier where there were facilities for wheel cleansing and disinfection. Drivers were required to wear boot covers when on the unit.

FEED: Feed was supplied by the company's own mill. It was blown into bins located on a concrete area central to all houses.

BEDDING: Wood shavings for the next flock were brought in after cleansing and disinfection had been completed following depopulation. Additional bales of shavings were wrapped in plastic and stacked on a pallet. The whole pallet was wrapped in a further layer of plastic and stored outside. Once the turkeys reached five weeks of age, top up shavings were added daily. The process described for this involved one person remaining outside and passing the bales manually to another person standing inside the shed. There were some conflicting reports about whether each bale was disinfected beforehand. Once the outer layer of plastic had been breached, the whole pallet would either have been used or discarded.

WATER: Mains supply with storage in covered header tanks.

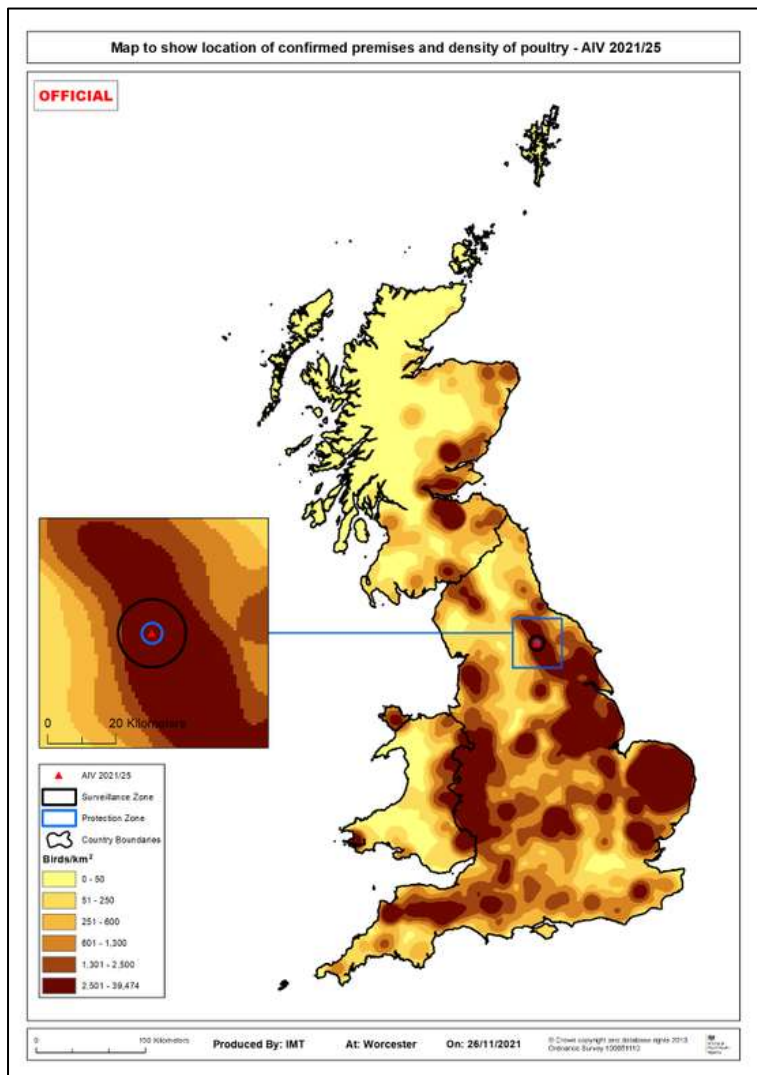
ABP: Dead birds were stored in a freezer and once this was full, frozen carcasses were transferred in a loader bucket into a bin which was outside the boundary of the unit. Collection was carried out monthly.

VERMIN: Evidence of rodent activity was observed on concrete areas around the houses. Pest control was carried out routinely and the records were available, however it was reported to be an on-going challenge.

OTHER: This unit was adjacent to a large, open store of woodchip for the biomass enterprise. Wild birds used it for roosting and rodent activity had been noted.

Map with location in Great Britain and poultry density

Figure 88: Location of IP and poultry density



Overview of the surrounding area

The unit was in a high poultry density area and there was also a significant amount of pig production. There were four other poultry units on the site, all within 1 km of each other. There was an unrelated laying unit within 1 km of the airfield site which subsequently became an IP. There was a pig unit and pet crematorium adjacent to the site. More widely, there was arable ground and a river to the west.

Ornithological assessment:

Desktop assessment: Bridge species were considered likely to have been common and appeared to present the most likely potential wild bird infection pathway onto the site with both gulls and corvids likely to visit the wider airfield site and approach buildings to contaminate surfaces. Although wildfowl, waders and other water birds were likely to have been generally common in the landscape, it was not thought that

they would have posed significant infection pressure on this IP. Passerines were not thought to be significant here.

Local intelligence: Large numbers of geese had been seen flying overhead within the last two weeks preceding the onset of disease. There were various gamebird shoots nearby.

Clinical picture

24/11/2021 – approximately 15 birds were found dead during the morning checks of house 4. This was above recent normal fluctuations. Birds were reported to be having seizures and dying quickly, as had been found on the other units on the site. Suspicion of avian influenza was reported to APHA and a report case investigation was carried out on the same day.

APHA found that a further 18 birds were dying and recorded clinical signs including pyrexia, depression, lethargy, discharge from beak and nostrils, diarrhoea and recumbency. Post-mortem findings included generalised hyperaemia, congestion of lungs and spleen, pericarditis and watery intestinal contents. The other houses remained unaffected at the time of the investigation and the following day.

Some of the first 15 birds to be found dead had died overnight. Further review of mortality data showed that three birds had died between 22/22/2021 and 24/11/2021. Although this was within the limits of daily fluctuations in mortalities over the course of the crop, a precautionary approach was taken and the onset of clinical signs was considered to be 22/11/2021.

Timeline

Tracings windows

Source tracings window:

High-risk:	19/11/2021 to 21/11/2021
Likely:	08/11/2021 to 18/11/2021
Precautionary:	03/11/2021 to 07/11/2021

Spread tracings window:

High-risk:	20/11/2021 to 24/11/2021
Likely:	09/11/2021 to 19/11/2021
Precautionary:	04/11/2021 to 08/11/2021

Most likely date of infection: 19/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 89: Source and spread timeline for AIV 2021/25

Source Tracing Window	Spread Tracing Window	Date	
		01/11/21	
		02/11/21	
Day 19		03/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		04/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		05/11/21	
Day 16		06/11/21	
Day 15		07/11/21	
Day 14		08/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	09/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	10/11/21	
Day 11	Day 3	11/11/21	
Day 10	Day 4	12/11/21	
Day 9	Day 5	13/11/21	
Day 8	Day 6	14/11/21	
Day 7	Day 7	15/11/21	
Day 6	Day 8	16/11/21	
Day 5	Day 9	17/11/21	
Day 4	Day 10	18/11/21	
Day 3	Day 11	19/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	20/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	21/11/21	
	Day 14	22/11/21	Precautionary onset of clinical signs. 1 bird found dead
	Day 15	23/11/21	2 birds found dead
	Day 16	24/11/21	50 birds found dead at morning check (died overnight). Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/76). Restrictions served.
		25/11/21	Avian Influenza H5N1 confirmed by CVO based on PCR results with case reference AIV2021-25.
		26/11/21	H5N1 confirmed by CVO
		27/11/21	VFEI Investigation
		28/11/21	Culling commenced.
		29/11/21	
		30/11/21	
		01/12/21	
		02/12/21	Culling completed
		03/12/21	
		04/12/21	Preliminary C&D carried out
		05/12/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

38 premises with poultry holding between 2-128,400 birds (12 premises with 50 or more birds).

SZ (3-10 km)

204 premises with poultry holding between 1-240,000 birds (29 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for one visitor who delivered chemicals and for the feed deliveries. All tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds; this was attributed a high likelihood assessment with low uncertainty.

Assessment and evidence base for the likely source

Tracings investigations have not identified any likely lateral transmission pathways onto this unit. All pathways assessed were found to be low, very low or negligible likelihood. Biosecurity protocols for visiting personnel and vehicles were generally considered to be good.

Although biosecurity for regular personnel and routine management was generally also good, there were a few aspects which could have increased the likelihood of virus entering the bird area. These included:

1. storage of bedding outside and daily addition of bedding into the houses.
2. significant rodent activity around the houses, control of which was reported to be a constant challenge.
3. proximity to the biomass woodchip store which attracted wild birds and rodents.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

Tracings activities have shown that all other potential spread pathways were very low or negligible likelihood with low uncertainty.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/26, Near Poulton le Fylde, Wyre, Lancashire, England

Description of the premises

Overview of the premises and the wider business

This premises contained an ornamental bird breeding flock containing waterfowl, poultry and gamebirds. The premises comprised a dwelling house with a large back garden where the collection was kept. During the breeding season, hatching eggs and birds were sold and additional stock purchased

In addition, there was a stable block housing family horses, a separate livery yard, stud and a riding school business..

Species and number of each present

Doves/pigeons (80), pheasants (100), chickens (500), ducks (300), geese (22), swans (2) and guinea fowl (50) were present.

Description of the housing

The waterfowl species co-mingled on a large pond within the garden. The other species were mainly housed in a variety of wood and wire mesh constructed pens and runs, although some domestic fowl and guinea fowl were seen roaming the site. The majority of doves and pigeons were housed in dovecotes and were free flying and roosted in a large tree.

Plan of the infected premises

The holding delineated in black and the bird area in red is shown below.

Figure 90: Plan of AIV 2021/26

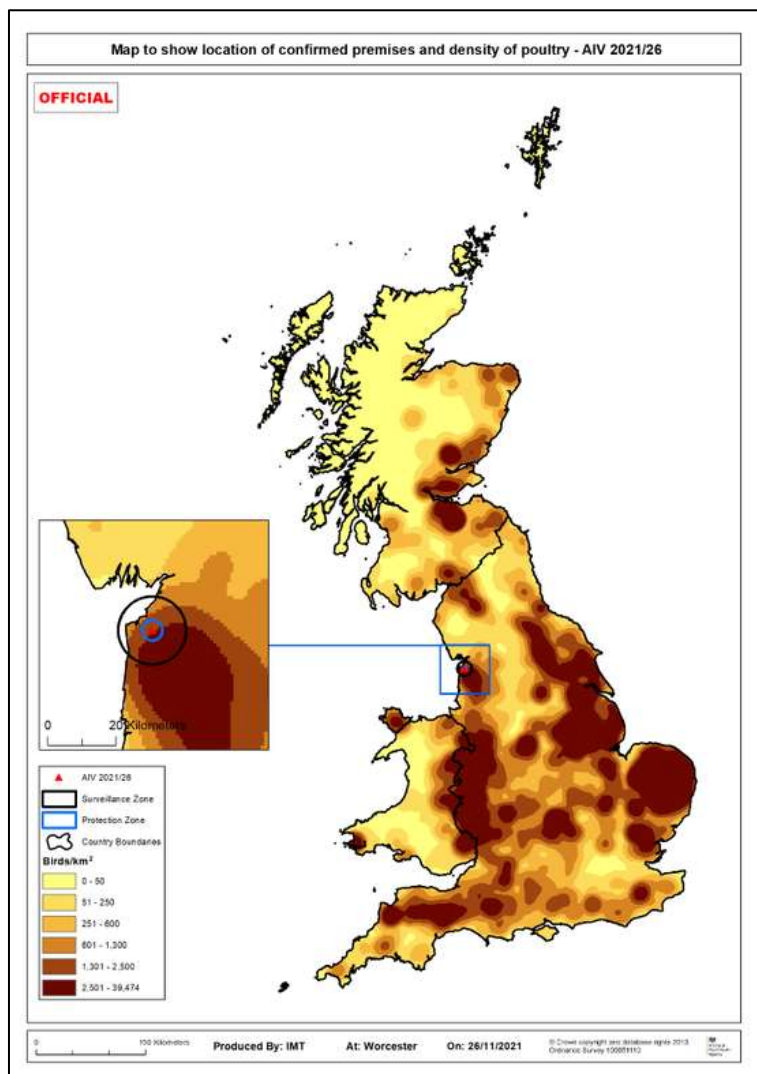


Overview of biosecurity

Biosecurity in the bird area was considered to be poor, with a vermin problem identified. Wild birds were noted to be accessing the on-site pond and mingling with the domestic birds. The domestic pigeons were free flying and could leave the site.

Map with location in Great Britain and poultry density

Figure 91: Location of IP and poultry density



Overview of the surrounding area

The IP was located in a coastal area close to the river Wyre and next to a large game bird breeding establishment that had previously been infected with avian influenza in 2017. It was surrounded by agricultural land but was close to large coastal communities.

Desktop ornithological assessment

No on-site ornithological assessment was carried out; however, an on-site assessment in of the nearby 2017 IP concluded that

“The location was in an area of relatively high populations of wild bird species known to carry HPAI infection, particularly waterfowl. There were many thousands of gulls, waterfowl and waders at sites along the coast and inland along the river Wyre. A total of 11,283 birds were counted within 10 km of the IP. There were a number of significant movements of birds over the IP observed during the early morning and

evening roost movements. There were also the normal species of gulls, corvids, pigeons and other bird species that would be expected to occur in an agricultural landscape anywhere in lowland England. However, the high numbers of corvids and pigeons in a small area may suggest good resources available to those particular birds. The number of outdoor poultry units in the area may contribute to the rich resources available to wild birds. The area is well known for its over-wintering population of pink-footed geese, of which many thousands were observed to fly over the farm on route to grazing in the south of the Surveillance Zone.'

Local intelligence confirmed the large number of wild birds present in the area during this 2021 to 2022 HPAI season.

Clinical picture

20/11/2021 – 3 chickens were found dead. Mortality subsequently increased in the chickens and started in the ducks .

22/11/2021 – approximately 45 chickens and 3 ducks had died. The PVS was contacted, and the same treatment as prescribed for a previous mycoplasma infection was initiated. There was no response to the treatment (previously improvement was seen within 24 hours) and mortality increased and spread to other species.

24/11/2021 – suspicion of notifiable avian disease was reported. Clinical signs included the chickens' being huddled and fluffed up with congested combs and wattles, sunken eyes, some diarrhoea, some swollen heads and some sudden death with no prior signs.

Timeline

Tracings windows

Source tracings window:

High-risk:	13/11/2021 to 18/11/2021
Likely:	05/11/2021 to 12/11/2021
Precautionary:	03/11/2021 to 04/11/2021

Spread tracings window:

High-risk:	14/11/2021 to 24/11/2021
Likely:	06/11/2021 to 16/11/2021
Precautionary:	04/11/2021 to 05/11/2021

Most likely date of infection (start of the high-risk source tracing window): 13/11/2021
(Based on seroconversion in samples taken at the time of the disease investigation).

Timeline chart

Figure 92: Source and spread timeline for AIV 2021/26

Source Tracing Window	Spread Tracing Window	Date	
Day 16		03/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 15		04/11/21	Start of precautionary spread tracing window (source + 24h).
Day 14		05/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	06/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	07/11/21	
Day 11	Day 3	08/11/21	
Day 10	Day 4	09/11/21	
Day 9	Day 5	10/11/21	
Day 8	Day 6	11/11/21	
Day 7	Day 7	12/11/21	
Day 6	Day 8	13/11/21	Most likely infection date due to serology at the time of culling in waterfowl. Start of high risk source tracing window.
Day 5	Day 9	14/11/21	Start of high risk spread tracing window (source +24h).
Day 4	Day 10	15/11/21	
Day 3	Day 11	16/11/21	
Day 2	Day 12	17/11/21	
Day 1	Day 13	18/11/21	
	Day 14	19/11/21	Precautionary onset of clinical signs. (Birds found dead on 20/11/21 likely to have died overnight.)
	Day 15	20/11/21	Initial deaths identified (3 hens)
	Day 16	21/11/21	
	Day 17	22/11/21	
	Day 18	23/11/21	
	Day 19	24/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/71). Restrictions served. Between 20 - 24th approx 130 birds found dead. Symptoms: sudden death, diarrhoea, cyanotic combs, swolled heads. Chickens mainly affected but also guinea fowl and ducks. Geese, swans and pigeons and most of the duck not showing clinical signs.
	Day 20	25/11/21	Further 37 chickens, 7 Guinea fowl and 4 ducks dead. Avian Influenza H5N1 confirmed by CVO based on PCR results with case reference AIV2021-26.
	Day 21	26/11/21	Another 10 chickens dead. Cleavage site sequencing has revealed a high pathogenicity motif. CVO confirmed HPAI H5N1 .
	Day 22	27/11/21	Cull started. Samples at the time of cull requested.
	Day 23	28/11/21	
	Day 24	29/11/21	
	Day 25	30/11/21	Result from sampling at the time of culling indicate seroconversion has occurred at 1/64 or greater so likely to be infected 14 day previously.
	Day 26	01/12/21	Cull complete
	Day 27	02/12/21	Preliminary C and D completed
	Day 28	03/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

88 premises with poultry holding between 1-86,000 birds (9 premises with 50 or more birds).

SZ (3-10 km)

260 premises with poultry holding between 1-180,000 birds (26 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

No tracings were identified within the high-risk window for this premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Poor biosecurity was practiced and direct and indirect contact with wild birds was certain as the pond attracted wild birds that mingled with the domestic flock and vermin were known to be present on the holding.

There were no movements of birds, feed or bedding onto the IP within the risk periods.

Spread investigations: Assessment of potential and likelihood of spread

The possibility of disease spread via free ranging birds flying to the neighbouring game farm was considered to be a medium likelihood; however, investigation and sampling failed to disclose any evidence of HPAI H5N1 infection at this location.

Given the direct contact on the site with wild birds it was considered that spread via wild birds was highly likely, but would not greatly increase the overall background risk from wild birds.

Spread by indirect contact via feed and bedding deliveries was considered a very low likelihood due to there being no contact in the risk source and spread windows..

The likelihood of spread via the livery business on the site was considered to be low, and tracings failed to disclose any additional cases.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/27, Near Gaerwen, Isle of Anglesey, Wales

Description of the premises

Overview of the premises and the wider business

This was a small, mixed backyard flock of birds rescued from end-of-lay commercial flocks, which were kept as pets. Eggs were used for personal consumption and occasionally given to friends (none since October)

Four ducks were moved in on 13/11/2021 and kept in a separate pen within the enclosure separated from the other birds by wire mesh.

Species and number of each present

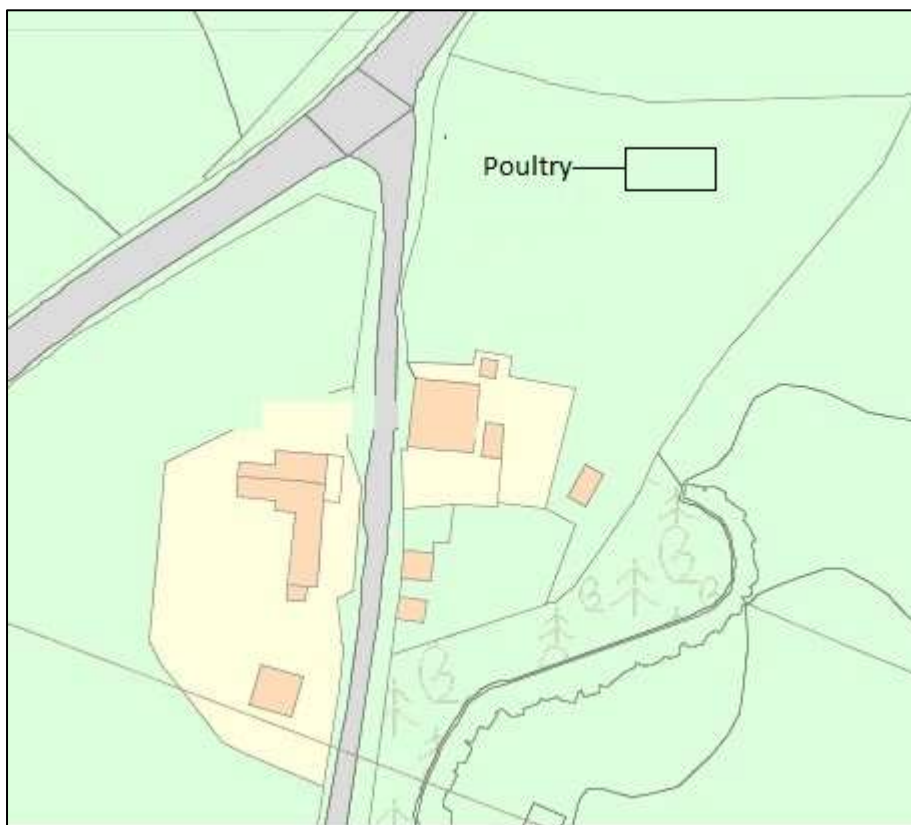
Nine chickens and six ducks.

Description of the housing

The poultry were kept in coops within a large wire and wood partitioned enclosure. This had a wire and mesh roof, but was not completely bird proof and occasionally sparrows were found inside it.

Plan of the infected premises

Figure 93: Plan of AIV 2021/27



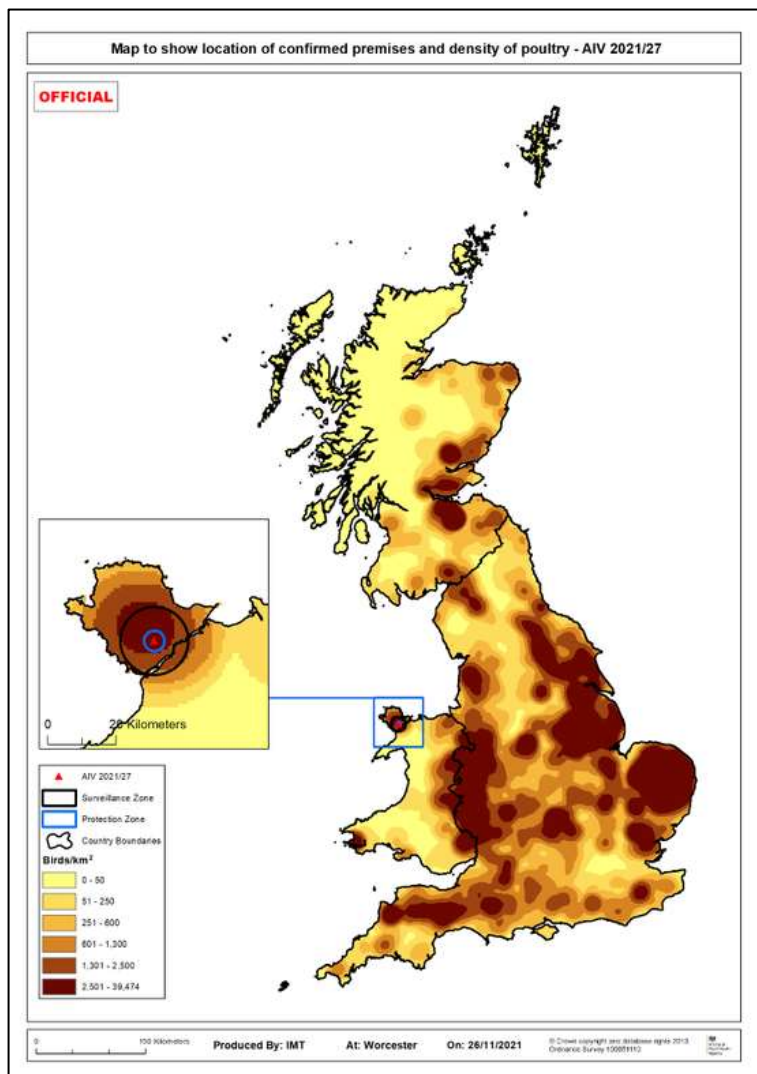
Overview of biosecurity

The birds were restricted within a covered enclosure, but this was not completely wild bird proof and could have been contaminated by droppings from wildfowl flying overhead.

Dedicated footwear was used within the enclosure, but there were no foot dips or other biosecurity measures.

Map with location in Great Britain and poultry density

Figure 94: Location of IP and poultry density



Overview of the surrounding area

The area was rural with marshland attracting migratory wildfowl nearby and was located in an area of high poultry density.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: An extensive RSPB wetland reserve was approximately 1 km away. The keeper did not see wild waterfowl enter the back garden, but they frequently flew overhead.

Clinical picture

24/11/2021 – Three chickens and one duck were found dead and suspicion of avian notifiable disease was reported. The dead duck was one of four that had been moved in on 13/11/2021. The dead chickens were in a different pen.

Of the remaining three recently arrived ducks, one was healthy, one was lethargic and the other showed neurological and respiratory signs.

25/11/2021 – Of the six remaining chickens, four were lethargic with respiratory signs and watery faeces and three of these died.

26/11/2021 – Samples were taken and H5N1 HPAI was confirmed by the CVO at which stage only 5 birds remained alive and these were showing signs of disease.

Timeline

Tracings windows

Source tracings window:

High-risk:	19/11/2021 to 21/11/2021
Likely:	08/11/2021 to 18/11/2021
Precautionary:	06/11/2021 to 07/11/2021

Spread tracings window:

High-risk:	20/11/2021 to 24/11/2021
Likely:	09/11/2021 to 19/11/2021
Precautionary:	07/11/2021 to 08/11/2021

Most likely date of infection: 19/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 95: Source and spread timeline for AIV 2021/27

Source Tracing Window	Spread Tracing Window	Date	
Day 21		01/11/21	
Day 20		02/11/21	
Day 19		03/11/21	
Day 18		04/11/21	
Day 17		05/11/21	
Day 16		06/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 15		07/11/21	Start of precautionary spread tracing window (source + 24h).
Day 14		08/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	09/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	10/11/21	
Day 11	Day 3	11/11/21	
Day 10	Day 4	12/11/21	
Day 9	Day 5	13/11/21	4 ducks moved onto premises
Day 8	Day 6	14/11/21	
Day 7	Day 7	15/11/21	
Day 6	Day 8	16/11/21	
Day 5	Day 9	17/11/21	
Day 4	Day 10	18/11/21	
Day 3	Day 11	19/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	20/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	21/11/21	
	Day 14	22/11/21	Precautionary onset of clinical signs.
	Day 15	23/11/21	
	Day 16	24/11/21	4 birds died over previous 48 hours. Unknown exact timing - keeper not present. Notification of suspicion of disease to APHA. Restrictions served, APHA Investigation and sampling of all birds present (DPR 2021/77).
	Day 17	25/11/21	Avian Influenza H5N1 confirmed based on PCR results
	Day 18	26/11/21	HPAI H5N1 confirmed by CVO. Culling commenced and completed. Preliminary C&D completed. VFEL investigation
	Day 19	27/11/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

18 premises with poultry holding between 1-72 birds (1 premises with 50 or more birds).

SZ (3-10 km)

65 premises with poultry holding between 1-164,960 birds (6 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds.

Assessment and evidence base for the likely source

Four ducks were moved onto the premises in the likely source window, but there was no disease in their flock of origin and blood sample results indicated that they were not infected at the time of movement.

Migratory wildfowl gathered in the nearby marshland and regularly flew overhead.

The enclosure was not completely bird proof and contamination was possible from birds flying over, or by indirect transmission as a result of the keeper walking the infection into the enclosure.

Spread investigations: Assessment of potential and likelihood of spread

Five chickens had been moved off the IP on 14/11/2021 and remained healthy.

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/28, Near Clitheroe, Ribble Valley, Lancashire, England

Description of the premises

Overview of the premises and the wider business

This was a small, non-commercial, hobby flock of peacocks, geese, ducks and chickens kept as pets.

There were also 9 sheep and 3 goats.

The overall site comprised approximately 68 acres, with 3 acres within the centre of the premises for the birds, sheep and goats. The remainder of the surrounding fields were rented out for grazing to other sheep keepers.

All birds had been present for many months to years, the hens being the youngest animals on site. No movements of birds onto, or off, the premises had occurred in recent months.

Eggs from the hens were either consumed by owner, or not at all. No eggs had been consumed in the previous three weeks. Eggs were neither sold at the farm gate, nor passed onto friends.

Species and number of each present

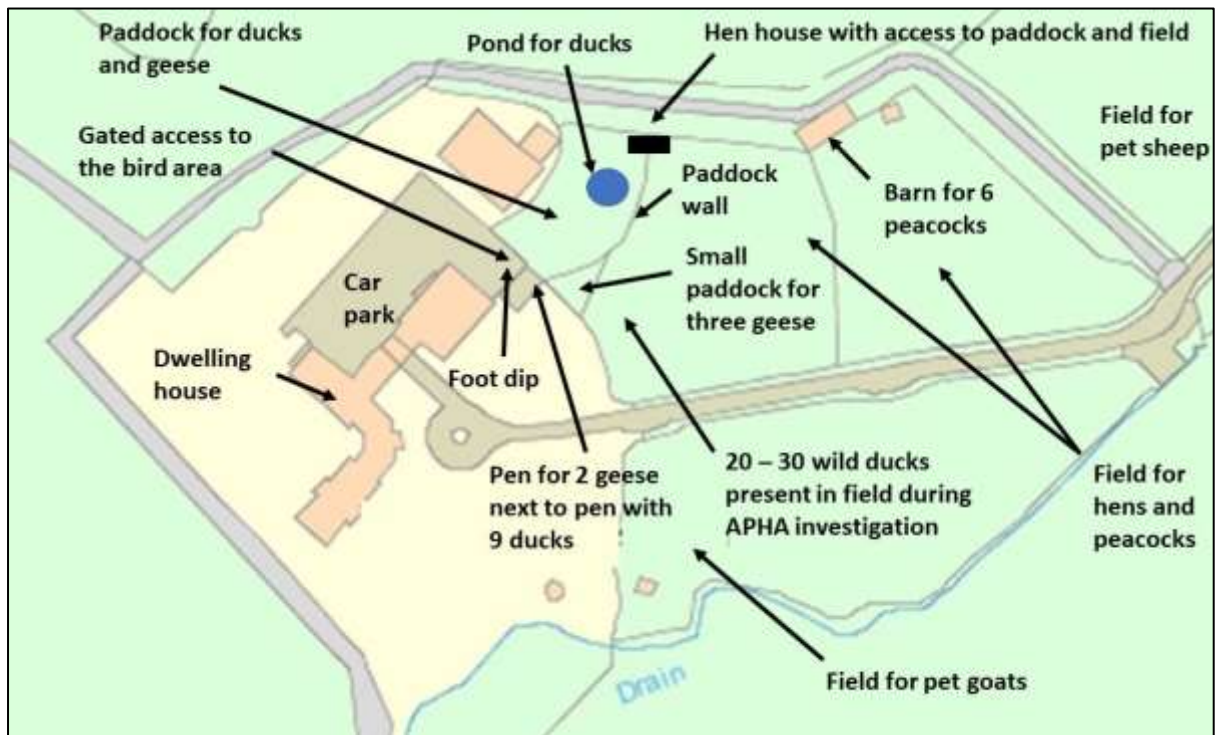
There were four hens , 6 peacocks, 5 geese and 9 ducks.

Description of the housing

The birds usually had access to outdoor areas, but the hens, geese and ducks were housed on 16/11/2021, and the peacocks were housed on 19/11/2021. The hens, peacocks and geese were housed in separate pens in a big barn and the ducks in an outdoor pen.

Plan of the infected premises

Figure 96: Plan of AIV 2021/28



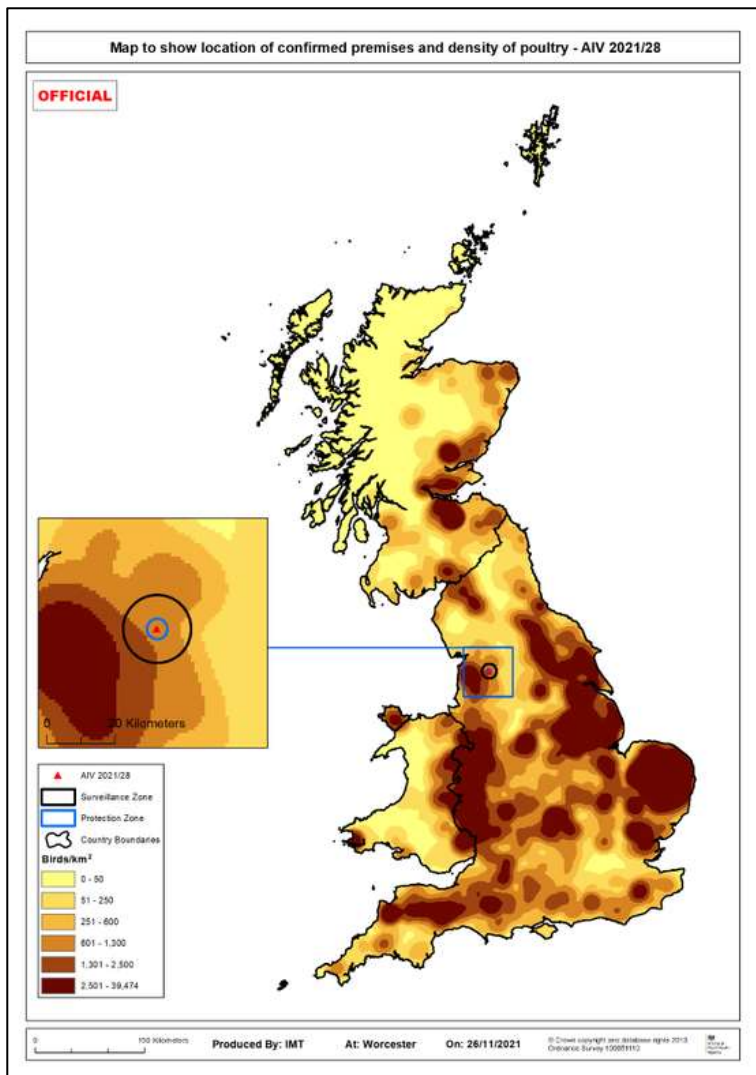
Overview of biosecurity

Limited biosecurity was observed on the IP. A disinfectant foot dip (Jeyes fluid) was present by the gate at the entrance to the bird area. However, the foot dip was uncovered and potentially exposed to dilution by rainwater. The owner reported that C&D of the hen house was undertaken every week. The owner and assistant tending to the birds moved from one paddock/house to another without taking additional biosecurity measures in between.

Neither had any contact with any other birds outside of the premises.

Map with location in Great Britain and poultry density

Figure 97: Location of IP and poultry density



Overview of the surrounding area

The IP was located in an area of medium poultry density. However, it was surrounded by grazing land rented out to sheep keepers. and there were no immediately adjacent poultry premises.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Wild ducks were present in the field adjacent to the resident poultry and captive birds.

Clinical picture

17/11/2021 -18/11/2021 – the four hens stopped laying once housed and started to show signs of lethargy, depression and yellowish mucoid diarrhoea.

19/11/2021 -21/11/2021 – all four hens died.

23/11/2021 – a peacock started showing respiratory signs and deteriorated, dying on 24/11/2021. The owner contacted the private veterinary surgeon who reported suspicion of avian notifiable disease to APHA on the morning of 24/11/2021.

At the APHA investigation the same day, the remaining peacocks, ducks and geese had no clinical signs. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	14/11/2021 to 16/11/2021
Likely:	03/11/2021 to 13/11/2021
Precautionary:	03/11/2021 to 13/11/2021

Spread tracings window:

High-risk:	15/11/2021 to 24/11/2021
Likely:	04/11/2021 to 14/11/2021
Precautionary:	04/11/2021 to 14/11/2021

Most likely date of infection: 14/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 98: Source and spread timeline for AIV 2021/28

Source Tracing Window	Spread Tracing Window	Date	
Day 14		03/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA). Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	04/11/21	Start of precautionary spread tracing window (source tracing window +24h). Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	05/11/21	
Day 11	Day 3	06/11/21	
Day 10	Day 4	07/11/21	
Day 9	Day 5	08/11/21	
Day 8	Day 6	09/11/21	
Day 7	Day 7	10/11/21	
Day 6	Day 8	11/11/21	
Day 5	Day 9	12/11/21	
Day 4	Day 10	13/11/21	
Day 3	Day 11	14/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak based on onset of clinical signs in chickens and results of PCR and serology from samples from ducks, geese and peafowl taken at report case investigation on 24/11/21 - following consultation with the disease consultant.
Day 2	Day 12	15/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	16/11/21	
	Day 14	17/11/21	Precautionary onset of clinical signs in chickens.
	Day 15	18/11/21	
	Day 16	19/11/21	Chickens died between 19th - 21st.
	Day 17	20/11/21	Chickens died between 19th - 21st.
	Day 18	21/11/21	Chickens died between 19th - 21st.
	Day 19	22/11/21	
	Day 20	23/11/21	Clinical signs in 1 peacock
	Day 21	24/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/74). Restrictions served. Peacock died.
	Day 22	25/11/21	
	Day 23	26/11/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/28.
	Day 24	27/11/21	
	Day 25	28/11/21	Culling completed. Preliminary C&D completed.
	Day 26	29/11/21	Preliminary C&D considered effective.
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

CBMZ (3 km)

37 premises with poultry holding between 1-900 birds (13 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Source investigations

No source tracings were identified.

Hypothesis for the source

The most likely source identified was direct and/or indirect contact with wild birds.

Assessment and evidence base for the likely source

Wild ducks were present in the field adjacent to the resident poultry and captive birds.

Resident poultry and captive birds had access to the outside areas during the high-risk source window.

A vermin problem was reported, with rats and crows accessing the chicken coop to eat eggs.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was assessed as being not higher than the background risk.

No spread tracings were identified.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/29, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

This was a small backyard flock of chickens, ducks and swans together with sheep, goats, ponies, and wallabies. Poultry, captive ducks and swans were kept as pets with any eggs used for home-consumption only.

Species and number of each present

Nine chickens, four Muscovy ducks and two swans plus two ponies, four sheep, two goats and two wallabies.

Description of the housing

The ducks and swans had free-range of the premises and access to a large lake within the garden boundary and were housed at night. Wild waterfowl (ducks and geese) and two captive swans were also present on the lake. During the day, the chickens had access to the 'hen garden', an uncovered enclosure containing a water bath and accessible to both the captive ducks and other wild birds. They were housed in secure buildings at night.

Plan of the infected premises

Figure 99: Plan of AIV 2021/29

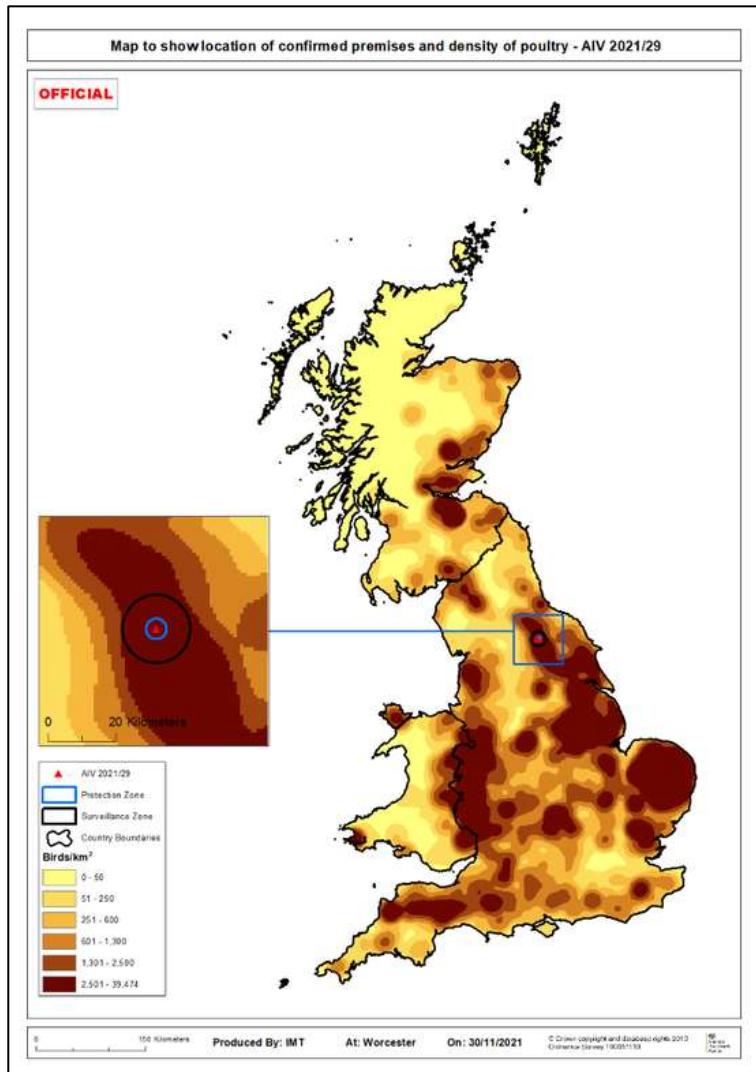


Overview of biosecurity

There were no biosecurity measures in place and the keeper walked between all bird areas.

Map with location in Great Britain and poultry density

Figure 100: Location of IP and poultry density



Overview of the surrounding area

The farm was bordered by woodland to the south-west of the property and was directly adjacent to arable land. There was a large lake to the east of the property, next to a railway line. There was a house directly opposite, but it had no livestock.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Wild geese and ducks were seen on the lake on the premises mixing with the kept birds. The keeper commented that the number of migratory waterfowl this year was the highest that she had ever seen at the lake.

Clinical picture

21/11/2021 – 22/11/2021 – The chickens were seen to be lethargic and depressed, with a drop in egg production and some soft-shelled eggs.

23/11/2021 – Two chickens died overnight.

24/11/2021 – Two chickens died during the day and suspicion of disease was reported and sample taken.

25/11/2021 – One chicken died overnight.

Timeline

Tracings windows

Source tracings window:

High-risk:	18/11/2021 to 20/11/2021
Likely:	07/11/2021 to 17/11/2021
Precautionary:	03/11/2021 to 06/11/2021

Spread tracings window:

High-risk:	19/11/2021 to 24/11/2021
Likely:	08/11/2021 to 18/11/2021
Precautionary:	04/11/2021 to 07/11/2021

Most likely date of infection: 18/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 101: Source and spread timeline for AIV 2021/29

Source Tracing Window	Spread Tracing Window	Date	
Day 18		03/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		04/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		05/11/21	
Day 15		06/11/21	
Day 14		07/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	08/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	09/11/21	
Day 11	Day 3	10/11/21	
Day 10	Day 4	11/11/21	
Day 9	Day 5	12/11/21	
Day 8	Day 6	13/11/21	
Day 7	Day 7	14/11/21	
Day 6	Day 8	15/11/21	
Day 5	Day 9	16/11/21	
Day 4	Day 10	17/11/21	
Day 3	Day 11	18/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	19/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	20/11/21	
	Day 14	21/11/21	Precautionary onset of clinical signs in chickens in evening: lethargy.
	Day 15	22/11/21	Chickens housed.
	Day 16	23/11/21	2 chickens found dead - died overnight 22-23/11/21.
	Day 17	24/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/75). Restrictions served. 1 chicken died overnight 23-24/11/21 and 1 died in afternoon and another that night.
	Day 18	25/11/21	
	Day 19	26/11/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/29.
	Day 20	27/11/21	
	Day 21	28/11/21	Culling completed. Preliminary C&D completed.
	Day 22	29/11/21	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects Increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

19 premises with poultry holding between 2-120,000 birds (2 premises with 50 or more birds).

SZ (3-10 km)

238 premises with poultry holding between 1-262,300 birds (45 premises with 50 or more birds).

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct contact with wild birds.

Assessment and evidence base for the likely source

Ducks had access to the lake where wild ducks and geese live, together with two captive swans, were seen.

Chickens were allowed free access to the 'hen garden' which was accessible to the kept ducks and other wild birds

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/30, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a commercial unit containing turkeys for the Christmas market. The unit was one of five located on a disused airfield in North Yorkshire. Three of the other units had also been populated with turkeys and the remaining one contained broilers. This was the fourth of the units containing turkeys to become an IP. The other unit containing broilers subsequently became an IP about two weeks later. These five units were owned by a large fully integrated poultry company which had many turkey and broiler rearing and breeding sites across the UK.

The site also included a green waste composting plant, a biomass enterprise and land for storing logs. Each unit had two biomass boilers associated with it.

Species and number of each present

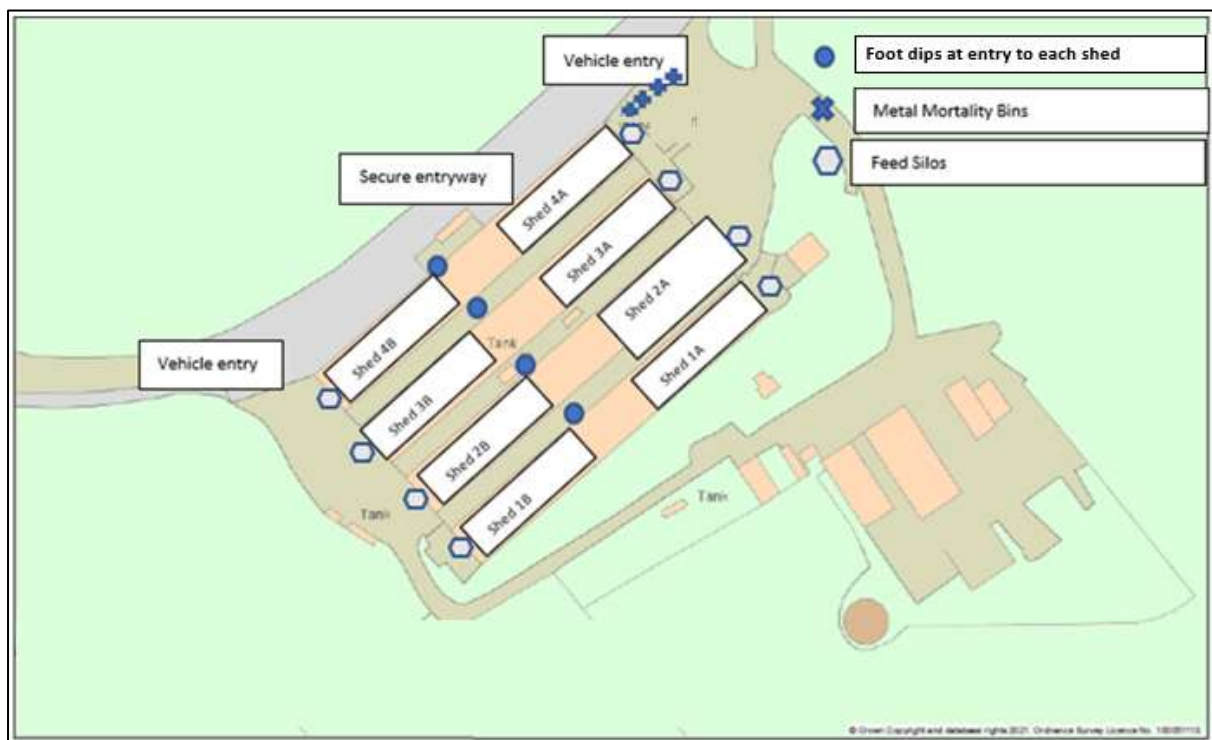
Approximately 22,992 turkeys had been placed across four sheds, each of which had two separate airspace sections. This unit had been populated by a movement of birds from another of the units on the site which took place on 18/10/2021. This was outside of the tracing windows. This was an exceptional contingency move due to abattoir staff shortages. The birds were 59 days old when they were placed and 99 days old at the time of the report case investigation.

Description of the housing

The unit comprised four sheds. Each shed was divided into two sections with separate airspaces. The two sections were separated by a management area. The sheds were generally in satisfactory condition, although a few inadequacies were identified. Much of the concrete around the sheds was found to be eroded with some large crevices.

Plan of the infected premises

Figure 102: Plan of AIV 2021/30



Overview of biosecurity

On the whole, the unit was considered to have good biosecurity and this was reflected across all units on this site. A series of standard operating procedures were in place and there was a system of continual staff training. Although the aim was to have two dedicated members of staff for each unit, there had been some deviation from this on this unit. The unit manager had been consistent, but one member of staff had worked on the unit until 21/11/2021 and was then replaced by another member of staff on 22/11/2021. This change over spanned the likely and high-risk tracing periods. Although company protocol prohibited staff from keeping poultry at home, both of these members of staff worked on other poultry units. A visitors' book was maintained in the office although routine staff were not required to sign in.

PERSONNEL: Staff and visitors entered the unit via the office. Visitors were provided with a disposable overall suit and wellingtons. From here, they crossed the concrete areas in order to enter the sheds. There was a boot dip at the entrance to each shed. Once inside the sheds, there was a barrier system for entering each separate section. At this point wellingtons were swapped for a different pair which were only used inside the bird areas. Visitors used plastic overshoes if there were not enough wellingtons. Apart from wellingtons and boot covers, other clothing was not changed when moving between bird areas. The reverse process was carried out to leave the unit. There was no requirement to shower on to the site, but staff showered before leaving.

HOUSING: The sheds were generally in satisfactory condition, although inadequacies were noted. There were gaps underneath the large double doors at the ends of each shed; several large boards were kept inside the houses and used to cover these over, but it was unlikely that a complete seal was achieved. Although this may have allowed rodent entry, wild birds would not have been able to access the sheds.

DELIVERY VEHICLES: The feed wagon had to enter the fenced perimeter of the unit in several different places in order to fill up the silos. Between each entry, it returned to the outside of the perimeter. Cleansing and disinfection was not carried out during this process.

FEED: Feed was supplied by the company's own mill. It was blown into silos which were located on a concrete base outside each shed.

BEDDING: Wood shavings for the next flock were brought in after cleansing and disinfection had been completed following depopulation. Additional bales of shavings were wrapped in plastic and stacked on a pallet. The whole pallet was wrapped in a further layer of plastic and stored outside. From five weeks of age, top up shavings were added daily. The process described for this involved one person remaining outside and passing the bales manually to another person standing inside the shed. There were conflicting reports about whether each bale was disinfected beforehand. Once the outer layer of plastic has been breached, the whole pallet would either have been used or discarded.

WATER: Mains supply with storage in covered header tanks.

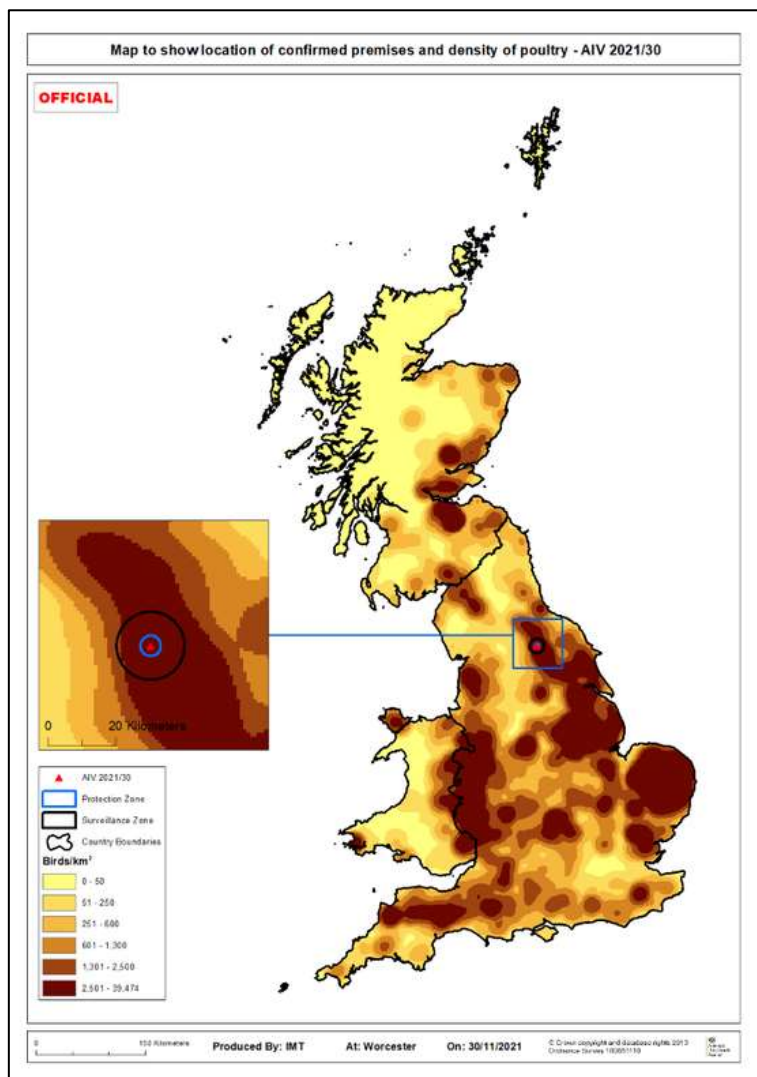
ANIMAL BY-PRODUCT (ABP): Dead birds were collected by hand and then placed in a wheelbarrow which was kept in the management area of each shed. The carcasses were then transported to one of four metal bins. One of these was noted to be incompletely sealed due to damage. Collection was carried out as required. A large trailer would wait outside the fenced perimeter of the unit. A forklift was then unloaded from the trailer and cleansed and disinfected prior to entering the unit. The forklift then lifted each of the metal bins and emptied them into the trailer. It was cleansed and disinfected again prior to leaving the unit.

VERMIN: Pest control was carried out by a contractor, usually on a monthly basis. Records from the last visit (October) noted rodent activity around the bait boxes.. Dead rats had been seen around the bait boxes. The gaps under the doors could have allowed rodents to enter the sheds.

OTHER: This unit was adjacent to a pig unit and there was shared vehicular access. The pig unit was however under separate management and there were no other links identified.

Map with location in Great Britain and poultry density

Figure 103: Location of IP and poultry density



Overview of the surrounding area

The unit was in a high poultry density area and there was also a significant amount of pig production. There were four other poultry units on the airfield site, all within 1 km of each other. There was an unrelated laying unit within 1 km of the airfield site which subsequently became an IP. There was a pig unit (as described above) and a pet crematorium contiguous to the site. More widely, there was arable ground and a river to the west.

Ornithological assessment:

Desktop assessment: Bridge species were considered likely to have been common and appeared to present the most likely potential wild bird infection pathway onto the site with both gulls and corvids likely to have visited the wider airfield site and

approached buildings to contaminate surfaces. Although wildfowl, waders and other water birds were likely to be generally common in the landscape, it is not thought that they would pose significant infection pressure on this IP. Passerines are not thought to be significant here.

Local intelligence: Seagulls, geese and pheasants had been seen around the unit regularly and there were various gamebird shoots nearby. Large numbers of geese had been seen flying overhead within the two weeks preceding the onset of disease.

Clinical picture

27/11/2021 – 20-30 turkeys were found dead at the morning check of section 2A. The other birds in this section were dull and uninterested in food. Prior to this, no abnormalities had been detected. Suspicion of avian influenza was reported to APHA and a report case investigation was carried out on the same day.

APHA found that more turkeys were dying. Birds were otherwise very dull and some were pyrexemic but no other clinical signs were observed at this stage. Post-mortem examinations showed a small amount of fluid in the pericardial sac but were otherwise unremarkable. Increases in mortality above normal fluctuations were observed in sections 1A and 2B from 27/11/2021. A range of clinical signs were subsequently observed including nasal discharge, ruffled feathers, reduced vocalisation and spasms.

As the first 20-30 dead turkeys were found at the morning check on 27/11/2021, it is likely that some died in the night on 26/11/2021. A precautionary approach was taken and the onset of clinical signs was considered to be 25/11/2021.

Timeline

Tracings windows

Source tracings window:

High-risk:	22/11/2021 to 24/11/2021
Likely:	11/11/2021 to 21/11/2021
Precautionary:	08/11/2021 to 10/12/2021

Spread tracings window:

High-risk:	23/11/2021 to 27/11/2021
Likely:	02/11/2021 to 22/11/2021
Precautionary:	07/11/2021 to 11/12/2021

Most likely date of infection: 22/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 104: Source and spread timeline for AIV 2021/30

Source Tracing Window	Spread Tracing Window	Date	
Day 19		06/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		07/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		08/11/21	
Day 16		09/11/21	
Day 15		10/11/21	
Day 14		11/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/11/21	
Day 11	Day 3	14/11/21	
Day 10	Day 4	15/11/21	
Day 9	Day 5	16/11/21	
Day 8	Day 6	17/11/21	
Day 7	Day 7	18/11/21	
Day 6	Day 8	19/11/21	
Day 5	Day 9	20/11/21	
Day 4	Day 10	21/11/21	
Day 3	Day 11	22/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	24/11/21	
	Day 14	25/11/21	Precautionary onset of clinical signs. 1 bird found dead in section 2A
	Day 15	26/11/21	1 bird found dead in section 2A, small rise in mortality in section 1A and 2B.
	Day 16	27/11/21	35 birds found dead at morning check of section 2A (died overnight). Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/80). Restrictions served.
		28/11/21	HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-30
		29/11/21	VFEI Investigation
		30/11/21	Culling commenced
		01/12/21	
		02/12/21	
		03/12/21	Culling completed
		04/12/21	Preliminary C&D completed
		05/12/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

47 premises with poultry holding between 2-180,000 birds (15 premises with 50 or more birds).

SZ (3-10 km)

188 premises with poultry holding between 1-240,000 birds (25 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for an employee who had been working in another poultry premises prior to the IP, an electrician who visited to fix broken feeders and feed deliveries. All tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds; this was attributed a high likelihood assessment with low uncertainty.

Assessment and evidence base for the likely source

Tracings investigations have not identified any likely lateral transmission pathways onto this unit. Despite there having been some changes in staff, together with contact with other poultry units, all pathways assessed were found to be low, very low or negligible likelihood.

Although biosecurity for regular personnel and routine management was generally good, there were a few aspects which could increase the likelihood of virus entering the bird area. These include:

1. storage of bedding outside and the daily addition of bedding into the houses.
2. gaps under the house entrance doors which could have allowed rodent entry.
3. poorly maintained concrete areas which would be difficult to cleanse and disinfect effectively. Wild bird faeces was seen on these areas.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk. Tracings investigations have shown that all potential spread pathways were low or negligible likelihood with low uncertainty.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/31, Near Barrow upon Soar, Charnwood, Leicestershire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial free-range chicken layer unit. The birds were voluntarily housed on 23/11/2021 as a preventive measure against AI. Eggs were collected three times per week and delivered to a packing station.

The IP was part of a wider company with other sites (see tracings investigations). One of these was located across the road and had been identified as an IP (AIV 2021/24) but no direct links were identified between the two sites.

Species and number of each present

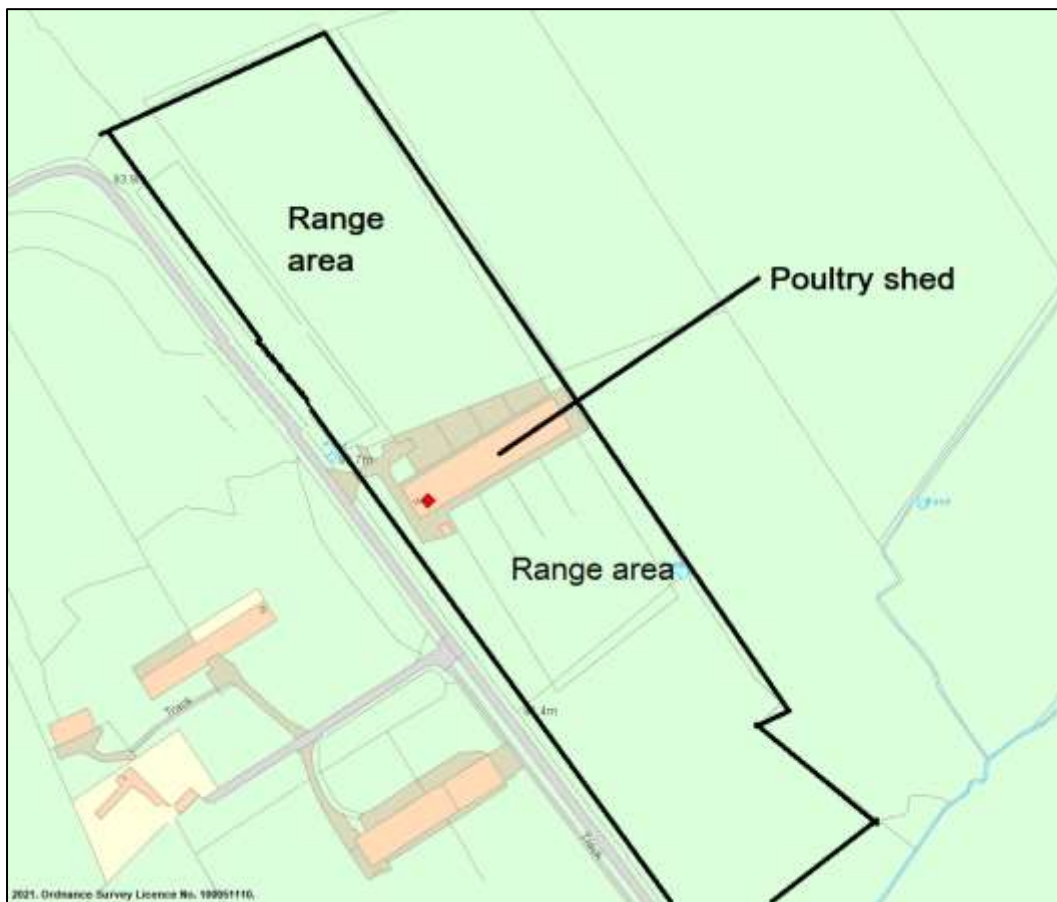
32,000 laying hens (44-week-old). The birds had been placed at 16 weeks of age.

Description of the housing

The birds were housed in a single newly built shed with metal frame with wooden cladding. It was divided internally into two sections, with 16,000 birds in each side, linked by an open door and with a double barrier system at the entrance.

Plan of the infected premises

Figure 105: Plan of AIV 2022/31



Overview of biosecurity

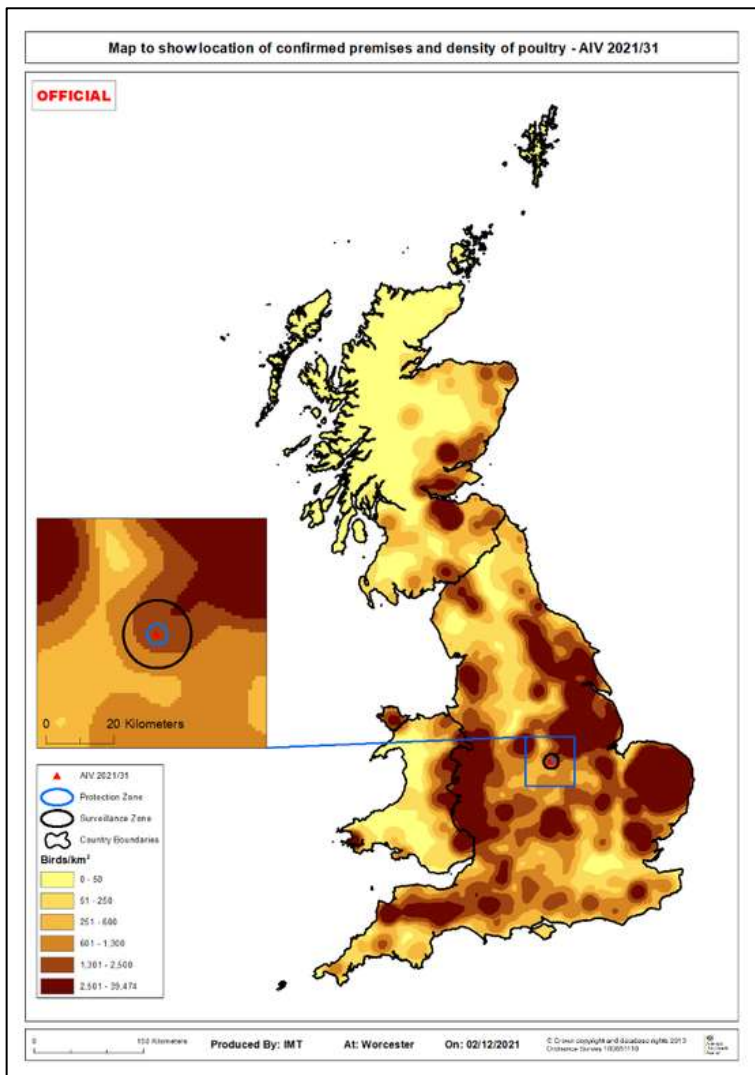
Good biosecurity measures appeared to be in place.

These included overalls and dedicated boots for the birds' house, slip on shoes for the office and egg packing area. There was a double barrier system and foot dips inside before entering the house and outside the building.

The same staff worked in both sides of the poultry shed wearing the same footwear. There was also perimeter fencing and gated entrance which was kept locked.

Map with location in Great Britain and poultry density

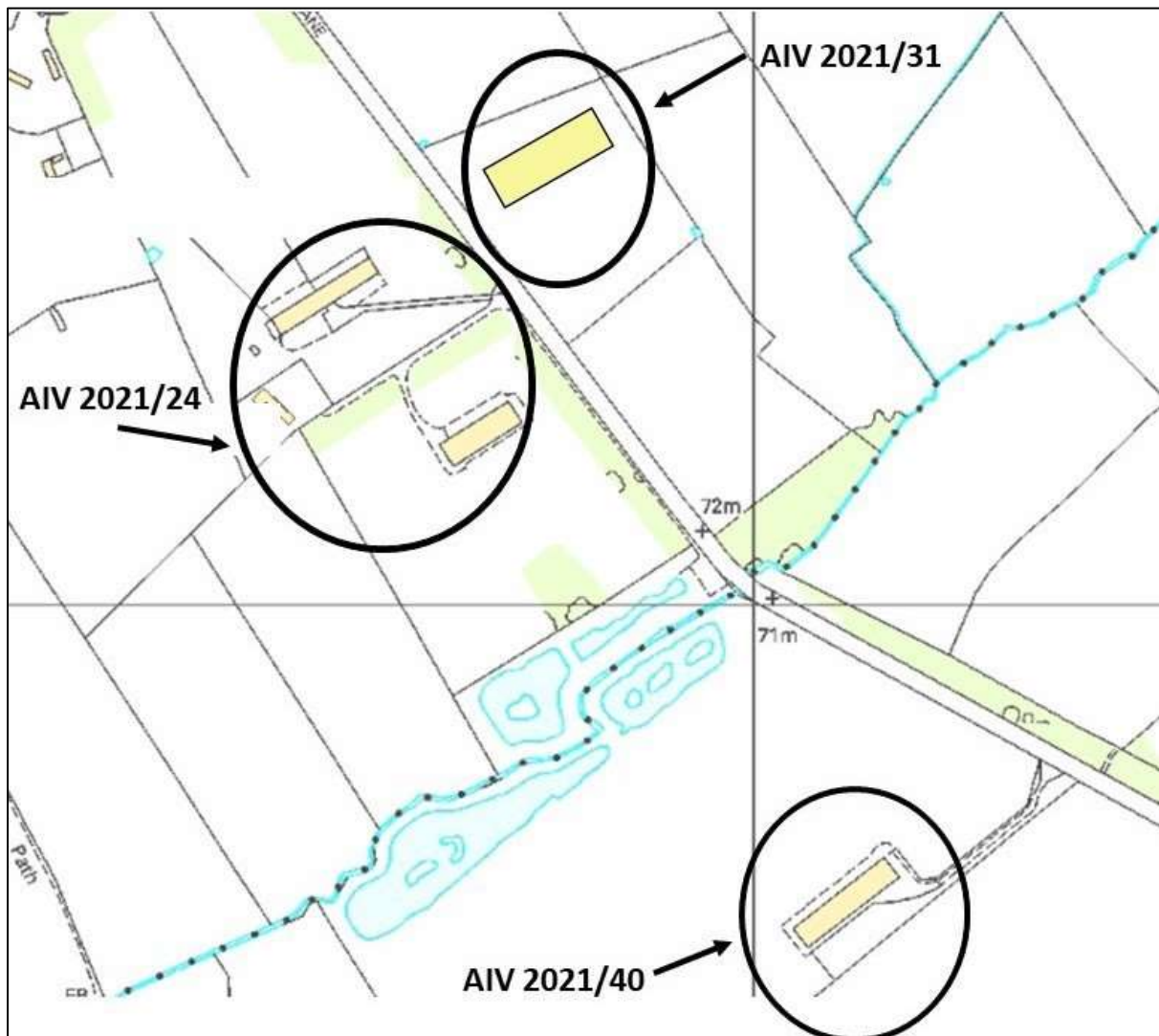
Figure 106: Location of IP and poultry density



Overview of the surrounding area

The IP was in a medium to high poultry density area. It was located across the road from AIV 2021/24 and a series of fishing ponds known to attract wild waterfowl were located nearby.

Figure 107: plan showing the location of AIV 2021/31 in relation to other nearby IPs and the fishing ponds



Ornithological assessment:

Desktop assessment: Wild birds presented an obvious substantial source of infection pressure to the IP. The premises was close to a river and several large waterbodies. There were also pools adjacent/close to the poultry ranges. Wildfowl were likely to be abundant on significant waterbodies and at least common local to the site.

Local intelligence: Waterfowl were present in the fishing ponds nearby.

Clinical picture

28/22/2021 – there was a sudden increase in mortality in both sides of the shed (151 dead birds on side 1 and 66 dead birds on side 2).

29/11/2021 – further deaths were identified and the other birds were reported as lethargic, quiet and dull. Suspicion of notifiable avian disease was reported.

At the APHA investigation the same day, clinical signs including lethargy, difficulties breathing, nasal and eye discharge, dark wattle and combs and increased temperature were seen. Feed and water intake as well as egg production appeared to be normal.

Timeline

Tracings windows

Source tracings window:

High-risk:	22/11/2021 to 24/11/2021
Likely:	11/11/2021 to 21/11/2021
Precautionary:	08/11/2021 to 10/11/2021

Spread tracings window:

High:	23/11/2021 to 29/11/2021
Likely:	12/11/2021 to 22/11/2021
Precautionary:	09/11/2021 to 11/11/2021

Most likely date of infection: 22/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 108: Source and spread timeline for AIV 2021/31

Source Tracing Window	Spread Tracing Window	Date	
Day 17		08/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		09/11/21	Start of precautionary spread tracing window (source + 24h).
Day 15		10/11/21	
Day 14		11/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/11/21	
Day 11	Day 3	14/11/21	
Day 10	Day 4	15/11/21	
Day 9	Day 5	16/11/21	
Day 8	Day 6	17/11/21	
Day 7	Day 7	18/11/21	
Day 6	Day 8	19/11/21	
Day 5	Day 9	20/11/21	
Day 4	Day 10	21/11/21	
Day 3	Day 11	22/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/11/21	Start of high risk spread tracing window (source +24h). Birds housed from 17:00.
Day 1	Day 13	24/11/21	
	Day 14	25/11/21	Precautionary onset of clinical signs based on production records.
	Day 15	26/11/21	
	Day 16	27/11/21	
	Day 17	28/11/21	
	Day 18	29/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/83). Restrictions served.
Day 19		30/11/21	HPAI H5N1 confirmed on PCR results (AIV 2021/31).
Day 20		01/12/21	
Day 21		02/12/21	
Day 22		03/12/21	Culling commenced.
Day 23		04/12/21	Culling completed.
Day 24		05/12/21	Preliminary C&D completed.
Day 25		06/12/21	Preliminary C&D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

65 premises with poultry holding between 1-251,000 birds (8 premises with 50 or more birds).

SZ (3-10 km)

207 premises with poultry holding between 1-273,100 birds (18 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the farm employees, collection of table eggs to the egg packing centre, feed deliveries, ABP disposal and the collection of poultry manure.

Although, this premises was identified as a tracing contact from AIV 2022/24 (egg collection route) the date of the contact fell outside the most likely source date for AIV 2022/31. There were two egg collections to the egg packing centre during the high-risk window and the investigation into the egg collection route identified two premises which had been visited by the egg collection vehicle immediately after collecting from the IP. These two premises were part of the same company. They subsequently became report cases and HPAI was confirmed as AIV 2021/40 and AIV 2021/41.

In addition, AIV 2021/40 was also identified as the location of the incinerator for the carcasses that moved off in the likely risk window. However, at the time of the tracing visit to the poultry premises co-located with the incinerator, no sign of notifiable disease was observed and it was pending a 21-day post-contact tracing visit when it became a report case.

Poultry manure stored on a nearby farm with no poultry was restricted.

All the other tracings were investigated, assessed as being very low risk, and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There were fishing lakes in proximity which attracted wild birds.

The chickens were ranging until the 22/11/2021 (the start of the high-risk source tracing window).

Spread investigations: Assessment of potential and likelihood of spread

Risk of onward transmission through wildlife not higher than the background risk.

Other potential spread pathways assessed as being very low risk.

Remaining uncertainty

Some uncertainty remains around whether there may have been onward transmission to AIV 2021/40 or AIV 2021/41 as the spread window for this IP overlaps the source windows for them both (via common egg and manure collection routes). These were however, considered to be very low risk following tracings investigations.

AIV 2021/32, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises normally held free-range laying chickens, but the birds had been housed since 21/11/2021 in accordance with the housing order for North Yorkshire. The unit was family owned and comprised one poultry shed, and a range with trees. Eggs were supplied to a local egg collection centre. There was also a store cattle enterprise and a group of four sheep on the holding.

Species and number of each present

There were approximately 16,000 Bovan Brown hens placed across four sections within the poultry shed. They were approximately 47 weeks old at the time of the investigation.

Description of the housing

The shed was of steel construction and in a good state of repair. There were four bird areas, but all shared the same airspace. Since the chickens had been housed, wild birds would not have been able to have contact with them. There was an egg packing area located at one end of the house. The egg store was opposite this and attached to the back of the cattle shed. The range had been planted with trees.

Plan of the infected premises

Figure 109: Plan of AIV 2021/32



Overview of biosecurity

Overall, the unit was clean, tidy and well-maintained. However, some biosecurity procedures were lacking. A diary was kept by the owner which served as a visitors' book.

PERSONNEL: Two family members attended to the birds and they had no contact with any other poultry. There were two boot dips outside the poultry shed for use prior to entry. The first was used for scrubbing off organic matter and the second for rinsing. Both contained disinfectant. The door opened into the egg collection area and personnel had to go through this in order to access the bird area. There was another boot dip prior to entering the bird area. The same clothing and footwear was worn outside, inside the poultry house and in the egg packing and storage areas.

HOUSING: The housing was well-maintained and since the chickens had been housed, wild birds would not be able to enter.

DELIVERY VEHICLES: There were no cleansing and disinfection procedures for on-coming vehicles.

EGGS: Eggs were moved from the egg collection area into a storage room once the pallets were full. The storage room was a separate building outside the poultry house and therefore collection drivers did not need to enter the poultry shed. There were facilities for hand washing and cleaning but no biosecurity measures for vehicles.

FEED: Feed was delivered once per week from a commercial supplier. Wagons entered the site and feed was blown into bins located at the end of the poultry shed next to the egg packing area.

BEDDING: The poultry shed was bedded prior to placement of the birds and additional bedding was not added.

WATER: Borehole supply and stored in header tanks inside the poultry shed so it was unlikely to become contaminated during storage.

ABP: Dead birds were collected by hand and stored in a freezer. Once this was full, carcasses were transferred to the farm gateway in a receptacle for collection by a fallen stock company.

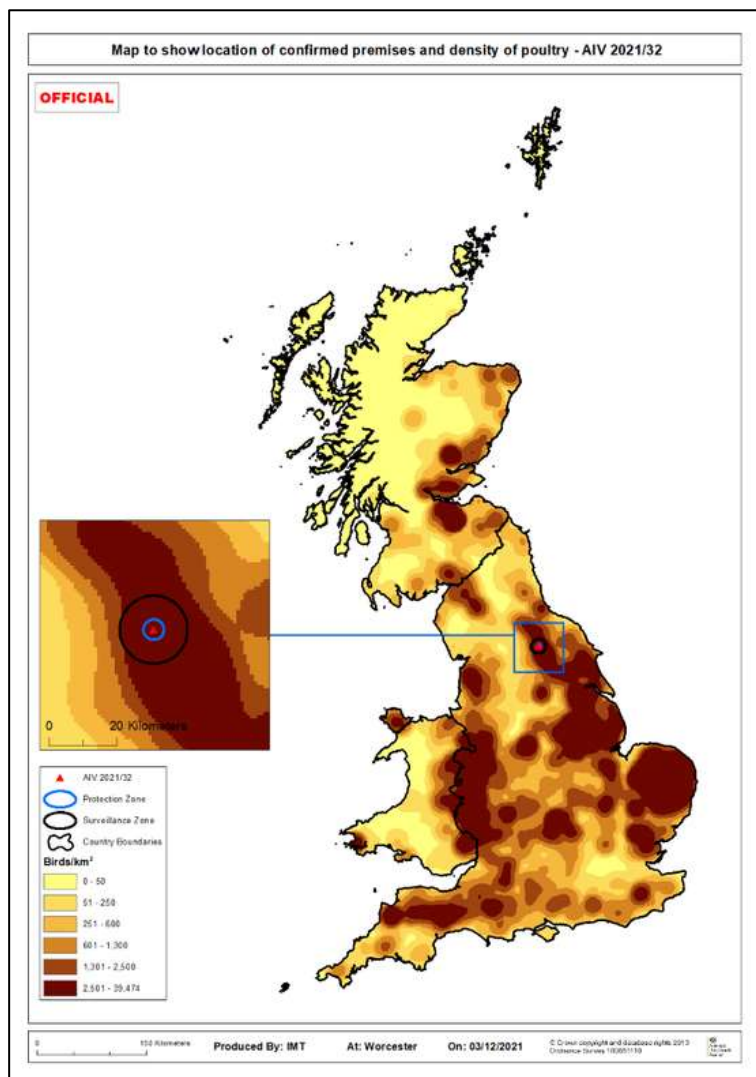
VERMIN: Control was carried out by the owner. There was no evidence of activity noted during the investigation or in recent records.

MUCK: Muck was removed via a muck belt which was emptied into a trailer at the time of removal. The site owner reportedly operated the belt as required so the driver would not need to enter the poultry shed. The system was in a good state of repair and could not be accessed by wild birds or vermin.

VENTILATION: The roof had chimney outlets and there were fans in the wall adjacent to section four. There were baffles in place to prevent wild bird access. Under normal circumstances, air entered via the chimneys and the fans sucked the air out however during strong winds, as had occurred recently, the fan baffles were often blown open which could allow ingress of organic material.

Map with location in Great Britain and poultry density

Figure 110: Location of IP and poultry density



Overview of the surrounding area

The unit was in a high poultry density area and there was also a significant amount of pig production. There were several commercial poultry units within 1 km, some of which had also become IPs. There was much arable ground and various gamebird shoots in the vicinity. A river ran approximately 1.5 miles to the west.

Ornithological assessment:

Desktop assessment: Bridge species were considered likely to have been common and appeared to present the most potential wild bird infection pathway onto the site. Both gulls and corvids were likely to exploit farm ranges and contaminate operational surfaces. Wildfowl were likely to be common although it is unclear whether there were suitable habitats to host large aggregations nearby. Nevertheless, there was

potential for them to contaminate the site and produce some infection pressure. Although waders were not thought to be common in the landscape, they may also have visited the ranges on this IP. Wild passerines, woodpigeon and starlings may also have contributed several alternative infection pathways to add to the infection pressure here.

Local intelligence: Large numbers of geese had been seen in the area within the two weeks prior to onset of disease. Various wild birds were seen on the site daily.

Clinical picture

01/12/2021 – 100 birds were found dead during the morning check of section 4. The private vet was called and following this, suspicion of NAD was reported to APHA. A report case investigation was initiated on the same day.

APHA found that the remaining birds were active and not showing any overt clinical signs. Post-mortem examination was unremarkable. Over the next 24 hours, the mortality rate increased and clinical signs became apparent, particularly listlessness and recumbency which were rapidly followed by death.

Review of mortality data showed that there had been two deaths on 30/11/2021 and one death on each of 29/11/2021 and 28/11/2021. There had been no deaths on 27/11/2021. Although one or two deaths per day would not be considered unusual on this unit, a precautionary approach was taken and the onset of clinical signs was considered to be 28/11/2021.

Timeline

Tracings windows

Source tracings window:

High-risk:	25/11/2021 to 27/11/2021
Likely:	14/11/2021 to 24/11/2021
Precautionary:	10/11/2021 to 13/11/2021

Spread tracings window:

High-risk:	26/11/2021 to 01/12/2021
Likely:	15/11/2021 to 25/11/2021
Precautionary:	11/11/2021 to 14/11/2021

Most likely date of infection: 25/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 111: Source and spread timeline for AIV 2021/32

Source Tracing Window	Spread Tracing Window	Date	
		06/11/21	
		07/11/21	
		08/11/21	
		09/11/21	
Day 18		10/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		11/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		12/11/21	
Day 15		13/11/21	
Day 14		14/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	15/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	16/11/21	
Day 11	Day 3	17/11/21	
Day 10	Day 4	18/11/21	
Day 9	Day 5	19/11/21	
Day 8	Day 6	20/11/21	
Day 7	Day 7	21/11/21	
Day 6	Day 8	22/11/21	
Day 5	Day 9	23/11/21	
Day 4	Day 10	24/11/21	
Day 3	Day 11	25/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	26/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	27/11/21	No deaths recorded.
	Day 14	28/11/21	Precautionary onset of clinical signs. 1 bird found dead
	Day 15	29/11/21	1 bird found dead
	Day 16	30/11/21	2 birds found dead
	Day 17	01/12/21	100 birds found dead at the morning check (died overnight). Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/85). Restrictions served.
		02/12/21	HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-32.
		03/12/21	VFEI investigation
		04/12/21	Culling commenced
		05/12/21	Culling completed .
		06/12/21	Preliminary C&D completed
		07/12/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

39 premises with poultry holding between 2-180,000 birds (13 premises with 50 or more birds)

SZ (3-10 km)

197 premises with poultry holding between 1-240,000 birds (28 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the private vet, farm workers, feed delivery and egg collections during the high-risk window. There were no ABP collections within that time. A heap of manure that had been moved off the farm was restricted for 42 days at the new location.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds; this was attributed a high likelihood assessment with low uncertainty.

Assessment and evidence base for the likely source

Tracing investigations did not identify any likely lateral transmission pathways onto this unit. There had been very few movements onto the site during the high-risk source period and they were considered to pose very low or negligible likelihood source pathways.

Some biosecurity procedures for routine staff and management of the unit were suboptimal and may have allowed indirect contact with wild birds. One particular example was the use of the same footwear both outside and inside the bird areas. It was considered possible that recent storms had affected the ventilation structures such that they could have allowed ingress of contaminated material. Notably, the large wall fans were situated in the side of section 4, which was the first to become affected.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk. Tracing investigations have shown that all other potential spread pathways were low or negligible likelihood with low or medium uncertainty.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/33, Near Tutbury, East Staffordshire, Staffordshire, England

Description of the premises

Overview of the premises and the wider business

This was a non-commercial backyard flock of 35 chickens and four geese kept in a very large garden. The chickens were old and laid few eggs. No eggs, or other products from the birds, were sold or given away.

The most obvious source of infection of AIV was the wild ducks, which visited the pond in large numbers every day. The pond was very near to the chicken enclosure with a very large direct contact area.

Species and number of each present

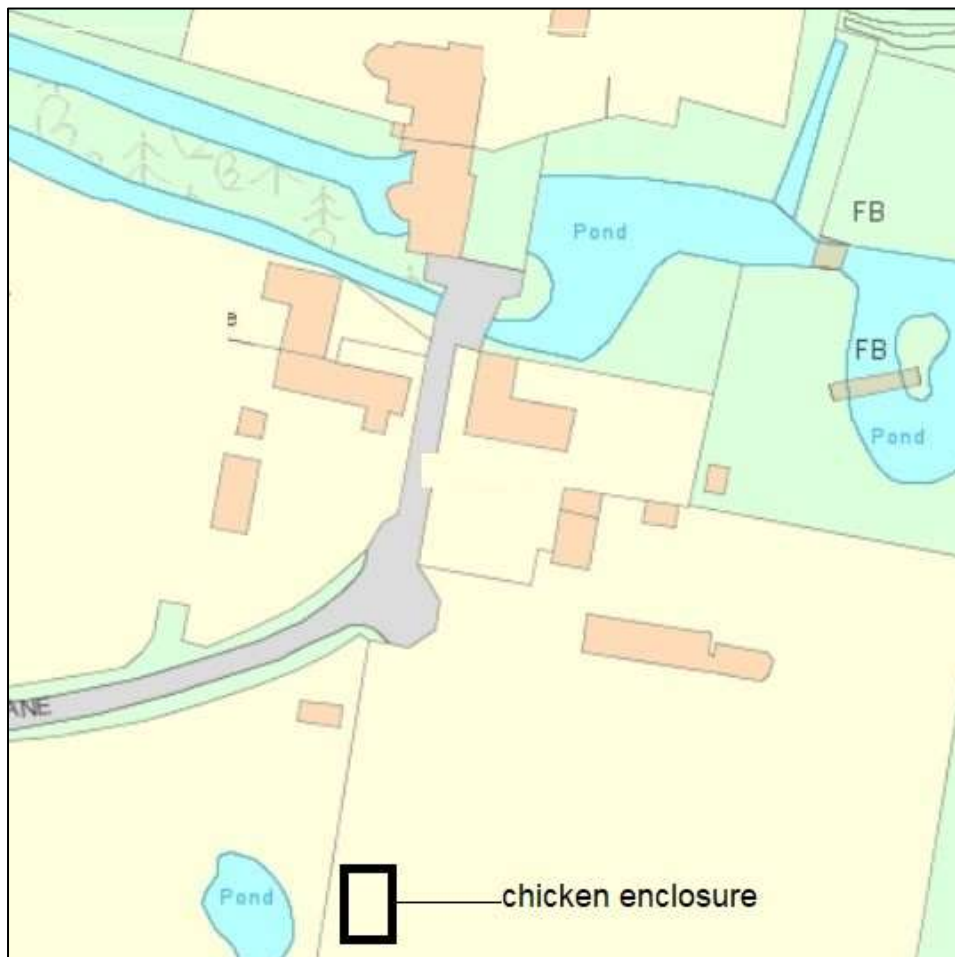
35 chickens and four geese

Description of the housing

During the past month, the chickens had been moved into a wired enclosure covered with waterproof lining and containing three wooden chicken houses. This enclosure was in the gardens near a large pond where around 50 feral ducks ranged freely together with four old pet geese. The chickens and other birds could make contact through the wired sides.

Plan of the infected premises

Figure 112: Plan of AIV 2021/33

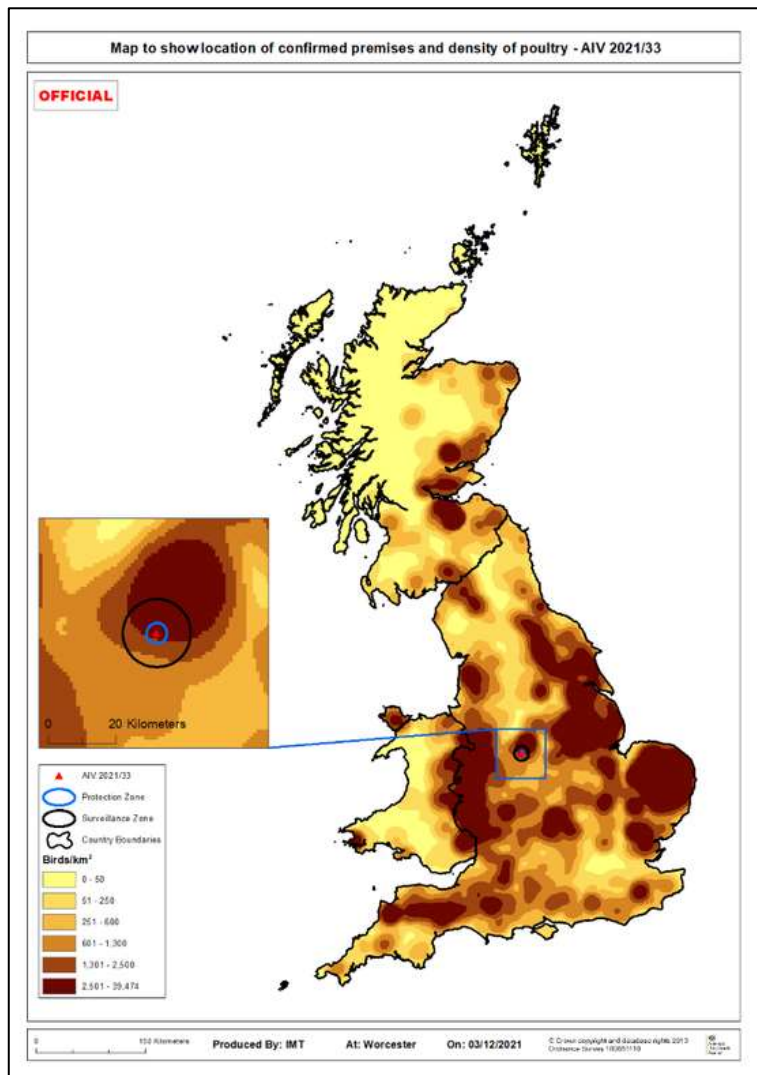


Overview of biosecurity

Biosecurity was assessed as poor. Although the chickens had been moved to a covered enclosure, contact with wild birds was possible as the sides were made of wire mesh. The keeper did not use designated protective clothing or boot washing when entering the enclosure, making contamination likely.

Map with location in Great Britain and poultry density

Figure 113: Location of IP and poultry density



Overview of the surrounding area

The house and large garden was within a small hamlet with several large waterbodies nearby.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Many feral ducks were attracted to the pond within the garden. These ranged freely with the kept geese.

Clinical picture

22/11/2021 – Chickens started dying at a rate of one a day since after showing lethargy and dullness.

30/12/2021 – Three chickens died

01/12/2021 – Six more died and suspicion of disease was reported and samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	18/11/2021 to 20/11/2021
Likely:	07/11/2021 to 17/11/2021
Precautionary:	10/11/2021 to 17/11/2021

Spread tracings window:

High-risk:	19/11/2021 to 01/12/2021
Likely:	08/11/2021 to 18/11/2021
Precautionary:	11/11/2021 to 18/11/2021

Precautionary and likely windows overlap due to late reporting of suspicion of disease.

Most likely date of infection: 18/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 114: Source and spread timeline for AIV 2021/33

Source Tracing Window	Spread Tracing Window	Date	
Day 14		07/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	08/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	09/11/21	
Day 11	Day 3	10/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 10	Day 4	11/11/21	Start of precautionary spread tracing window (source + 24h).
Day 9	Day 5	12/11/21	
Day 8	Day 6	13/11/21	
Day 7	Day 7	14/11/21	
Day 6	Day 8	15/11/21	
Day 5	Day 9	16/11/21	
Day 4	Day 10	17/11/21	
Day 3	Day 11	18/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	19/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	20/11/21	
	Day 14	21/11/21	Precautionary onset of clinical signs. First death could have occurred overnight.
	Day 15	22/11/21	First death noted
	Day 16	23/11/21	1 dead
	Day 17	24/11/21	1 dead
	Day 18	25/11/21	1 dead
	Day 19	26/11/21	1 dead
	Day 20	27/11/21	1 dead
	Day 21	28/11/21	1 dead
	Day 22	29/11/21	1 dead: Initial call to APHA to report suspicion of disease. Not progressed by CAD team.
	Day 23	30/11/21	3 dead
	Day 24	01/12/21	6 hens dead. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/86). Restrictions served.
	Day 25	02/12/21	Additional hen dead. Avian Influenza H5N1 confirmed by CVO based on PCR results with case reference AIV2021-33. HPAI also confirmed as a result of clinical picture and mixing with wild water fowl.
	Day 26	03/12/21	Cull commenced
	Day 27	04/12/21	Cull Completed
	Day 28	05/12/21	Preliminary C and D completed
	Day 29	06/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

39 premises with poultry holding between 1-35,000 birds (3 premises with 50 or more birds)

SZ (3-10 km)

135 premises with poultry holding between 1-333,990 birds (35 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct and indirect contact with wild birds

Assessment and evidence base for the likely source

Large numbers of ducks were visiting the pond adjacent to the chicken enclosure and direct bird to bird contact was possible through the mesh sides.

Poor biosecurity allowed indirect contamination of the enclosure through keeper movement.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/34, Near Leominster, North Herefordshire, Herefordshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a commercial broiler-breeder unit in Herefordshire. This unit was part of a company, which had 13 units in total: four rearing sites that supplied nine broiler breeder sites. The IP supplied eggs to a nearby hatchery.

All 13 units were managed independently and run as an all-in-all-out system. There was no shared equipment. All had the same biosecurity protocol for personnel entering the unit, which included showering on and off, and the use of designated clothing and footwear. They all had an APHA-approved on-site incinerator for ABP.

Species and number of each present

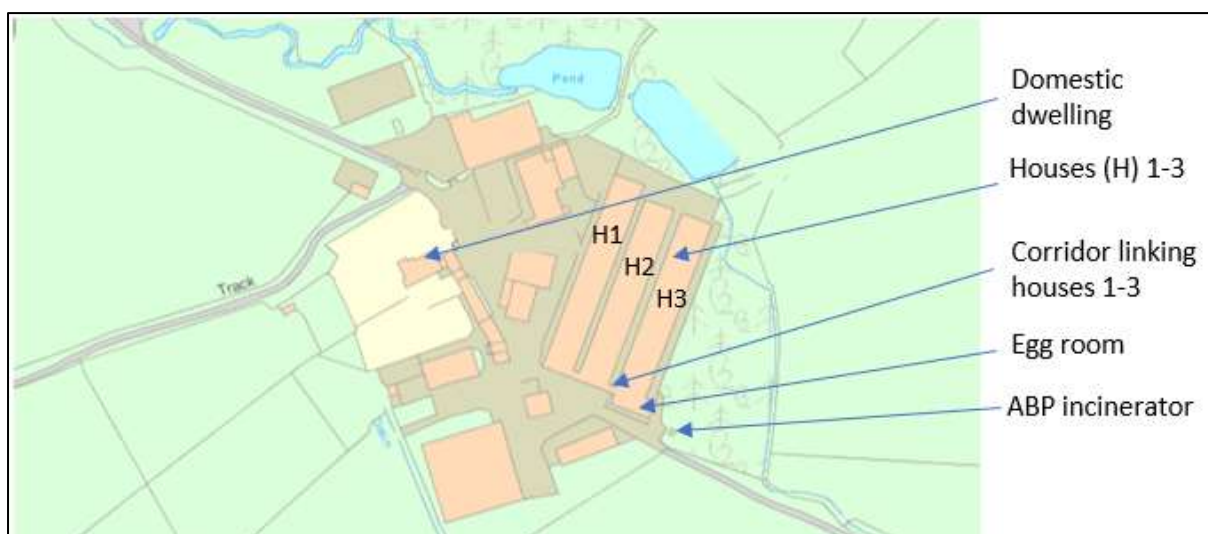
The IP had approximately 27,000 broiler-breeders with 10 hens to one cockerel.

Description of the housing

The IP consisted of three houses, each housing around 9,000 birds. There was a passageway that connected all three houses with egg handling and storage areas. Within each house there were central nest boxes with conveyors to move eggs to a common passageway and then to the egg room. The unit was constructed of galvanised metal and was in good condition. The house ventilation systems had sidewall extractors and apex inflow.

Plan of the infected premises

Figure 115: Plan of AIV 2021/34



Overview of biosecurity

Biosecurity was deemed to be good on the IP and between other units within the company. Company employees were prohibited from keeping their own birds at home.

There were two visitors' books, although routine staff were not required to sign in. Some weekday staff were specific to the IP, however both weekday and weekend cover were found to move between farms within the company.

PERSONNEL: the IP was a shower on and off site. There was designated onsite clothing and footwear. Foot dips were kept at the two outer doors used to enter/leave the house complex. A record was kept of when foot dips are replenished, usually weekly. Once inside the complex, there were no further foot dips, nor was there dedicated footwear for the poultry area.

EQUIPMENT: none was shared with other units. Any equipment that was used was kept within the house complex.

FEED DELIVERIES: Commercial feed was delivered to the site about once a week and blown into the two external feed silos from where feed was piped into the house complex. Visitor protocol was for drivers to use foot dips in the gate house, and clean and disinfect vehicle wheels on arrival and departure, with approved disinfectant. This was not supervised but the staff were confident that the written protocol was adhered to.

BEDDING: Wood shavings for the next flock are brought in after C & D had been completed following depopulation. Small plastic wrapped bales were delivered on pallets which were themselves wrapped in black plastic. The black plastic was removed before the smaller bags were brought into the complex. These were fumigated before being placed in the individual houses. Any surplus was left in the corridor within the complex to be used throughout the batch as required. Generally, no more shavings were added for the duration of the flock. Litter remained in situ until the flock was depopulated.

PEST CONTROL: there were no reports or evidence of rodents inside the unit. Rat activity had been observed around the feed silos and the incinerator. Pest control was carried out by the site manager and comprised of eight bait boxes checked weekly and recorded.

HOUSING: The unit was 14 years-old and of solid galvanised metal construction and designed to be rodent proof. The exterior doors were metal which are either only openable from the inside or are kept locked. There were more than two exterior doors, which could potentially be opened leading to breach in biosecurity. Doors into the bird area from the shared corridor had no air-lock system, only a small board to stepover.

ABP: Carcasses were put in bins at the entrance to each house and incinerated daily. Floor eggs were collected daily in buckets and stored in cardboard trays until being incinerated (normally daily).

WATER: Water was supplied from a bore hole and treated with hydrogen peroxide. Water quality was monitored regularly in-house (strips) and samples sent off to external laboratory every 1-2 months. The last samples submitted on 18/10/2021 and no problems were reported. The water was pumped into covered 5000-litre header tanks within the corridor of the house complex.

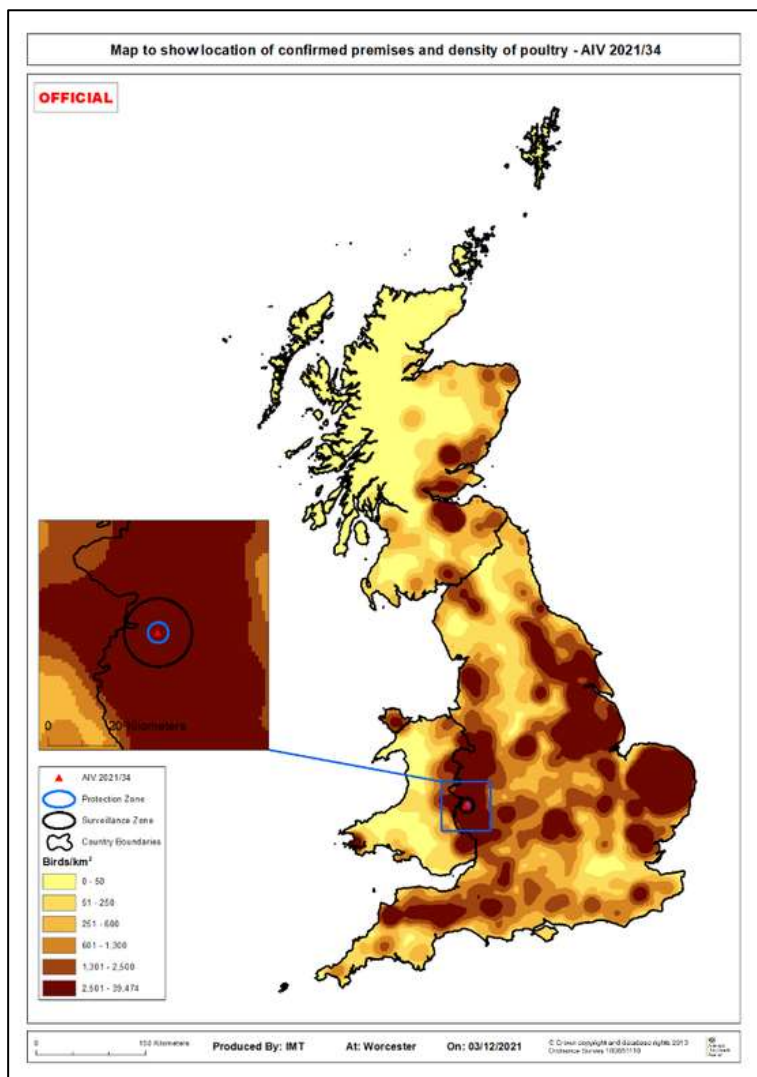
EGG COLLECTION: Eggs laid in the nest boxes were conveyed on belts that passed through each individual bird house and joined a central conveyor belt in the corridor which took the eggs to the egg packing station where they were graded by hand and added to plastic trays on trolleys. The trolleys were then wheeled into the egg storeroom.

The full egg trolleys were collected twice a week by the hatchery. Empty trays and trolleys from the hatchery were left. The eggs in the egg room were fumigated daily with hydrogen peroxide.

The egg-collection drivers wore plastic over-shoes and disposable overalls before entering the egg storeroom. They did not go further into the unit. Once the driver left, the floor of the egg store was sprayed with approved disinfectant. Trolleys were sent back if they were dirty. Trays observed to be visibly contaminated were washed with approved disinfectant before being used.

Map with location in Great Britain and poultry density

Figure 116: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density. The nearest poultry unit was another broiler-breeder unit about 1 km north. A large hatchery was approximately 2.5 km north. The land around the IP was sheep grazing or recently harvested maize.

Ornithological assessment:

Desktop assessment: Wild birds presented a 'Likely source of infection pressure' to this IP. The operational surfaces on the IP were considered to be relatively unattractive to wild birds, but the boundary was marked by adjacent mature deciduous woodland and ponds.

Small passerines, starlings and wood pigeon were likely to have been abundant and the presence of the village close by and the woodland immediately adjacent to the site may have encouraged these species to aggregate and rest close to the IP.

Clinical picture

29/11/2021 – Eight birds were found dead in house 2. This was in contrast to an expected mortality of <1 bird dead per day per house. Forty-one were dead on 30/11/2021 in house 2 and 76 on 1/12/2021. Mortality rates for houses 1 and 3 remained normal.

The increased mortality rate was reported to the private veterinary surgeon (PVS) on 01/12/2021. Following post-mortem examination of these birds, the PVS reported suspicion of notifiable avian disease to APHA.

The APHA vet visited on 01/12/2021 and found birds in houses 1 and 3 to be showing no clinical signs. In house 2 there were small numbers of lethargic and moribund birds with heads drooping and eyes closed; they were unresponsive to being handled. There were several dead birds in small numbers in the litter and these had cyanotic heads and congested carcasses on examination. There was some respiratory distress which involved beak opening and closing and notably, several birds appeared to have a tremble/tremor of their whole body. There was no sign of diarrhoea, vomiting, or sneezing.

Analysis of mortality data for 21 days plus prior to 29/11/2021 was unremarkable and the mortality rate for house 2 was comparable with those for houses 1 & 3. This confirmed the picture reported that mortality began to increase over night of 28/11/2021 in house 2.

Feed and water consumption did not reduce before 29/11/2021. Egg production as a percentage of point of lay reduced slightly on 29/11/2021 to 80.89% (average for 6 days preceding was 83.46%) and dipped to 78.33% on 01/12/2021.

In the days following confirmation in house 2, mortality began to steadily increase in houses 1 and 3. On 5/12/2021 mortality was estimated at 5% in house 3. Clinical signs in houses 1 and 3 were similar to those in 2.

Timeline

Tracings windows

Source tracings window:

High-risk: 25/11/2021 to 27/11/2021
 Likely: 14/11/2021 to 24/11/2021
 Precautionary: 10/11/2021 to 13/11/2021

Spread tracings window:

High-risk: 26/11/2021 to 01/12/2021
 Likely: 15/11/2021 to 25/11/2021
 Precautionary: 11/11/2021 to 14/11/2021

Most likely date of infection: 25/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 117: Source and spread timeline for AIV 2021/34

Source Tracing Window	Spread Tracing Window	Date	
Day 18		10/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		11/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		12/11/21	
Day 15		13/11/21	
Day 14		14/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	15/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	16/11/21	
Day 11	Day 3	17/11/21	
Day 10	Day 4	18/11/21	
Day 9	Day 5	19/11/21	
Day 8	Day 6	20/11/21	
Day 7	Day 7	21/11/21	
Day 6	Day 8	22/11/21	
Day 5	Day 9	23/11/21	
Day 4	Day 10	24/11/21	
Day 3	Day 11	25/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	26/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	27/11/21	
	Day 14	28/11/21	Precautionary onset of clinical signs.
	Day 15	29/11/21	
	Day 16	30/11/21	
	Day 17	01/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/87). Restrictions served.
Day 18		02/12/21	H5N1 confirmed by CVO with case reference AIV2021-34.
Day 19		03/12/21	
Day 20		04/12/21	
Day 21		05/12/21	Culling started
Day 22		06/12/21	Culling complete
Day 23		07/12/21	
Day 24		08/12/21	
Day 25		09/12/21	
Day 26		10/12/21	Preliminary C & D started
Day 27		11/12/21	Preliminary C & D considered effective
Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.			
Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.			

Surveillance activity

PZ (0-3 km)

42 premises with poultry holding between 1-4,723,200 birds (19 premises with 50 or more birds)

SZ (3-10 km)

84 premises with poultry holding between 1-304,386 birds (27 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for egg collections, feed deliveries and a shared worker who also worked at another poultry premises. All were deemed very low risk and closed following initial and 21-day post contact visits to the worker-linked poultry premises.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Biosecurity, and compliance with it, appeared to be good on this IP. Staff were dedicated to this site or honoured sufficient poultry-free time between sites. Feed, and egg collection lorries exhibited good cleansing and disinfecting practices, so they were unlikely sources. Further, the tracings work identified no other infected premises linked to this one.

Whilst the overall building integrity was good, there were known problems. A known leak in the roof after very heavy rain over the corridor between houses 1 and 2. The design of the roof meant that if the drainage gulley became blocked, water could gain ingress into the corridor. Whilst no leak was reported at the time of investigation, Storm Arwen occurred on 27-28 November, which could fit with the disease timeline. It was possible that rainwater contaminated with HPAI virus could have dripped into the corridor and been carried into the bird area. There were no foot dips or other precautions at the bird area entrances to mitigate this risk.

Small birds had been known to enter the bird areas through the air vents in the past. The protective grill on the outside of the vents was not small enough to avoid this. No wild birds were observed during this flock; however they could not be excluded as a source.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

All other spread pathways investigated, with no further action required.

Remaining uncertainty

No remaining uncertainties.

AIV 2021/35, Near Gretna, Dumfriesshire, Dumfries and Galloway, Scotland

Description of the premises

Overview of the premises and the wider business

The infected premise (IP AIV 2021/35) was a mixed stock farm situated close to Lockerbie in Dumfries and Galloway in the south-west of Scotland.

It had a flock of free-range layers housed in two sheds that consisted of 26-week-old Lohman Brown hens placed at beginning of October 2021 at 16 weeks old. The farm was independently run but contracted to a large egg production company supplying supermarkets and had no farm gate egg sales.

The farm operated an all in- all out system and the birds had been housed since Thursday 18/11/2022. The farm also had beef cattle and a flock of sheep on winter grazing. Horses were also kept in farmhouse stables.

The poultry units were the main farm business, and its layout and management were quite separated from the rest of the farm. The poultry were looked after by the farmer with help from his wife, father and one employee.

Access to the farm was via a dead end hard stoned farm track from a public road, located 1 km from a M74 junction. There was a right of access for 2 neighbouring households.

Feed was delivered every 10 days and eggs were collected on Tuesday and Friday each week..

Animal by products were delivered up to the main road by the farmer when required. No collection had occurred for this flock since placement with all mortalities kept in a freezer.

There was no shared equipment with other farms nor for management of different species on farm apart from a trailer to move ABP when required.

Species and number of each present

The poultry business consisted of two sheds with house 1 containing 10 000 birds and house 2, 12 000 birds.

232 beef cattle and 85 sheep plus 7 horses were also on the wider farm.

Description of the housing

The poultry housing consists of sheds (house 1 and house 2) with metal roofs, slatted floor system, integrated perches, and automatic ventilation (side inlets with roof extractors).

Covered nests ran along each shed. The birds usually had access to an outdoor free-range area: each house had a fenced area that were adjacent to each other, separated by a single fence.

The layout of both sheds and the management mirrored each other. Good maintenance was observed, and the sheds were clean and tidy with no moss accumulation on the roofs.

The main door opened into the egg collection room, and at the side there was the egg storeroom with a separate side door for delivery. All were accessed from a clean concrete apron.

Plan of the infected premises

Figure 118: Plan of AIV 2021/35



Overview of biosecurity

A visitor book and questionnaire were available, however, regular visitors such as egg collection and feed delivery drivers were not recorded. Also, pest control visits were not in the visitor book, however the latest report was available.

There was no designated area with C&D facility available for vehicles. Parking was available for cars along the road outside the poultry site. A gate was in place to restrict access however, it did not appear to be used. The private road was a dead-end and there was limited access.

An agreement was in place for feed delivery and egg collection regards an access protocol. The drivers were to use their own equipment to carry out wheel C&D at the top of the farm track however C&D procedures were not monitored.

A disinfectant point was present at the entrance to each house. This was a covered bucket of 1% Virkon S which was changed every Tuesday and Friday. No soil accumulation was noted in the bucket at the time of the disease investigation.

Dedicated PPE was used by the staff, but no changing room was available. The large space at the entrance of the houses was in good order. Good cleaning was observed. Pest control was in place via a local contractor and fly activity was minimised with effective control by sticky paper.

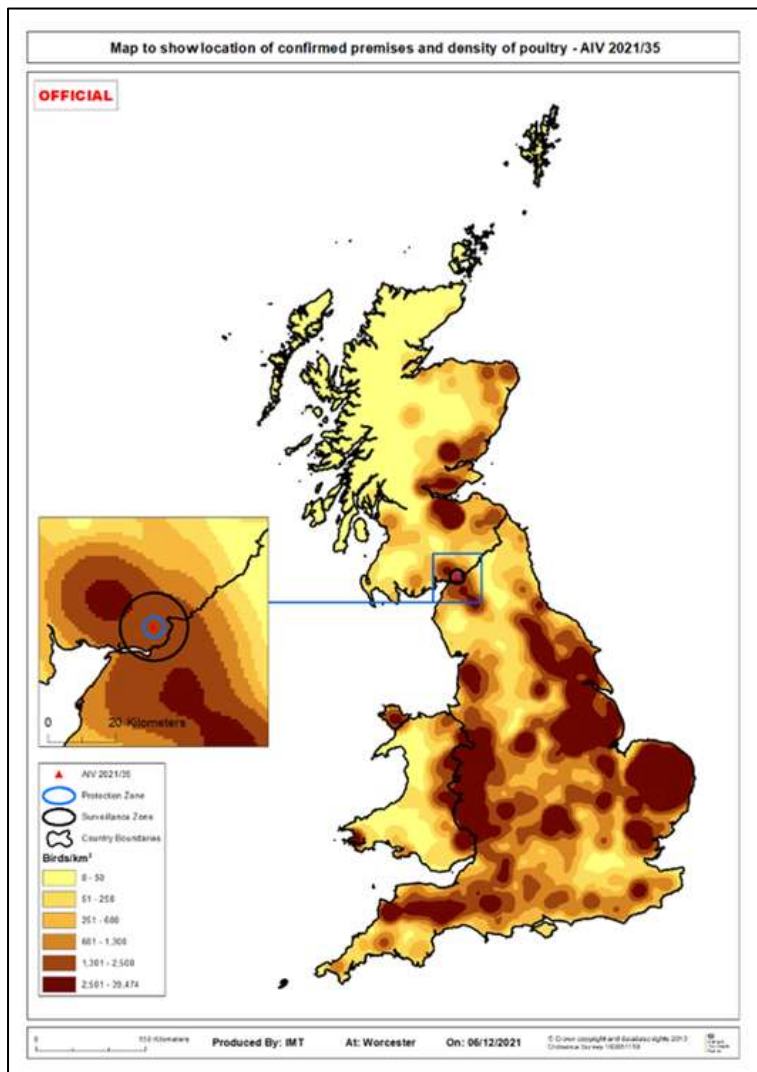
The main door opened into the egg collection room, and at the side there was the egg storeroom with a separate side door for delivery. A hygiene station with hand washing facilities was inside the house at the entrance. A hand disinfectant dispenser was available (and filled up) before entering the bird area. No broken eggs were detected on the floor and packaging was raised from the floor. The egg room was well maintained with no holes/gaps.

There was a homemade system to segregate the egg room and the walkway to the bird area. This forced the changing of boots and walking on a disinfectant mat before climbing up stairs to reach the door to the bird area.

During the visit, no spillage of feed was seen and no waste/uncovered ABP was detected.

Map with location in Great Britain and poultry density

Figure 119: Location of IP and poultry density



Overview of the surrounding area

This Scottish IP was set in a rural and lowland landscape within 5 km of the border with England. The IP was at 60 m above sea level and surrounded by forests and intensive agriculture and as such was typical of inland settings. However, it was also <6 km from the mouth of the Solway Firth and its intertidal habitats, so there was some coastal influence.

Within 2 km, the landscape was flat and largely agricultural, with arable mixed into predominantly grassland landcover, though the later appeared to range from intensive grass leys, through to managed and unmanaged grassland, hay meadows and rough grazing, with the last often found around watercourses. A pond was present in a field 250 metres north-east from the poultry houses.

At a greater distance the landscape to the north became wilder as it rose, with more natural and semi natural habitat present and areas of extensive commercial forestry.

Landscapes to the east and west remained largely agricultural, though there were substantial areas of forestry as well as extensive parkland estate to the east. Estuarine and wetland habitats dominated to the distant south.

Ornithological assessment:

Desktop assessment: This rural and lowland IP was set in a mixed agricultural landscape typical of inland settings. However, it was relatively close to estuarine habitats hosting substantial populations of waterbirds, providing a substantial source of infection in the wider landscape.

Wildfowl were abundant in the wider landscape and produced a known substantial source of infection at moderate distance from the IP though it was less clear if any nearby source of infection occurred here. Wildfowl may have contaminated surfaces at the IP with these infection pathways producing some infection pressure.

Waders and other waterbirds were abundant in the wider landscape, though it was less clear if this included producing aggregations local to the IP which might have provided a source of infection. The birds were unlikely to use the IP directly and produced little infection pressure.

Gulls were abundant in this landscape and corvids were likely to be common. Both groups of bridge species produced the most significant infection pathways, with gulls producing the greatest pressure where they move considerable distances between scavenging infected carcasses from the coast or at sea and foraging around farms.

Small passerines, Woodpigeon and Starling were likely to be at least common. However, the lack of likely sources of infection that might be used by these species close to the IP suggested that they produced little infection pressure here.

Local intelligence: The Solway Firth was used as a feeding ground and nature reserve by numerous migratory birds in their journey from/to north of the Arctic Circle. During 2021 to 2022 there had been numerous reported deaths in wild geese that had been attributed to HPAI H5N1. Wild bird activity was reported as occurring in the area and birds/geese were noted flying over the area at the time of investigation.

Clinical picture

House 1

Suspicion of disease was reported on 2/12/2021. Prior to notification a slight drop in egg production (3%) was noted over the previous 10 days with an increase in mortality as follows:

30/11/2021 – 7 birds,

01/12/2021 – 66 birds,

02/12/2021 at 08:00 – 164 birds

On 01/12/2021 the owner sent 6 carcasses for post-mortem testing. Liver pathology and ascites was reported. The flock was under treatment for “blackhead”

(*Histomonas meleagridis*). At the time, the private veterinary surgeon (PVS) did not visit the farm.

The birds did not show any respiratory or neurological signs at the time of the APHA case vet's visit on 02/12/2021. There was no diarrhoea, and the birds were recorded as eating and drinking well. The only unusual thing the owner noticed was that the birds were "shaking their heads" but this was assumed as being due to recent treatment.

House 2:

No significant changes in egg production, water, or feed intake were noted. Mortality records did required interpretation as 5 dead birds were found in one corner on 27/11/2021. The owner commented that until that day he had only lost 10 birds in that house since the beginning of the month: that spike of mortality was isolated and likely linked to another cause. Mortality in House 2 was:

28/11/2021 - three birds,

29/11/2021 - one bird,

30/11/2021 – two birds

1/12/2021 none up to case vet visit (2/12/2021).

Timeline

Tracings windows

Source tracings window:

High-risk:	26/11/2021 to 28/11/2021
Likely:	15/11/2021 to 25/11/2021
Precautionary:	11/11/2021 to 14/11/2021

Spread tracings window:

High-risk:	27/11/2021 to 02/12/2021
Likely:	16/11/2021 to 26/11/2021
Precautionary:	12/11/2021 to 15/11/2021

Most likely date of infection: 26/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 120: Source and spread timeline for AIV 2021/35

Source Tracing Window	Spread Tracing Window	Date	
Day 18		11/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		12/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		13/11/21	
Day 15		14/11/21	
Day 14		15/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	16/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	17/11/21	
Day 11	Day 3	18/11/21	
Day 10	Day 4	19/11/21	
Day 9	Day 5	20/11/21	
Day 8	Day 6	21/11/21	
Day 7	Day 7	22/11/21	
Day 6	Day 8	23/11/21	
Day 5	Day 9	24/11/21	
Day 4	Day 10	25/11/21	
Day 3	Day 11	26/11/21	Most likely infection date (initial clinical signs - 72hrs). Start of high risk source tracings
Day 2	Day 12	27/11/21	Start of likely high risk spread tracing window
Day 1	Day 13	28/11/21	
	Day 14	29/11/21	Some deaths noted on the 30th likely to have occurred overnight so precautionary likely onset of clinical signs taken as 29th Nov.
	Day 15	30/11/21	7 deaths occurred.
	Day 16	01/12/21	Increase in mortalities noted (60) and PME by PVS. Ascites
	Day 17	02/12/21	170 deaths: Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/89). Restrictions served. PME: pancreatic haemorrhages
	Day 18	03/12/21	300 deaths this AM and mortality continued to increase in shed 1 throughout the day during VFEI visit. Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-35.
	Day 19	04/12/21	
	Day 20	05/12/21	
	Day 21	06/12/21	Cull started.
	Day 22	07/12/21	
	Day 23	08/12/21	Cull complete
	Day 24	09/12/21	Preliminary C and D completed
	Day 25	10/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

20 premises with poultry holding between 1-31,797 birds (4 premises with 50 or more birds)

SZ (3-10 km)

54 premises with poultry holding between 1-230,000 birds (14 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were instructed for feed deliveries and egg collections within the high-risk window. This resulted in visits to another poultry unit visited next on the egg

collection route. Carcasses sent to the private vet prior to disease confirmation were also traced and their destruction and cleansing and disinfection protocols verified.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds.

Assessment and evidence base for the likely source

Investigations failed to identify any contact with other incursions of HPAI H5N1 and as a result direct contact with other domestic poultry or captive birds was assessed as negligible with low uncertainty.

Infection via indirect contact with other domestic flocks was assessed as very low with low uncertainty given that no other infected flocks were identified following tracing investigations.

Infection via contaminated products at source was assessed as very low with low uncertainty following the completion of tracing activities.

The farmer anticipated the national housing order and housed his birds on 18/11/2021. As such the likelihood of infection via direct contact with wild birds was assessed as very low with low uncertainty.

The farm was situated in an area with a large migratory waterfowl population where disease was known to have been circulating and as a result the environment was highly likely to have been contaminated with H5N1 virus. Indirect contact via fomite spread because of a failure in biosecurity was highly likely with low uncertainty as there is no house specific protective clothing used on site and biosecurity relied on compliance with unwritten standard biosecurity procedures in what is a mixed stock farm.

Infection from an international source was assessed as negligible likelihood with low uncertainty as no contact was disclosed.

Spread investigations: Assessment of potential and likelihood of spread

The investigation disclosed that spread of HPAI from this IP via direct contact with other domestic susceptible species was negligible with low likelihood. No birds or animal products moved to another farm or holding within the tracing windows.

Spread by indirect contact was assessed as a low likelihood with medium uncertainty. Tracing investigations failed to reveal any linked HPAI cases in the egg collection or feed delivery routes. All eggs entered the retail market. An additional IP AIV 2021/61 was disclosed on 14/12/2021 on a small holding premise which was located 250 metres from AIV 2021/35. Its likely infection date was assessed as 10/12/2021 the same day as the preliminary C and D was considered effective on AIV 2021/35.

Onward transmission via wildlife was assessed as a low likelihood with low uncertainty given that the hens were housed prior to the start of the high-risk spread

tracing window removing contact with the contaminated indoor environment. Due to early housing infected birds were unable to contaminate the wider range.

Spread of the virus through international trade was considered as negligible with low uncertainty as no connections were disclosed during investigations.

Remaining uncertainty

The likelihood of spread of disease from AIV 2021/35 to 2021/61 due to culling activities was assessed as low given the prevailing weather conditions during the cull were not conducive to airborne spread as the wind was in the wrong direction.

Transport of carcasses was highly regulated and supervised and there was no report of irregularities during the culling process on AIV 2021/35.

AIV 2021/36, Near Crickhowell, Powys, Wales

Description of the premises

Overview of the premises and the wider business

This was a mixed species premises, with commercial beef cattle, goats and sheep, as well as a family poultry breeding business supplying poultry and captive birds to smallholders and hobby keepers. In addition, they reared turkeys, ducks and geese for meat for the Christmas market.

There was an on-site, small, newly built slaughterhouse, which had not yet been used on a large scale.

No eggs were sold, as most were kept for incubating, a small number were used for the family's own consumption and the unwanted ones were discarded as waste.

Species and number of each present

There were approximately 3,270 birds in total – 2,120 ducks and waterfowl of different species, 140 geese, 795 chickens, 36 turkeys, 9 pheasants, 6 guinea fowl 25 rheas, 7 swans, 1 peafowl, 53 doves, and 77 feral doves.

In addition, there were 150 beef cattle, 15 goats and 20 sheep.

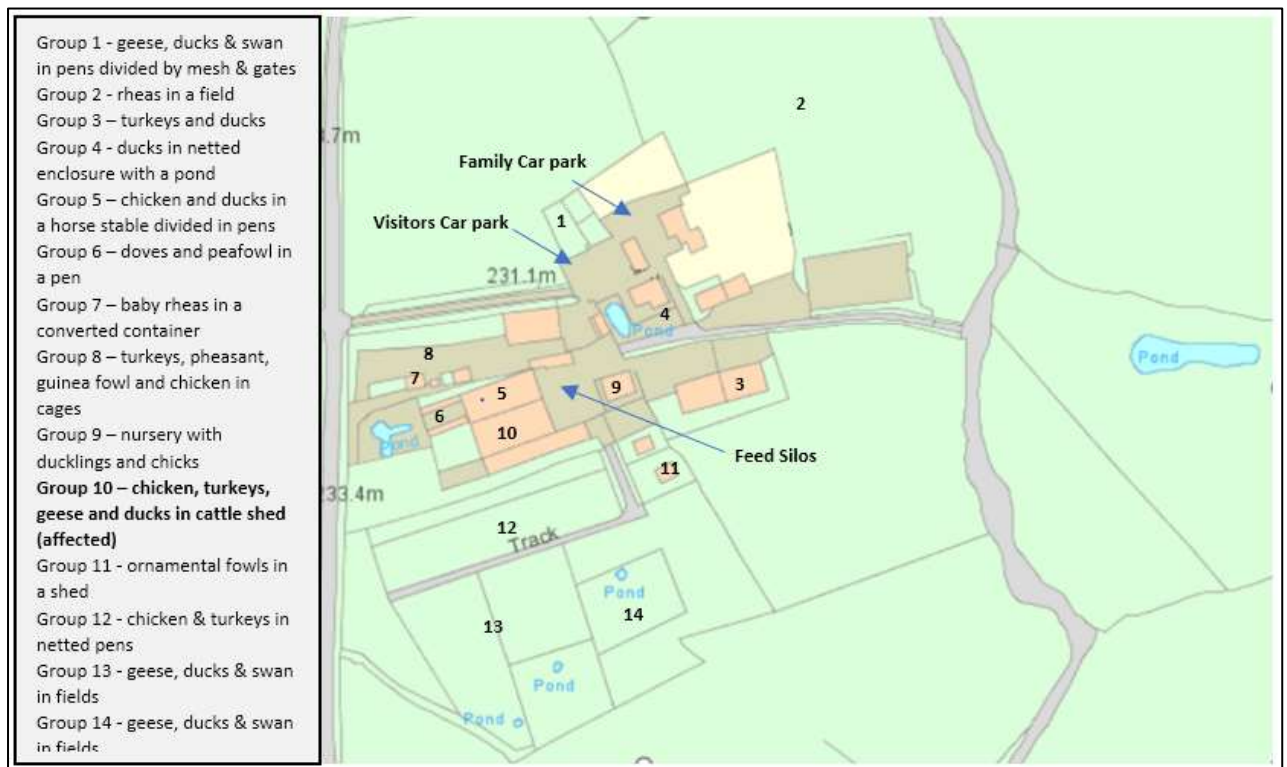
Description of the housing

Poultry and other birds were kept in fourteen different groups, many of these were mixed species groups, and in a variety of enclosures and conditions (indoor/outdoor, penned/loose, netted/open, etc).

The affected group was housed in an open barn (a cattle shed), which was divided in two sections, one holding the poultry and the other one adult cattle.

Plan of the infected premises

Figure 121: Plan of AIV 2021/36



Overview of biosecurity

Biosecurity in the premises was considered to be poor in respect of preventing contact with wild birds. Waterfowl and poultry were co-mingling, and several groups of birds were kept outside in pens or fields with little protection from contamination from wild birds' feathers and droppings. They also had access to the ponds. Two magpies' carcasses were found stuck in the netting on top of enclosures.

There were roughly 50 feral doves freely flying in the affected shed's space. These doves which were once owned, but they had escaped but remained in the area, flying in and sheltering in the cattle shed at night.

Feed was mainly kept in silos, but there was also pellet feed stored in bags that were kept in a stable barn, which was not wild bird proof.

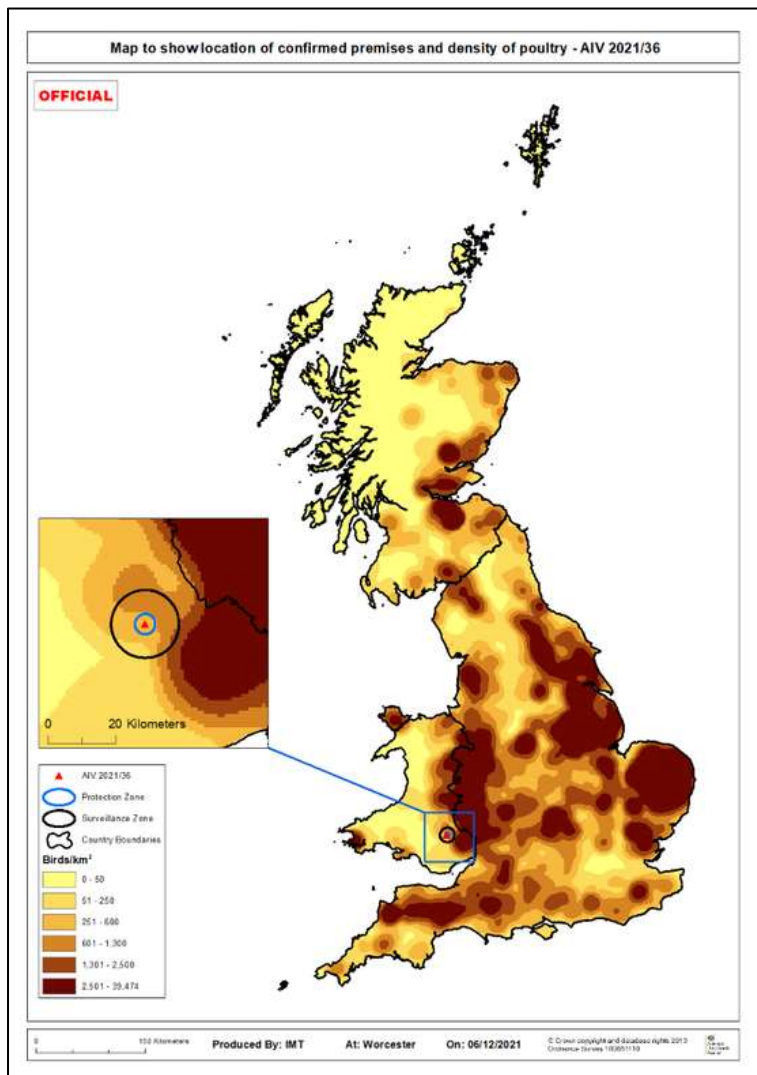
In addition, vermin were reported to be a problem at the time of the investigation.

There were no biosecurity standard operating procedures in place, but there was some evidence of basic on-farm biosecurity measures, such as footbaths with disinfectant by doors and gates.

Members of the public could enter the premises freely.

Map with location in Great Britain and poultry density

Figure 122: Location of IP and poultry density for AIV 2021/36



Overview of the surrounding area

The IP was located within the Brecon Beacons National Park, close to the river Usk and the Monmouthshire & Brecon canal, which was considered by ornithologists to be an important wildlife corridor and where wild birds of many species were likely to have been abundant.

The premises was not geographically close to any other IP, nor within any PZ or SZ.

Ornithological assessment:

Desktop assessment: not conducted.

Local intelligence: the keeper reported to have been seen large numbers of wild birds around the premises (crows, magpies, starlings, etc). There were several ponds on the premises, which would have attracted wild birds.

Clinical picture

02/12/2021 – following the death of approximately 15 chickens, 50 turkeys and 20 geese in the previous week, the owner reported suspicion of notifiable avian disease to APHA, and a report case visit was initiated on the same day.

The owner culled the remaining chickens from the same group and reported that the remaining turkeys in the group showed nervous signs and were not eating or drinking.

The affected birds were all in the same group and housed in the cattle shed (group 10 – Figure 121); the group contained mixed indicator and non-indicator species (chickens, turkeys, geese and ducks).

At the time of the APHA visit, four turkeys and two geese were found dead with the remaining being lethargic, or displaying nervous signs. The ducks did not show any clinical signs. Samples were taken.

Samples collected from culled birds revealed positive results for highly pathogenic H5N1 on RT-PCR testing, and positive for influenza antibodies to H5N1 on serology and 17 to H5N8 on serology from four epidemiological groups containing ducks and geese.

Timeline

Tracings windows

Source tracings window:

High-risk:	25/11/2021 to 28/11/2021
Likely:	15/11/2021 to 24/11/2021
Precautionary:	11/11/2021 to 14/11/2021

Spread tracings window:

High-risk:	26/11/2021 to 02/12/2021
Likely:	16/11/2021 to 25/11/2021
Precautionary:	12/11/2021 to 15/11/2021

Most likely date of infection: 25/11/2021 (Start of high-risk source tracing window)

(Based on seroconversion in samples taken at the time of culling).

Timeline chart

Figure 123: Source and spread timeline for AIV 2021/36

Source Tracing Window	Spread Tracing Window	Date	
Day 21		08/11/21	
Day 20		09/11/21	
Day 19		10/11/21	
Day 18		11/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		12/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		13/11/21	
Day 15		14/11/21	
Day 14		15/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	16/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	17/11/21	
Day 11	Day 3	18/11/21	
Day 10	Day 4	19/11/21	
Day 9	Day 5	20/11/21	
Day 8	Day 6	21/11/21	
Day 7	Day 7	22/11/21	
Day 6	Day 8	23/11/21	
Day 5	Day 9	24/11/21	
Day 4	Day 10	25/11/21	Start of high risk source tracing window (-10 days from 05/12/21) (Lab advice is that seropositive results of the ducks sampled on 05/12/21 indicate virus has been in these ducks for approx.10 days - timeline altered to reflect this) Most likely infection date for this outbreak.
Day 3	Day 11	26/11/21	Start of high risk spread tracing window (source +24h).
Day 2	Day 12	27/11/21	
Day 1	Day 13	28/11/21	
	Day 14	29/11/21	Precautionary onset of clinical signs (owner noticed turkeys "under the weather")
	Day 15	30/11/21	Initial deaths identified (turkeys)
	Day 16	01/12/21	
	Day 17	02/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/90). Restrictions served.
Day 18		03/12/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-36.
Day 19		04/12/21	
Day 20		05/12/21	Start of culling. 1st set of samples (grups 1, 4, 13 & 14) PCR and seropositive ducks
Day 21		06/12/21	
Day 22		07/12/21	
Day 23		08/12/21	
Day 24		09/12/21	End of the culling (rheas). 2nd set of samples (19 rheas) PCR and serology negative
Day 25		10/12/21	Preliminary C&D Completed 14.40
Day 26		11/12/21	Preliminary C&D Effective Date 14.40
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

26 premises with poultry holding between 1-2,944 birds (1 premises with 50 or more birds)

SZ (3-10 km)

34 premises with poultry holding between 2-241 birds (3 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for four members of the public who purchased birds within the high-risk window, one worker who transported the birds, an ABP collector, one carpenter who rented a workshop in the wider premises, one contractor who laid out a new concrete floor in the cattle shed, two helpers, a gardener and family members.

As a result of inquiries, it was confirmed that one of member of the public had not purchased birds and immediate tracing visits were instigated to inspect birds at the other three premises where the purchased birds were kept. No signs of notifiable disease were observed at the first of these premises, samples were taken and came back with negative results; the risk was assessed as very low and the tracing was closed.

At the second premises., no signs of notifiable disease were observed, samples collected came back with negative results and at the 21-day post-contact visit, restrictions were lifted, as the likelihood of spread was assessed as being very low and the tracing was closed.

At the third traced premises, no signs of notifiable disease were observed, no samples were collected and at the 21-day post-contact visit, restrictions were lifted as the likelihood of spread was assessed as being very low and the tracing was closed.

All the other tracings were investigated, assessed as being very low risk, and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Tracing investigations had not identified any likely lateral transmission pathways onto this premises. There had been no movements of poultry or captive birds onto the premises since the beginning of October.

Large number of wild birds were reported around the premises (crows, magpies, starlings, etc)

Direct and indirect contact with wild birds was possible, as most of the resident poultry/birds were either not housed, were kept on netted enclosures, or had access to ponds. In addition, wild birds had access to the inside of resident poultry/birds' accommodation and likely access to the water and feed offered outside the enclosures.

Vermin activity was reported. Rats and mice could have acted as vectors of infection.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: the risk was considered to be not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/37, Near Richmond, Richmondshire, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

41 turkeys were purchased in June to be reared for the Christmas market.

Species and number of each present

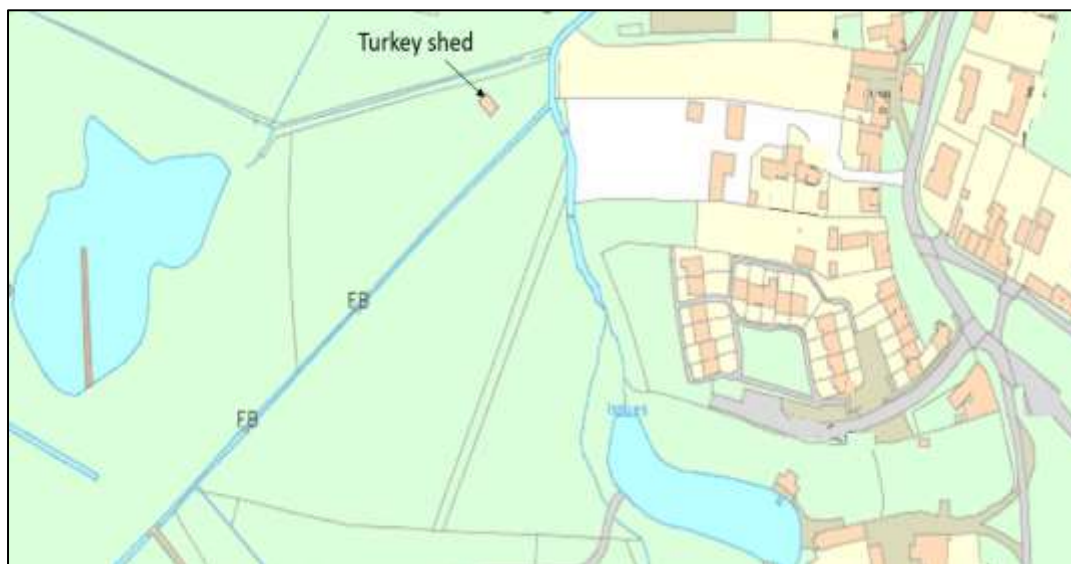
41 turkeys

Description of the housing

The turkey shed was within a wired enclosure on private land in the middle of a wooded area with two small lakes in the vicinity. The turkeys ranged in the outside enclosure until 29/11/2021.

Plan of the infected premises

Figure 124: Plan of AIV 2021/37

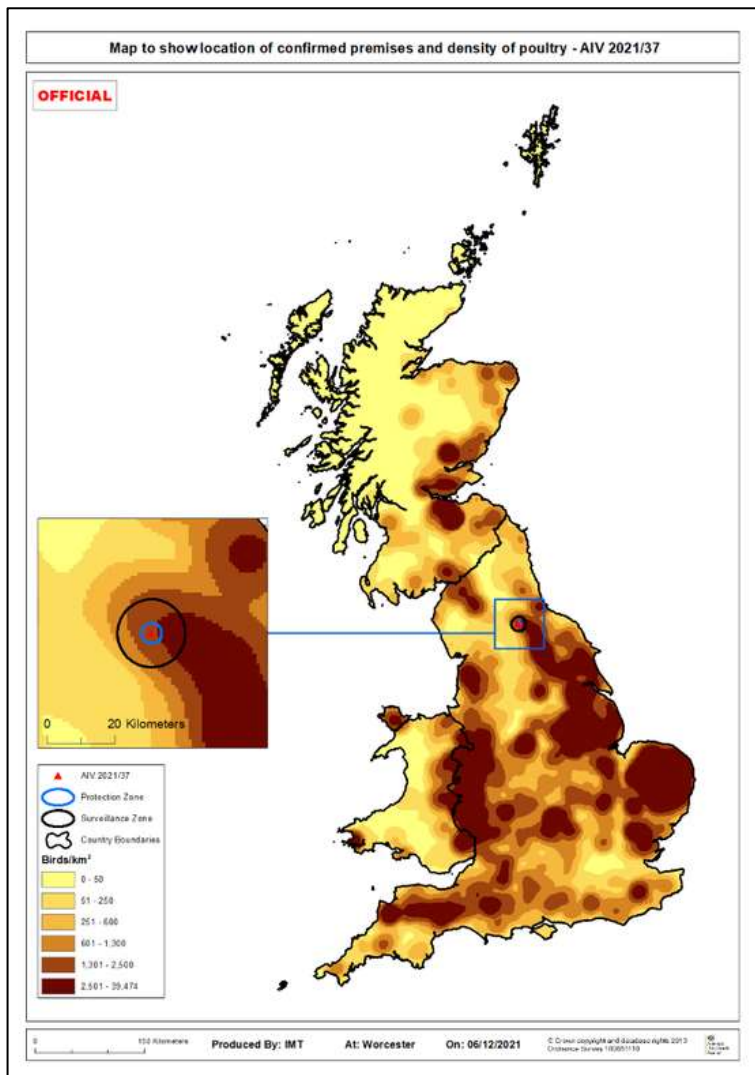


Overview of biosecurity

There was no biosecurity on site and the turkey shed was open to vermin and wild birds.

Map with location in Great Britain and poultry density

Figure 125: Location of IP and poultry density



Overview of the surrounding area

The turkeys were kept in a fenced area in private woodland. There were two small lakes with wild ducks nearby but no contiguous premises.

Ornithological assessment:

Desktop assessment: Not conducted

Local intelligence: Released pheasants and other wild birds had been reported to have access to the wooded areas. Wild ducks were living on nearby lakes.

Clinical picture

28/11/2021 – Some turkeys seen with respiratory signs and difficulty walking.

01/12/2021 – Three found dead and keeper reported suspicion of avian notifiable disease.

02/12/2021 – Few clinical signs seen at inspection; samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	25/11/2021 to 27/11/2021
Likely:	14/11/2021 to 24/11/2021
Precautionary:	10/11/2021 – 13/11/2021

Spread tracings window:

High-risk:	26/11/2021 to 01/12/2021
Likely:	15/11/2021 to 25/11/2021
Precautionary:	11/11/2021 to 14/11/2021

Most likely date of infection: 25/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 126: Source and spread timeline for AIV 2021/37

Source Tracing Window	Spread Tracing Window	Date	
Day 18		10/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		11/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		12/11/21	
Day 15		13/11/21	
Day 14		14/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	15/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	16/11/21	
Day 11	Day 3	17/11/21	
Day 10	Day 4	18/11/21	
Day 9	Day 5	19/11/21	
Day 8	Day 6	20/11/21	
Day 7	Day 7	21/11/21	
Day 6	Day 8	22/11/21	
Day 5	Day 9	23/11/21	
Day 4	Day 10	24/11/21	
Day 3	Day 11	25/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	26/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	27/11/21	
	Day 14	28/11/21	Precautionary onset of clinical signs.
	Day 15	29/11/21	
	Day 16	30/11/21	
	Day 17	01/12/21	First mortality. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/88). Restrictions served.
	Day 18	02/12/21	
	Day 19	03/12/21	H5N1 confirmed by CVO
	Day 20	04/12/21	
	Day 21	05/12/21	Culling started and completed
	Day 22	06/12/21	Preliminary C & D complete.
	Day 23	07/12/21	Preliminary C & D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

30 premises with poultry holding between 2-32,000 birds (1 premises with 50 or more birds)

SZ (3-10 km)

36 premises with poultry holding between 1-170,000 birds (9 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

The turkeys would not have been housed at the time of most likely infection date and wild birds and vermin had access to the uncovered enclosure.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/38, Near Newent, Forest of Dean, Gloucestershire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial collection of waterfowl, predominantly ducks that were sold on an appointment-only basis. It sat within a commercial garden nursery that was closed at the time of the outbreak.

Species and number of each present

Approximately 360 ornamental ducks of various breeds, 18 geese and four swans.

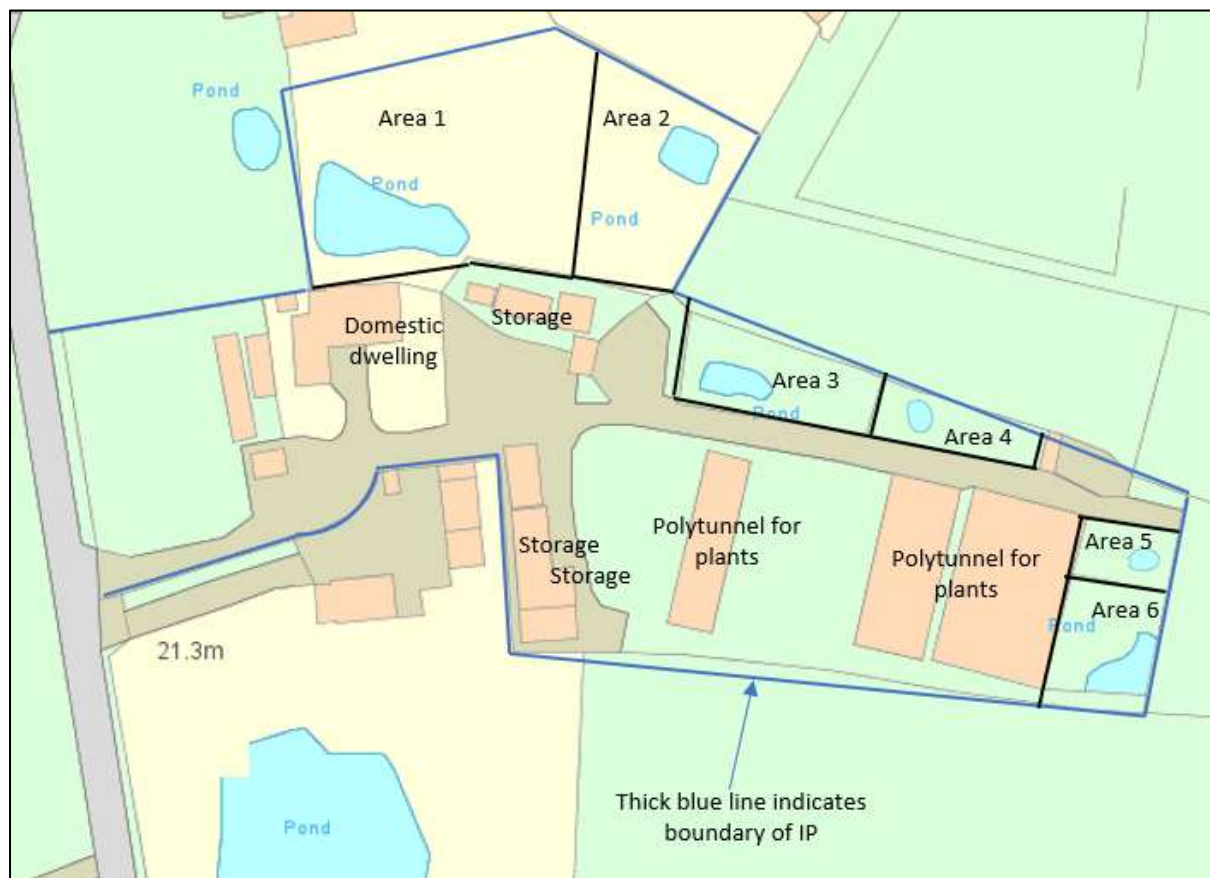
Description of the housing

Birds were enclosed in six outdoor pens, each with its own pond. Pens 4 and 5 were netted entirely, pens 1,2,3 and 6 had no netting roof. Pens 1 and 2 were contiguous with potential for beak-to-beak contact. Likewise with pens 3 & 4 and 5 & 6. The unnetted pens were surrounded by 2.5 m wire-mesh fences.

There was one bore hole supplying ponds 1 and 2, and a separate one supplying ponds 3- 6. Pond water changed colour and became smelly at times during the year and it had done so in the weeks preceding disease confirmation.

Plan of the infected premises

Figure 127: Plan of AIV 2021/38



Overview of biosecurity

Attempts had been made to reduce wild bird access to feed. Treadle-feeders and feed pipes were used in the smaller pens to minimise wild bird access. It was difficult to discourage wild birds from the areas and ponds themselves. The largest pond, in Area 1, had a series of criss-crossing wires over it to discourage wild birds, but this did not prevent wild mallards and moor hens landing frequently. Smaller wild birds were seen in other pens at the time of the investigation. The pond in area 1 had not been drained and cleaned out for eight years, while the others were cleaned two to three times a year

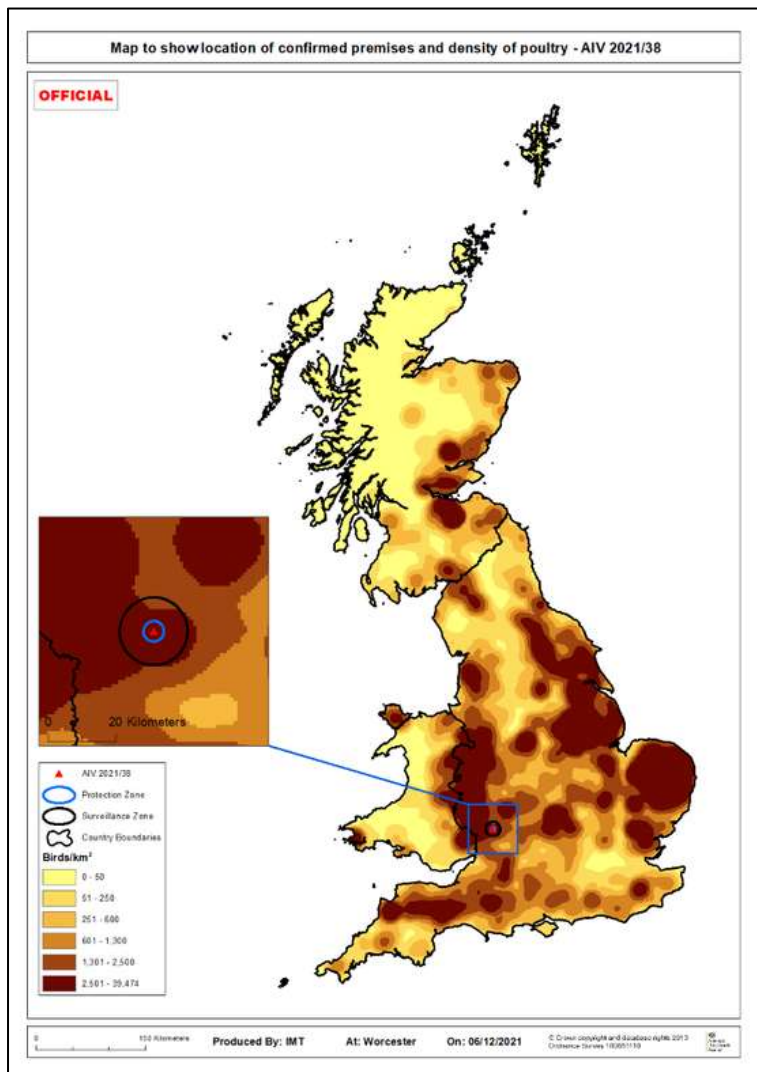
Boot dips containing approved disinfectant were used at the entrance to each pen. Boot dips were changed weekly or "when they were dirty"; however, APHA inspectors noted that the dips were dirty during disease investigation.

Rodent activity had been seen in Areas 5 and 6 earlier in 2021, so bait boxes were installed outside each pen and the rodents were controlled.

Carcases from natural deaths were buried on site.

Map with location in Great Britain and poultry density

Figure 128: Plan of IP and poultry density



Overview of the surrounding area

The premises sat within a small hamlet and was surrounded by a mixture of arable and grazing land. There were no large commercial poultry premises contiguous to it.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: This premises attracted wild birds because of the feed and shelter available.

Clinical picture

03/12/2021 – Suspicion of disease was reported by the owner after fifteen birds in Area 1 had died over the preceding eight days. The first clinical signs noticed were sudden death but at the time of reporting to APHA, the birds were flicking their heads, rubbing their eyes and showing inappetence.

A representative sample of birds was swabbed and blood sampled at culling. One PCR-positive goose was found in area 1 and one PCR-positive duck in Area 2 which was contiguous. Spread within the IP appeared to be contained to Area 1 and 2.

Timeline

Tracings windows

Source tracings window:

High-risk:	21/11/2021 to 23/11/2021
Likely:	10/12/2021 to 20/12/2021
Precautionary:	Within likely-source window due to timing of disease suspicion.

Spread tracings window:

High-risk:	22/11/2021 to 02/12/2021
Likely:	11/11/2021 to 21/11/2021
Precautionary:	Within likely-source window due to timing of disease suspicion.

Most likely date of infection: 21/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 129: Source and spread timeline for AIV 2021/38

Source Tracing Window	Spread Tracing Window	Date	
Day 14		10/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	11/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	12/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 11	Day 3	13/11/21	Start of precautionary spread tracing window (source + 24h).
Day 10	Day 4	14/11/21	
Day 9	Day 5	15/11/21	
Day 8	Day 6	16/11/21	
Day 7	Day 7	17/11/21	
Day 6	Day 8	18/11/21	
Day 5	Day 9	19/11/21	
Day 4	Day 10	20/11/21	
Day 3	Day 11	21/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	22/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	23/11/21	
	Day 14	24/11/21	Precautionary onset of clinical signs, based on first mortality on 25th Nov
	Day 15	25/11/21	First mortality
	Day 16	26/11/21	
	Day 17	27/11/21	
	Day 18	28/11/21	
	Day 19	29/11/21	
	Day 20	30/11/21	
	Day 21	01/12/21	
	Day 22	02/12/21	
	Day 23	03/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/94). Restrictions served.
	Day 24	04/12/21	
	Day 25	05/12/21	H5N1 confirmed by CVO with case reference AIV2021-38
	Day 26	06/12/21	
	Day 27	07/12/21	
	Day 28	08/12/21	Culling started and completed
	Day 29	09/12/21	Preliminary C & D completed
	Day 30	10/12/21	Preliminary C & D considered effective
	Day 31	11/12/21	
	Day 32	12/12/21	
	Day 33	13/12/21	
	Day 34	14/12/21	Preliminary C & D re-applied after finding some buried carcasses
	Day 35	15/12/21	Preliminary C & D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

53 premises with poultry holding between 1-20,571 birds (1 premises with 50 or more birds)

SZ (3-10 km)

129 premises with poultry holding between 1-651,794 birds (15 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The openness of the site together with observed wild bird incursions. The site was attractive to wild birds as a feed and shelter source. Possible reasons for only Area 1 being affected are: that it was the largest pen with the largest pond, was unnetted and has several treadle feeders placed on the ground. Together these conditions made it the most attractive area for visiting wild birds. The use of boot dips may have helped to prevent pen to pen spread.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainties.

AIV 2021/39, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

This premises was a commercial free-range table-egg laying hen enterprise which was part of a larger business comprising five additional laying premises and a pullet rearing premises. An egg packing centre serving the whole business and some independent farms was co-located on the infected premises, alongside a farm shop.

Species and number of each present

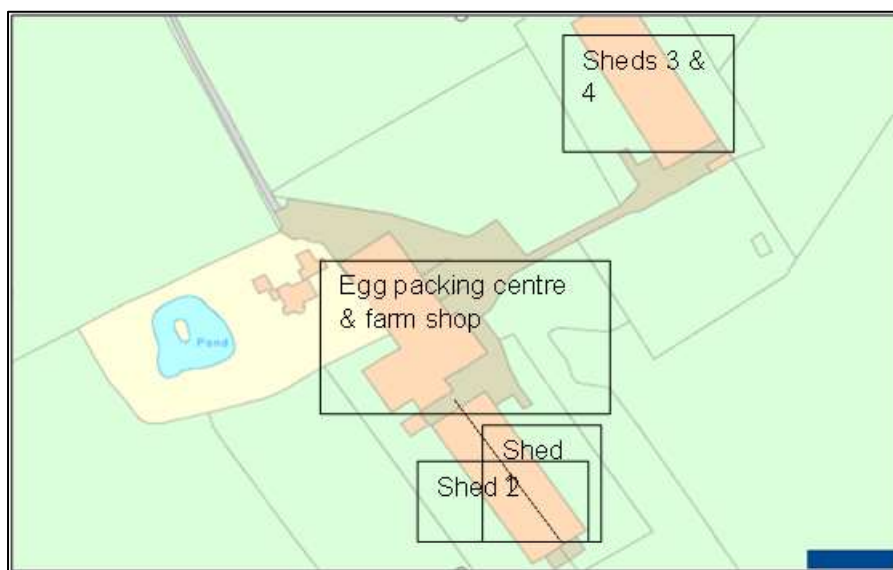
Approximately 60,000 chickens – laying hens (*Gallus domesticus*). They were 48 weeks old.

Description of the housing

Two new buildings (Standard Metal Free Range Eggs Unit by Big Dutchman International) were each split into two halves longitudinally by an access corridor, housing the hens in four lots of about 15,000 (sheds 1 to 4). Ventilation consisted of roof inlet chimneys, pop-holes when opened, and extractor outlets positioned on the end walls. Automatic belts transported eggs laid in the hen accommodation to an egg room at the end of each building. Muck was removed by an automatic belt system. Pop-holes were situated along both long sides of each building providing access to extensive ranges.

Plan of the infected premises

Figure 130: Plan of AIV 2021/39



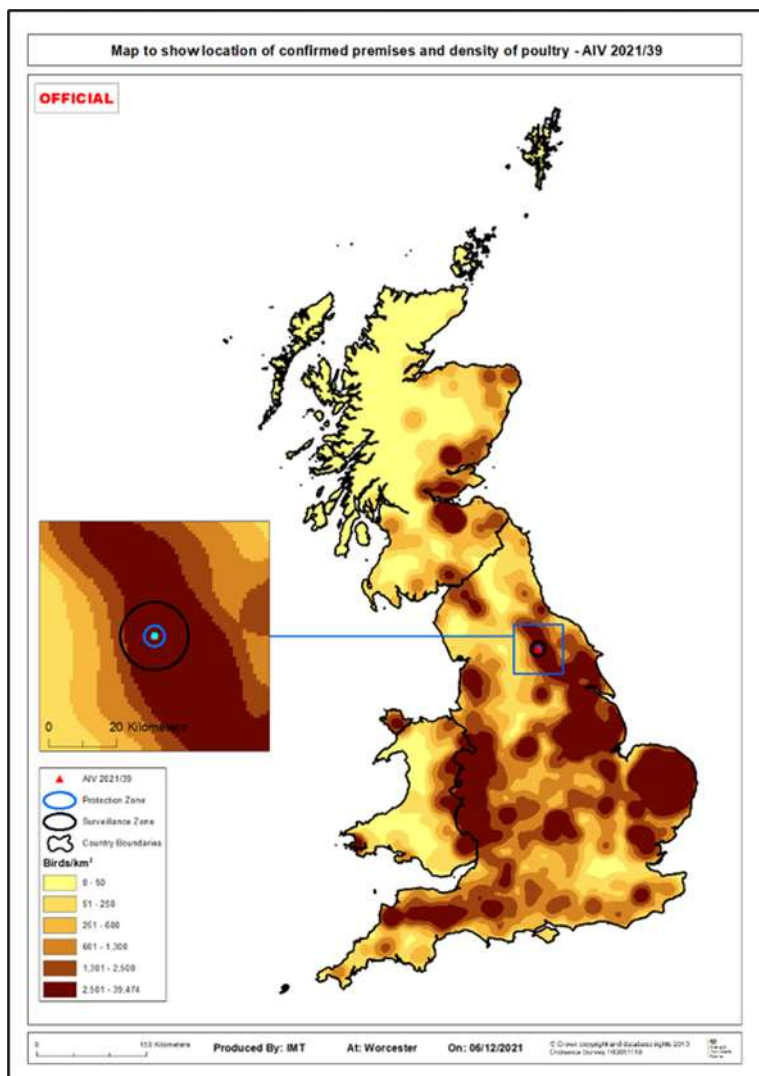
Overview of biosecurity

Biosecurity was generally good. All vehicles accessing the holding passed over an automatic disinfection spray. Staff only visited one farm per day and used dedicated farm overalls. However, disposable over-boots were reported to be used for entering the poultry accommodation. These are known to break easily and are not effective at preventing ingress of faecal contamination and virus.

Visitors were given disposable overalls and over-boots for outdoor areas and disinfectant foot dips were present on entry onto the site and into poultry accommodation. Even though the poultry farm was co-located with the egg packing centre, a lorry collection was made for the eggs with single farm visit and a good biosecurity protocol was followed. Animal By-Products were collected from outside the perimeter. Pest control was carried out by a contractor and had been increased to weekly visits. The cover of the manure belt leaving the poultry accommodation was missing allowing wild bird access to it.

Map with location in Great Britain and poultry density

Figure 131: Location of IP and poultry density



Overview of the surrounding area

This premises was in a high density poultry area near Thirsk, North Yorkshire and within the protection zones of three other IPs and surveillance zones of an additional two IPs – all confirmed between 22/11/2021 and 02/12/2021. It was about 0.75 km from the river Swale. A large pond was present about 100 m from the building holding sheds 1 and 2. The local area was predominantly arable agricultural landscape. Several poultry buildings from the same business were within 1.5 km.

Ornithological assessment:

Desktop assessment: Most waterbodies close to the IP were too small to host substantial populations of waterbirds. The large waterbodies known to host aggregations were distant, reducing their significance here. Wildfowl were likely to be generally common though it was not clear if any waterbodies close to the IP hosted aggregations likely to have produced a source of infection. However, wildfowl might have contaminated the ranges at the IP and produced some infection pressure in this case. Waders and other waterbirds were not thought common in this landscape and it appeared unlikely that they might have moved infection from the distant likely sources. However, as they might have shared the ranges with poultry, they may have contributed to some infection pressure here. Bridge species were considered likely to be common and appear to be the most likely infection pathway onto the IP, with both gulls and corvids likely to have exploited the farm ranges and contaminated operational surfaces. Wild passerines, Woodpigeon and Starling may also have contributed several alternative infection pathways to add to the infection pressure here.

Local intelligence: High numbers of geese were reported to have flown over the area of the premises during the previous month. Spreading of manure in a nearby field just over a week previously had attracted high numbers of crows and seagulls.

Clinical picture

The chickens had been housed from 22/11/2021 in accordance with the local housing order which predated the national housing order by a week. Increased mortality was noticed on 03/12/2021 with 12 dead overnight in shed 1. This increased to 101 on the 04/12/2021. Normal baseline mortalities had been at the most seven per day and up to 15 per week. On the 04/12/2021, in shed 1, many hens were lethargic, had green or brown diarrhoea, cyanosis of wattle and comb, and some exhibited respiratory distress by wide-beak gasping. Cloacal temperatures ranged up to 43.3 °C. Post-mortem examination carried out by farm staff showed petechial haemorrhages in the proventriculus and trachea. Other sheds were unaffected at this time. Signs of disease started to appear in shed 2 on 06/12/2021 but never appeared in sheds 3 and 4.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/11/2021 to 30/11/2021
Likely:	17/11/2021 to 27/11/2021
Precautionary:	13/11/2021 to 16/11/2021

Spread tracings window:

High-risk:	29/11/2021 to 04/12/2021
Likely:	18/11/2021 to 28/11/2021
Precautionary:	14/11/2021 to 17/11/2021

Most likely date of infection: 28/11/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 132: Source and spread timeline for AIV 2021/39

Source Tracing Window	Spread Tracing Window	Date	
Day 19		12/11/21	
Day 18		13/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		14/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		15/11/21	
Day 15		16/11/21	
Day 14		17/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	19/11/21	
Day 11	Day 3	20/11/21	
Day 10	Day 4	21/11/21	
Day 9	Day 5	22/11/21	
Day 8	Day 6	23/11/21	
Day 7	Day 7	24/11/21	
Day 6	Day 8	25/11/21	
Day 5	Day 9	26/11/21	
Day 4	Day 10	27/11/21	
Day 3	Day 11	28/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/11/21	
	Day 14	01/12/21	Precautionary onset of clinical signs (based on production records).
	Day 15	02/12/21	
	Day 16	03/12/21	
	Day 17	04/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/95). Restrictions served.
	Day 18	05/12/21	HPAI H5N1 confirmed by CVO and given case reference AIV2021-39.
	Day 19	06/12/21	
	Day 20	07/12/21	Culling started.
	Day 21	08/12/21	
	Day 22	09/12/21	
	Day 23	10/12/21	
	Day 24	11/12/21	
	Day 25	12/12/21	Culling completed.
	Day 26	13/12/21	Preliminary C&D completed.
	Day 27	14/12/21	Preliminary C&D considered effective.
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

47 premises with poultry holding between 1-180,000 birds (11 premises with 50 or more birds)

SZ (3-10 km)

180 premises with poultry holding between 1-240,000 birds (28 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for feed deliveries and egg collections within the high-risk period. In addition, a pest controller and electrician were also traced. Manure had been removed from this premises and was traced and restricted for 42 days after the last collection. ABP was collected from outside the IP boundary.

Source investigations: Hypothesis for the source

The most likely source with low uncertainty was indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Poultry were housed on 22/11/2021 with very low likelihood of direct contact with wild birds afterwards. Therefore, indirect contact with infected wild birds is most likely through several possible transmission pathways. The covering of the manure belt as it exited the sheds had been removed because of ongoing problems with blockages. This was accessible to wild birds and could have been contaminated with their faeces before re-entering the poultry accommodation. Although biosecurity was good, signs of rodent activity were present around the exit/entry point of the manure belt from sheds 1 and 2 where there was also a low-level ingress point for rodents acting as fomites into the poultry accommodation.

Spread investigations: Assessment of potential and likelihood of spread

The likelihood of spread of infection from this IP was assessed as very low likelihood with medium uncertainty. Eggs produced during the high-risk tracing period were restricted and destroyed at the co-located packing centre. Manure leaving the premises was controlled. Movement of people was investigated and concluded as being very low risk.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/40, Near Barrow upon Soar, Charnwood, Leicestershire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial free range laying unit, part of a large company which was also associated with three other IPs (AIV 2021/24, AIV 2021/31 and AIV 2021/41), two of which were in close proximity (see Figure 3 below).

The birds were permanently housed on 26/11/2021 following confirmation of disease on AIV 2021/24 and biosecurity measures were tightened.

The same egg collection vehicle, feed delivery company and manure collection vehicles were common to some of the other company premises, including some that became IPs.

Species and number of each present

Approximately 27,500 free range laying hens were on site, divided between two houses. They were 58 weeks old at the time of the disease report.

Description of the housing

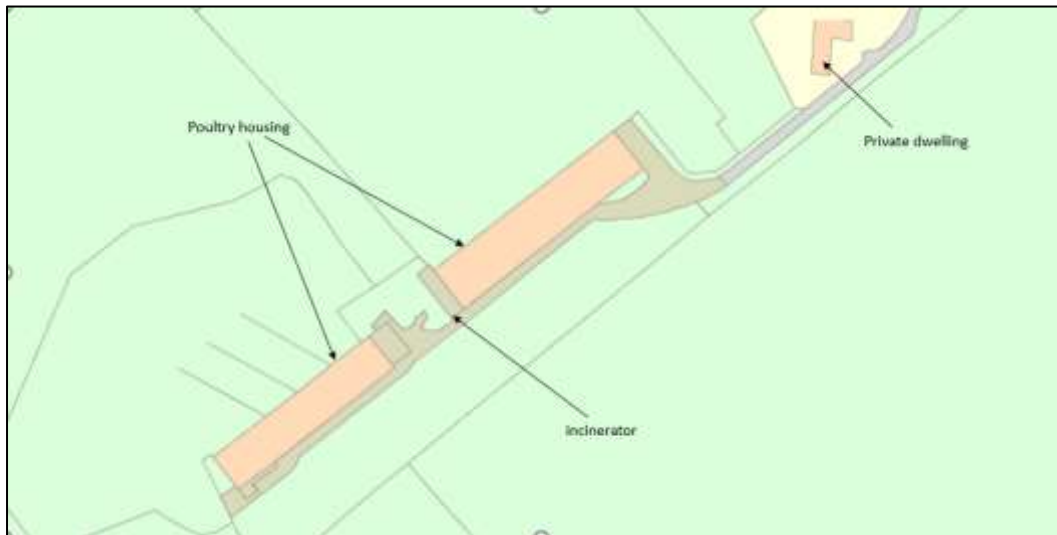
House 51 contained 12,228 birds in a single-tier system (on slats, no litter collection) while House 52 contained 15,294 birds in a multi-tier system.

The farm manager oversaw both houses and would visit them daily but only collected eggs from House 51. House 52 was run by two workers, one during the week and the other at weekends.

An incinerator shared with AIV 2021/24 and AIV 2021/31 for disposal of carcasses was located in the space between the two houses. Both houses ventilated opposite to the other house.

Plan of the infected premises

Figure 133: Plan of AIV 2021/40



Overview of biosecurity

Biosecurity measures on the farm were somewhat limited. There was a vehicle barrier and manual knapsack sprayer for disinfecting vehicle wheels at the entrance to the farm. The entrance gate was not locked and there were openings at either side such that access by people would not be prevented.

Dedicated overalls and wellingtons were used on site.

There were covered foot dips (using Bio-VX approved disinfectant) at the entrance of both houses and a double barrier was in place with different footwear used inside the sheds and another foot dip placed by the entrance door into the bird housing. No hand sanitiser was used prior to entering the bird housing and staff did not wear gloves.

Once biosecurity was tightened up from 26/11/2021 the site staff would disinfect the wheels of the manure collection vehicle and activate the manure belt from inside the poultry house with the driver remaining in his vehicle. This was only for House 52 as House 51 employed a slat system with manure only being removed after depopulation. From 03/12/2021 manure was retained on site in a sheeted trailer.

Egg collections were made by the company's own vehicle and eggs trays were handed out to the driver by site staff. Egg trays were plastic and were cleaned at the company egg packing centre and returned by the driver with a document confirming disinfection.

There was no visitor log kept at the farm. Visitors were required to report to the main company office at another site to sign a clearance form but there was no signage in place at the entrance requesting this. No paperwork was available regarding feed

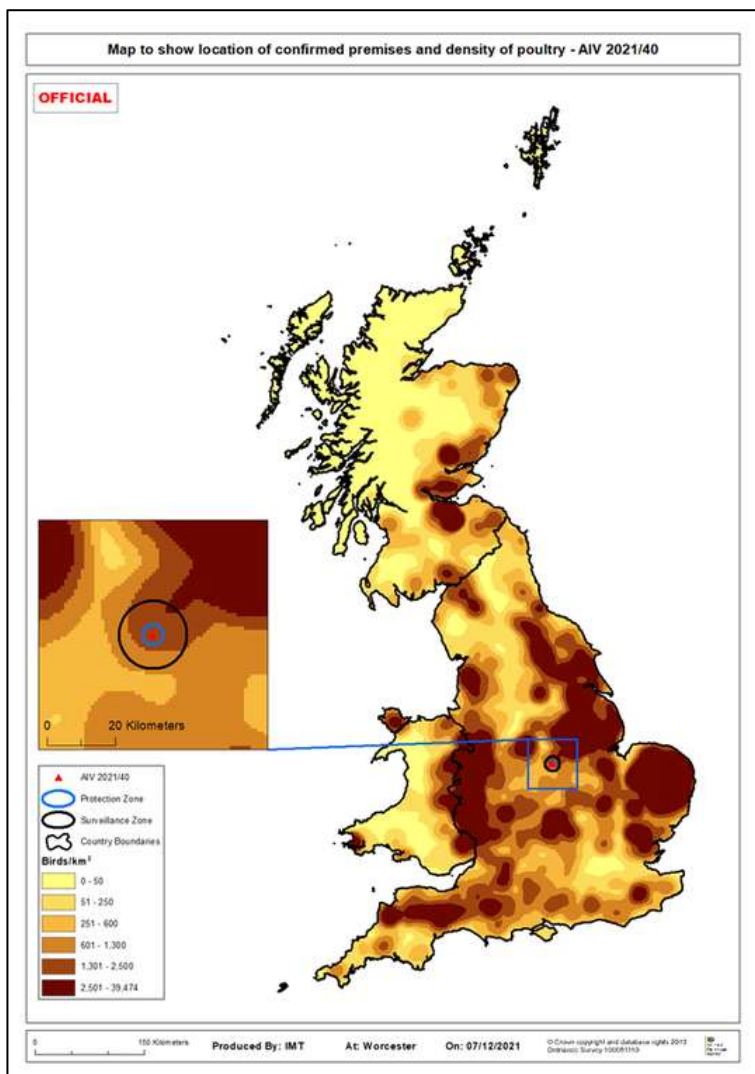
deliveries and collection of manure although there was paperwork for the egg collections.

There were no records of C&D of the incinerator area. There was a foot dip outside the incinerator but no means to wash and disinfect hands. There was no evidence of gloves being used. The incinerator area appeared not to have been cleaned or disinfected for some time based on the debris and cobwebs seen in the room.

No records were available to document C&D of vehicles on entering the site.

Map with location in Great Britain and poultry density

Figure 134: Location of AIV 2022/40 and poultry density



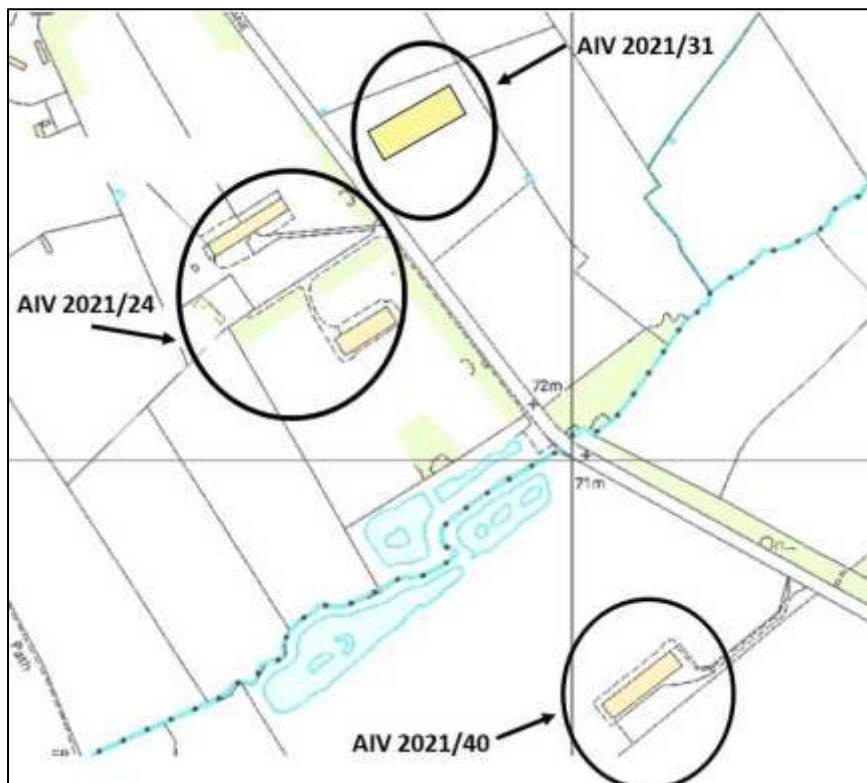
Overview of the surrounding area

The IP was located in a high poultry density area.

A series of fishing ponds known to attract wild waterfowl were located nearby to the south of the site and close to the IP as well as the two related IPs (AIV 2021/24 and 31).

The IP contained an incinerator shared between the three sites and the owners of AIV 2021/31 lived in a house located along the access road to the site, near the entrance from the main road.

Figure 135: Plan showing the location of AIV 2021/40 in relation to other nearby IPs and the fishing ponds



Ornithological assessment:

Desktop assessment: This lowland and rural IP was set inland in an intensively managed agricultural landscape. The site was sufficiently close to the river Soar and a number of large waterbodies associated with its floodplain, for this to affect its use by wild waterbirds.

There were also pools adjacent/close to the ranges of these free-range units.

Wildfowl were likely to have been abundant on significant waterbodies and at least common local to the site. This was likely to produce a source of infection in this landscape as well as suggesting that wildfowl may also have enabled direct and indirect infection pathways by moving the very short distances from pools onto the ranges.

Waders and other waterbirds were likely to be generally common in this landscape. As well as contributing as sources of infection here, some of these species may also

have exploited the ranges of the IPs and enabled indirect infection pathways by contaminating surfaces, contributing to the infection pressure at these sites.

Bridge species were considered likely to have been common and appeared to present the most likely potential wild bird infection pathway onto the site with both gulls and corvids likely to visit this cluster of potential foraging sites, producing direct and indirect infection pathways.

Wild passerines may also have contributed a number of alternative infection pathways to add to the infection pressure here.

Conclusion: An obvious substantial source of infection pressure.

Local intelligence: The fishing ponds were known to be frequented by wild waterfowl.

Wild birds were known to visit the ranges and wild waterfowl would overfly the site on route to the fishing ponds.

Clinical picture

01/12/2021 and 03/12/2021 – APHA staff had visited the farm to inspect the incinerator which was shared with AIV 2021/24 and AIV 2021/31. No clinical signs were seen in the birds and records for both houses showed a low level of mortality consistent with usual levels. Egg production and water consumption were unchanged.

05/12/2021 – four birds were found dead in House 52 with other birds showing lethargy. Suspicion of notifiable avian disease was reported.

At the APHA investigation on the same day, birds in House 51 remained clinically unaffected and examination of 50 birds revealed no issues. House 52 had a low number of birds appearing more lethargic than the rest and showing clinical signs including depression, unresponsiveness, lowered head carriage and tremors. Some had very reddened combs/wattles, mild cyanosis on the skin above the hock, fluid present in trachea and slightly watery eyes. Samples were submitted.

Birds in House 51 started showing signs of disease the following day while mortality rapidly increased in House 52.

Timeline

Tracings windows

Source tracings window:

High-risk:	29/11/2021 to 01/12/2021
Likely:	18/11/2021 to 28/11/2021
Precautionary:	14/11/2021 to 17/11/2021

Spread tracings window:

High-risk:	30/11/2021 to 05/12/2021
Likely:	19/11/2021 to 29/11/2021
Precautionary:	15/11/2021 to 18/11/2021

Most likely date of infection: 29/11/2021. (Start of high-risk source tracing window)

Timeline chart

Figure 136: Source and spread timeline for AIV 2021/40

Source Tracing Window	Spread Tracing Window	Date	
Day 18		14/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		15/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		16/11/21	
Day 15		17/11/21	
Day 14		18/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	19/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	20/11/21	
Day 11	Day 3	21/11/21	
Day 10	Day 4	22/11/21	
Day 9	Day 5	23/11/21	
Day 8	Day 6	24/11/21	
Day 7	Day 7	25/11/21	
Day 6	Day 8	26/11/21	Birds housed.
Day 5	Day 9	27/11/21	
Day 4	Day 10	28/11/21	
Day 3	Day 11	29/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	30/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	01/12/21	APHA visit to assess shared incinerator.
	Day 14	02/12/21	Precautionary onset of clinical signs based on production records.
	Day 15	03/12/21	APHA tracing visit and clinical inspection - birds appeared clinically well and no issues identified with production parameters.
	Day 16	04/12/21	
	Day 17	05/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/98). Restrictions served.
	Day 18	06/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/40.
	Day 19	07/12/21	
	Day 20	08/12/21	Culling commenced.
	Day 21	09/12/21	
	Day 22	10/12/21	
	Day 23	11/12/21	Culling completed.
	Day 24	12/12/21	
	Day 25	13/12/21	Preliminary C&D completed.
	Day 26	14/12/21	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

85 premises with poultry holding between 1-273,100 birds (11 premises with 50 or more birds)

SZ (3-10 km)

190 premises with poultry holding between 1-175,000 birds (14 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for farm employees, collection of table eggs to the egg packing centre, feed deliveries and the collection of poultry manure.

The packing centre was visited and its biosecurity and egg disposal procedures were verified; the tracing was assessed as being low risk and closed.

Although this premises was identified as a tracing contact from AIV 2022/31 due to the egg collection route and location of the incinerator for the disposal of carcasses, both events fell outside the most likely source date for AIV 2022/40.

Poultry manure collection resulted in a restricted manure heap on a nearby farm with no poultry.

In addition, three laying poultry premises under the same company management were identified as requiring a clinical inspection and biosecurity assessment. The three poultry premises received an immediate biosecurity visit and a 21-day post-contact visits to inspect the birds. In both visits no sign of notifiable disease was observed and restrictions were lifted as the likelihood of spread was assessed as very low, and tracings closed.

All the other tracings were investigated, assessed as being very low risk, and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds (high likelihood with medium uncertainty).

Assessment and evidence base for the likely source

Close proximity to fishing ponds known to be frequented by wild waterfowl.

Wild birds were known to visit the ranges and wild waterfowl would overfly the site on route to the fishing ponds.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wild birds: Risk not higher than the background risk.

All other potential spread pathways were assessed as low or very low likelihood.

Remaining uncertainty

Whether there may have been onward transmission from AIV 2021/31 to AIV 2021/40 as the high-risk spread window for AIV 2021/31 overlapped the high-risk source window for this IP (via common egg and manure collection routes), albeit considered to be very low risk following the tracing investigations.

Whether there may have been transmission, in either direction, between AIV 2021/40 and AIV 2021/41 as the high-risk source and spread windows for both IPs overlap (via common egg and manure collection routes), albeit considered to be very low risk following tracings investigations.

AIV 2021/41, Near Barrow upon Soar, Charnwood, Leicestershire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial free range laying unit, part of a large company which was also associated with three other IPs (AIV 2021/24, AIV 2021/31 and AIV 2021/40) and four other poultry premises.

It was located approximately 2.5 km from the other three closely located IPs.

The egg collection vehicle, feed delivery company and manure collection vehicle were common to some of the other company premises, including some that became IPs.

Species and number of each present

96,000 laying hens housed in three houses.

Description of the housing

Three separate poultry houses, each divided into two sections linked by an egg room area:

House 1 (CF 121/ CF 122) 32,000 birds with 16,000 in each side – 25 weeks old

House 2 (CF 102/CF 101) 32,000 birds with 16,000 in each side – 25 weeks old

House 3 (CF 111/CF 112) 32,000 birds with 16,000 in each side – 46 weeks old

Each house had separate range areas, but the birds were voluntarily housed on 19/11/2021. Powered ventilation was via netted openings with no risk of wild bird introduction.

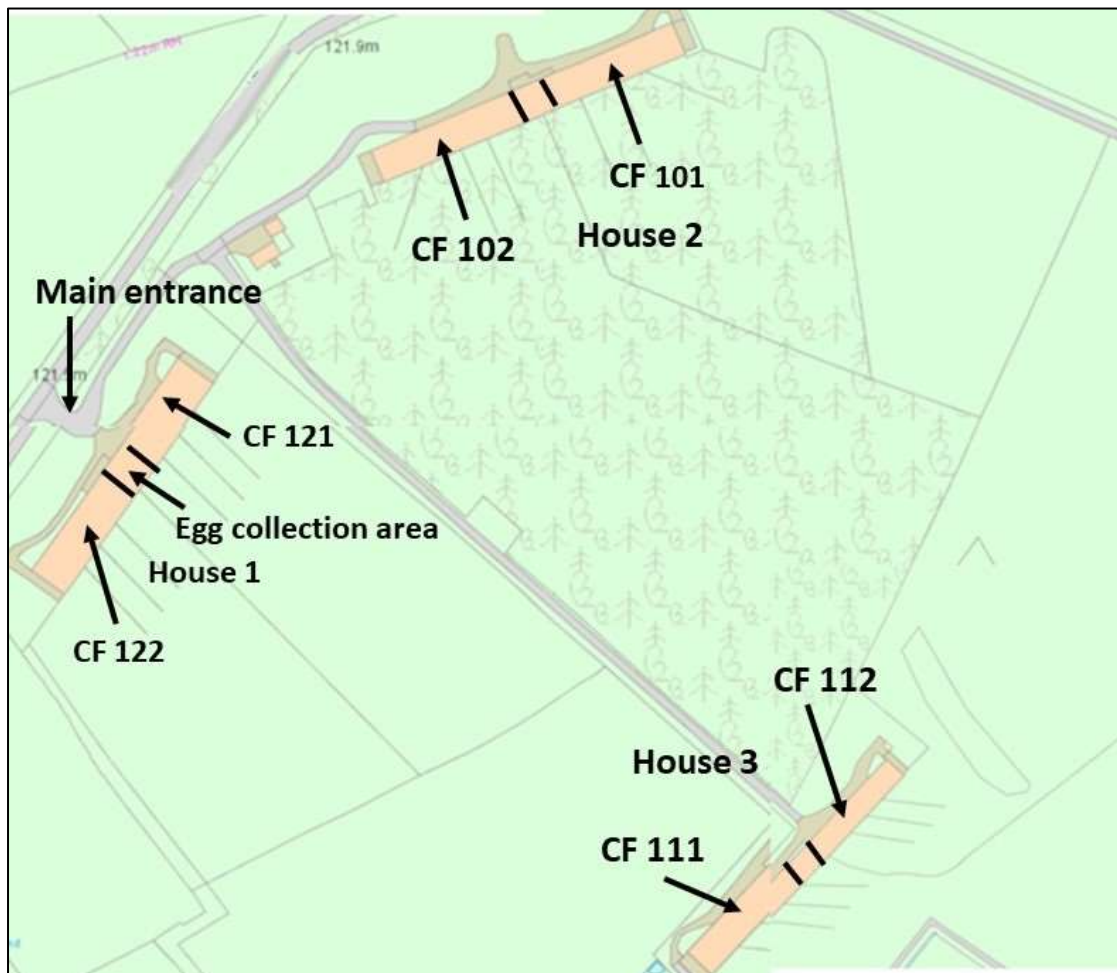
All houses used a multi-tier system and were similar. First clinical signs of disease were noted in House 1 (CF 121).

In the middle of each house there was an egg room, where conveyor belts brought the eggs from each side of the house ready to be collected for delivery to the Packing Station. There was access to both sides of the house from this room.

At each end of the building there was a service room, inside which the litter belt was activated by the driver of the muck lorry.

Plan of the infected premises

Figure 137: Plan of AIV 2021/41



Overview of biosecurity

The IP had one entrance or access to the site where the wheels of any vehicle were sprayed using a knapsack spray which contained DEFRA approved disinfectant (Bio-VX) at the approved dilution rate. However, this relied on vehicle drivers complying with the requirement and was not supervised.

There were covered foot dips at the entrance to each house, and each house was looked after by a different dedicated member of staff who also lived on site.

There was a double barrier system situated at the entrance of each air space located inside the building with dedicated boots for each shed as well as foot dips before entering the house.

At the time of the APHA visit staff members were wearing disposable overalls and face masks.

The range areas were deer-fenced and there had been no known recent predator incursions. The birds had been permanently housed since 19/11/2021, with biosecurity measures reported to have been further tightened on 29/11/2021.

There was no visitor record book on site, but visitors were required to report to the main office (at a different address) to sign a clearance form. However, documentation for feed deliveries and egg collections was available at the central egg room.

The farm had its own dedicated incinerator on site for carcass disposal.

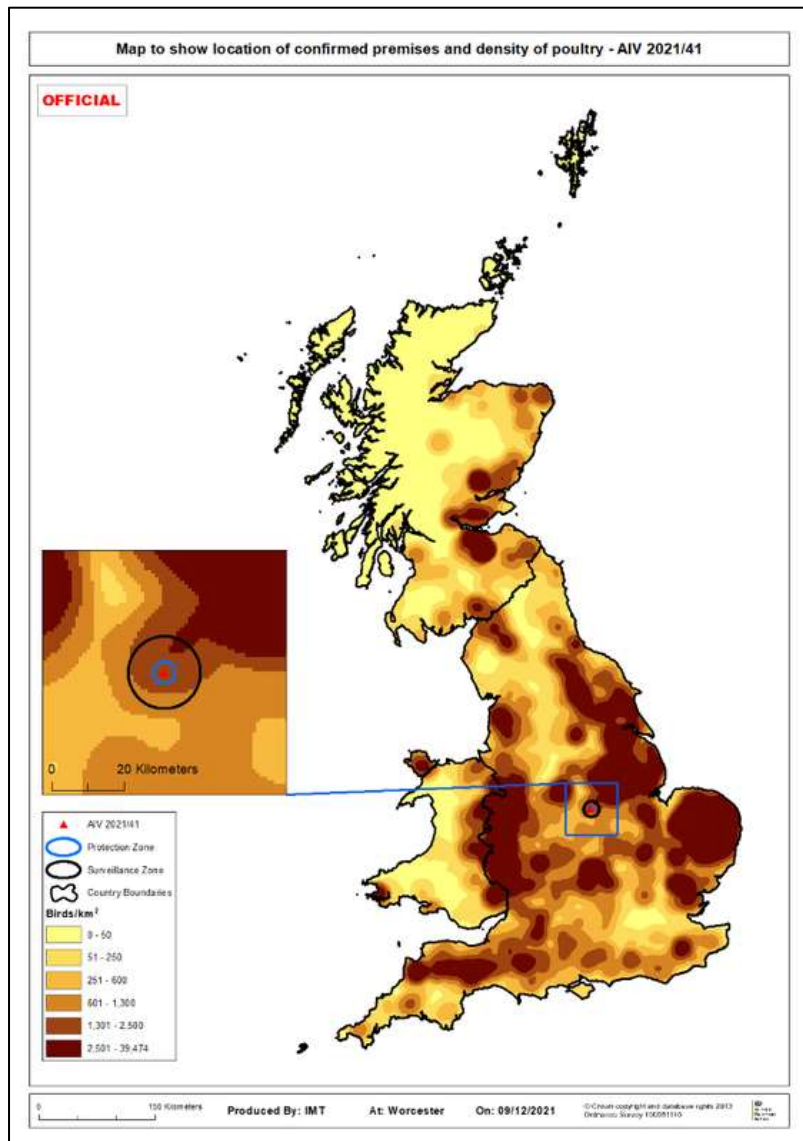
Egg collections took place three times a week, with the driver having to enter the egg room which was also the access room to the sheds.

Manure collections took place twice a week and the driver had to enter the service room at the end of the shed to activate the belt. No added biosecurity was present inside the room, just a foot dip outside the building next to the door. Farm staff would walk through the room when checking the birds.

Feed deliveries occurred to the three individual houses on different days.

Map with location in Great Britain and poultry density

Figure 138: Location of IP and poultry density



Overview of the surrounding area

The IP was located in a high poultry density area.

There were no lakes or ponds in the immediate vicinity.

Ornithological assessment:

Desktop assessment: This lowland and rural IP was set inland in an intensively managed agricultural landscape. Although not close to any large waterbodies, the site might just be influenced by the river valleys of the Soar and Wreake, and their associated riparian pasture, lakes, and pools.

Wildfowl (i.e. ducks, geese, swans) were likely to have been abundant on distant waterbodies and there produced a likely source of infection for the wider landscape. However, they may only have been common on pools closer to the IP and the

likelihood of them producing nearby sources of infection was low, as was the potential for wildfowl to visit the IP, and sustain direct or indirect infection pathways.

Waders and other waterbirds were likely to be generally uncommon around the IP. Despite this there was potential for some to visit the extensive ranges at the site and enable indirect infection pathways, so they may have contributed a little infection pressure here.

Bridge species were considered likely to have been common and appeared to present the most likely potential wild bird infection pathway onto the site.

Wild passerines and other species may also have contributed to alternative infection pathways to add to the infection pressure here, in particular woodpigeon and starlings that might have exploited the IP resources.

Conclusion: wild birds posed a likely source of infection pressure for the poultry kept on this IP.

Local intelligence: Nothing further to add.

Clinical picture

04/12/2021 to 05/12/2021 – 38 dead birds were found in CF 121 in House 1 with others showing signs of lethargy. Suspicion of notifiable avian disease was reported.

Similar signs were also reported at another suspected premises at the same time, subsequently confirmed as AIV 2021/40, which was approximately 2.5 km away.

At the APHA investigation the same day four dead birds were found and one was seen to be lethargic. Otherwise, the birds appeared bright, alert and responsive and feed and water intake and egg production was normal. Restrictions were served.

06/12/2021 – a repeat APHA inspection was undertaken and saw increased mortality in house 1 with 169 birds dead. The birds appeared listless and unresponsive and some had diarrhoea. Feed and water consumption had decreased. Samples were submitted.

Houses 2 and 3 appeared to be unaffected based on production records.

08/12/2021 – the birds in the adjacent part of House 1 (CF 122) started showing signs of disease with five mortalities.

Timeline

Tracings windows

Source tracings window:

High-risk: 30/11/2021 to 02/12/2021

Likely: 19/11/2021 to 29/11/2021

Precautionary: 14/11/2021 to 18/11/2021

Spread tracings window:

High-risk: 01/12/2021 to 05/12/2021

Likely: 20/11/2021 to 30/11/2021

Precautionary: 15/11/2021 to 19/11/2021

Most likely date of infection: 30/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 139: Source and spread timeline for AIV 2021/41

Source Tracing Window	Spread Tracing Window	Date	
Day 19		14/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		15/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		16/11/21	
Day 16		17/11/21	
Day 15		18/11/21	
Day 14		19/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	20/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	21/11/21	
Day 11	Day 3	22/11/21	
Day 10	Day 4	23/11/21	
Day 9	Day 5	24/11/21	
Day 8	Day 6	25/11/21	
Day 7	Day 7	26/11/21	
Day 6	Day 8	27/11/21	
Day 5	Day 9	28/11/21	
Day 4	Day 10	29/11/21	
Day 3	Day 11	30/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	01/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	02/12/21	
	Day 14	03/12/21	Precautionary onset of clinical signs based on production records.
	Day 15	04/12/21	
	Day 16	05/12/21	Notification of suspicion of disease to APHA. Initial APHA investigation (DPR 2021/99). Restrictions served.
	Day 17	06/12/21	Repeat inspection, samples collected
	Day 18	07/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV2021-41.
	Day 19	08/12/21	
	Day 20	09/12/21	
	Day 21	10/12/21	Culling commenced.
	Day 22	11/12/21	
	Day 23	12/12/21	
	Day 24	13/12/21	
	Day 25	14/12/21	
	Day 26	15/12/21	
	Day 27	16/12/21	
	Day 28	17/12/21	Culling completed.
	Day 29	18/12/21	Preliminary C&D completed.
	Day 30	19/12/21	Preliminary C&D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

35 premises with poultry holding between 1-251,000 birds (6 premises with 50 or more birds).

SZ (3-10 km)

222 premises with poultry holding between 1-273,100 birds (17 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for farm employees, collection of table eggs to the egg packing centre, feed deliveries and the collection of poultry manure.

The packing centre was visited, and their biosecurity and egg disposal procedures were verified; the tracing was assessed as being low risk and closed.

Although, this premises was identified as a tracing contact from AIV 2022/31, due to the egg collection route, the date of the tracing fell outside the most likely source date for AIV 2022/41.

Poultry manure collection resulted in a restricted manure heap on a nearby farm with no poultry.

In addition, three poultry laying premises under the same company management were identified as requiring a clinical inspection and biosecurity assessment. The three poultry premises received an immediate biosecurity visit and a 21-day post-contact visits to inspect the birds. In both visits no sign of notifiable disease was observed and restrictions were lifted as the likelihood of spread was assessed as very low and tracings closed.

All the other tracings were investigated, assessed as being very low risk, and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds, with a medium degree of uncertainty.

Assessment and evidence base for the likely source

The likely presence of infection pressure in wild birds and the presence of bridge species.

The absence of a highly plausible alternative transmission pathway from other sites following completion of tracings investigations although there was potential for biosecurity breaches through drivers entering shared staff areas.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wild birds: Risk not higher than the background risk.

All other potential spread pathways were assessed as low or very low likelihood.

Remaining uncertainty

Some uncertainty about the exact route of infection.

Whether there may have been onward transmission from AIV 2021/31 to AIV 2021/41 as the spread window for AIV 2021/31 overlaps the source window for this IP (via common egg and manure collection routes), albeit considered to be very low risk following tracings investigations.

Whether there may have been transmission, in either direction, between AIV 2021/40 and AIV 2021/41 as the high-risk source and spread windows for both IPs overlap (via common egg and manure collection routes), albeit considered to be very low risk following tracings investigations.

AIV 2021/42, Near Pocklington, East Yorkshire, East Riding of Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The Infected Premises (IP) was a commercial duck finishing unit, situated near York in the East Riding of Yorkshire. It consisted of four recently built sheds, plus straw storage. The IP was part of a wider farm business that included one other duck finishing unit (separately managed) and a large arable enterprise. The other duck premises became an IP on 14/12/2021 (AIV 2021/56). The IP farmed the ducks for a national duck-meat company.

Species and number of each present

Approximately 40,000 meat Peking cross ducks that were always housed.

Description of the housing

The premises was built specifically to finish ducks in 2014 and the buildings were in a good state of repair. The four sheds were of the same design and build. The walls were of concrete panels and the roof and gable ends were made from corrugated steel. Temperature and humidity were controlled by a series of sliding screens on the side with air extraction through the roof. No active fans were required and the inlets and outlets were screened or baffled to prevent wild bird entry.

The site itself had no other businesses or dwellings on it. It had a good 'outer shell' for biosecurity and the area surrounding the sheds was concrete.

Plan of the infected premises

Figure 140: Plan of AIV 2021/42



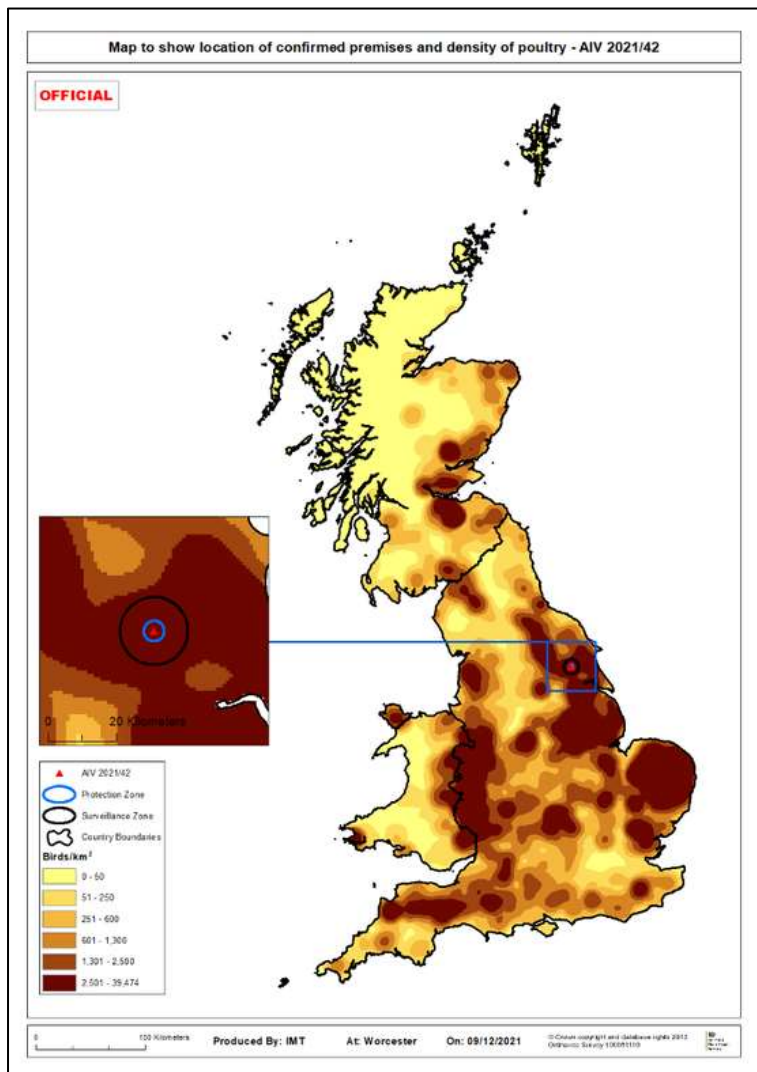
Overview of biosecurity

Biosecurity was assessed as good in some areas, but with a notable major breach. The good areas included a hard outer shell with fencing and a locked gate around the premises. There was a second locked gate at the Office/C&D point. All vehicles going through the second gate had C&D. ABP was moved to the first locked gate for collection. The sheds themselves were in good condition. Foot dips and PPE were being used and there were no shared staff with the company's other duck premises.

The major breach was the bedding-up process. The home-grown straw was stored unwrapped in an uncovered barn allowing free access to wild birds; and signs of wild birds were seen at the APHA investigation. The straw was loaded into a straw chopper and tractor, which was then driven through the duck shed. Whilst driving, the gable-end doors were left open. This process allowed for contaminated straw to be used, wild birds free access when doors left open and indirect spread from the tractor and machinery, as it was not cleansed or disinfected effectively between sheds.

Map with location in Great Britain and poultry density

Figure 141: Location of IP and poultry density



Overview of the surrounding area

The IP was in a high-density area of poultry. There was a wooded area to the south of the sheds and the IP was surrounded by arable crops. These arable fields were known to attract wild gamebirds.

The IP was not in any control zones at the time of disease confirmation.

Ornithological assessment:

Desktop assessment: For this IP the conclusion was that wild birds presented a possible source of infection pressure. There were no significant waterbodies close to the IP. It was unlikely that wildfowl or waders would approach the IP as it was barren. Bridge species were likely to be common and appeared to be the most likely pathway.

Local intelligence: Gamebirds were known to frequent the wooded area to the south of the sheds.

Clinical picture

28/11/2021 – Storm Arwen caused the temperature to decrease to 11 C from the normal 19 C in shed 2. This would have led to stress in the birds.

02/12/2021 – 12 dead birds were found.

03/12/2021 – a further 33 were found dead in shed 2 and a further 60 were culled. The PVS investigated and diagnosed bacterial septicaemia and dispensed amoxicillin.

05/12/2021 – a further 45 birds had died and suspicion of notifiable avian disease was reported. On APHA investigation, clinical signs seen included neurological, recumbency, green diarrhoea and tremors. Post-mortems found no petechiae, but air sacculitis, splenomegaly and enteritis.

Mortality data was analysed in the period before disease confirmation. The first notable rise in deaths was on the morning of 02/12/2021 in shed 2. It is worth noting that sheds 1, 3 and 4 had an increase in mortality from 08 December. Spread within the premises appears to have started soon after onset of clinical disease in shed 2. No sampling at culling was undertaken.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/11/2021 to 01/12/2021
Likely:	16/11/2021 to 27/11/2021
Precautionary:	14/11/2021 to 15/11/2021

Spread tracings window:

High-risk:	29/11/2021 to 05/12/2021
Likely:	17/11/2021 to 28/11/2021
Precautionary:	15/11/2021 to 16/11/2021

Most likely date of infection: 28/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 142: Source and spread timeline for AIV 2021/42

Source Tracing Window	Spread Tracing Window	Date	
Day 17		14/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		15/11/21	Start of precautionary spread tracing window (source + 24h).
Day 15		16/11/21	Start of likely source tracing window (14 days c/s)
Day 14		17/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 13	Day 1	18/11/21	
Day 12	Day 2	19/11/21	
Day 11	Day 3	20/11/21	
Day 10	Day 4	21/11/21	
Day 9	Day 5	22/11/21	
Day 8	Day 6	23/11/21	
Day 7	Day 7	24/11/21	
Day 6	Day 8	25/11/21	
Day 5	Day 9	26/11/21	
Day 4	Day 10	27/11/21	
Day 3	Day 11	28/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/11/21	
	Day 14	01/12/21	Precautionary onset of clinical signs.
	Day 15	02/12/21	First deaths reported 9pm
	Day 16	03/12/21	
	Day 17	04/12/21	
	Day 18	05/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/101). Restrictions served.
	Day 19	06/12/21	
	Day 20	07/12/21	Avian Influenza H5N1 confirmed by CVO with case reference AIV2021-42.
	Day 21	08/12/21	
	Day 22	09/12/21	
	Day 23	10/12/21	Culling started
	Day 24	11/12/21	Culling complete
	Day 25	12/12/21	
	Day 26	13/12/21	Preliminary C & D completed
	Day 27	14/12/21	Preliminary C and D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

15 premises with poultry holding between 1-96,000 birds (3 premises with 50 or more birds)

SZ (3-10 km)

74 premises with poultry holding between 1-204,800 birds (30 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the carcasses sent to the private veterinary practice, the company fieldsman who visited the premises and took the carcasses to the veterinary practice, one delivery of gas, one ABP collection and one feed delivery.

All tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Infected wild birds were the most likely source. Although the unit had good biosecurity two possible routes of transmission from wild birds were identified. The most likely was indirectly through wild birds during the bedding-up process. The other was direct/indirect from wild birds on 28/11/2021, which was the night of the storm Arwen, when wild birds could have potentially been blown into shed 2.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk. The potential for spread to AIV 2021/56 was investigated thoroughly and there was no clear pathway. All other spread pathways were investigated with no further action needed.

Remaining uncertainty

No remaining uncertainties.

AIV 2021/43, Near Sudbury, Babergh, South Suffolk, England

Description of the premises

Overview of the premises and the wider business

This premises was a commercial independent free-range table-egg laying enterprise producing hen and geese eggs. These were sold to an egg packing centre, local businesses, and direct to the public through an on-site farm shop. Small numbers of caged bantams, guineafowl, and pheasants were also kept for egg production. Game birds were reared seasonally but none were present at this time of the year.

Species and number of each present

7,000 hens between 18 and 49 weeks old.

120 geese between three and six years old and not laying at this time.

100 bantam hens of various ages.

24 guinea fowl

3 pheasants

1 peacock

2 finches

Description of the housing

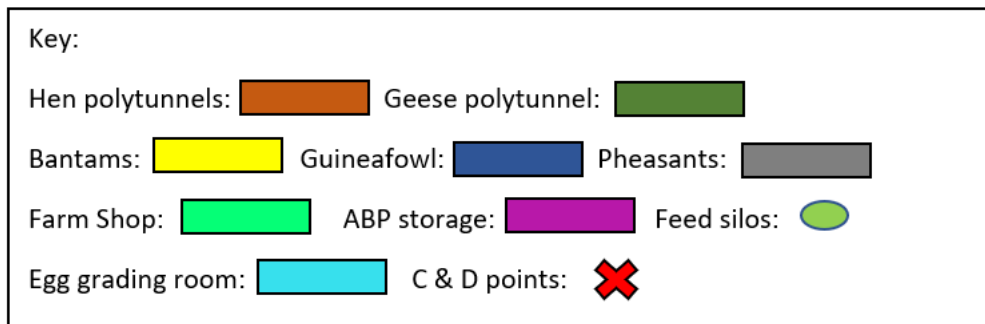
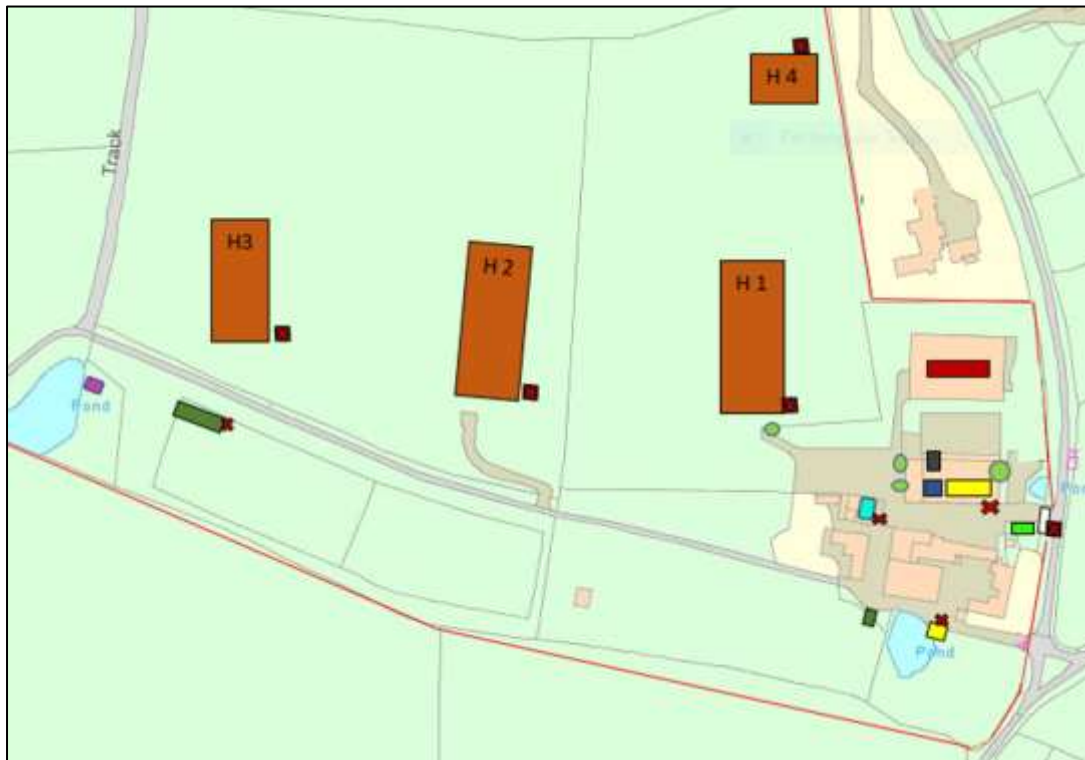
The free-range poultry were housed in five mobile polytunnels. Each of the four hen houses consisted of a raised slatted floor with nest boxes and conveyor belt for egg collection. A netted partition was used when hens were first introduced preventing them accessing the scratch area of grass pasture within the house. Pop-holes were distributed across both sides of each building. Personnel access was provided by a single door at the front and rear. Access to the egg collection room was through double doors at the front of the tunnel. The geese were housed in a plain straw-bedded polytunnel.

The caged birds were kept in large wood and wire mesh runs constructed inside an open sided barn with concrete floor and bedded with straw.

The finches were kept in the owner's house and the peacock in a hutch.

Plan of the infected premises

Figure 143: Plan of AIV 2021/43

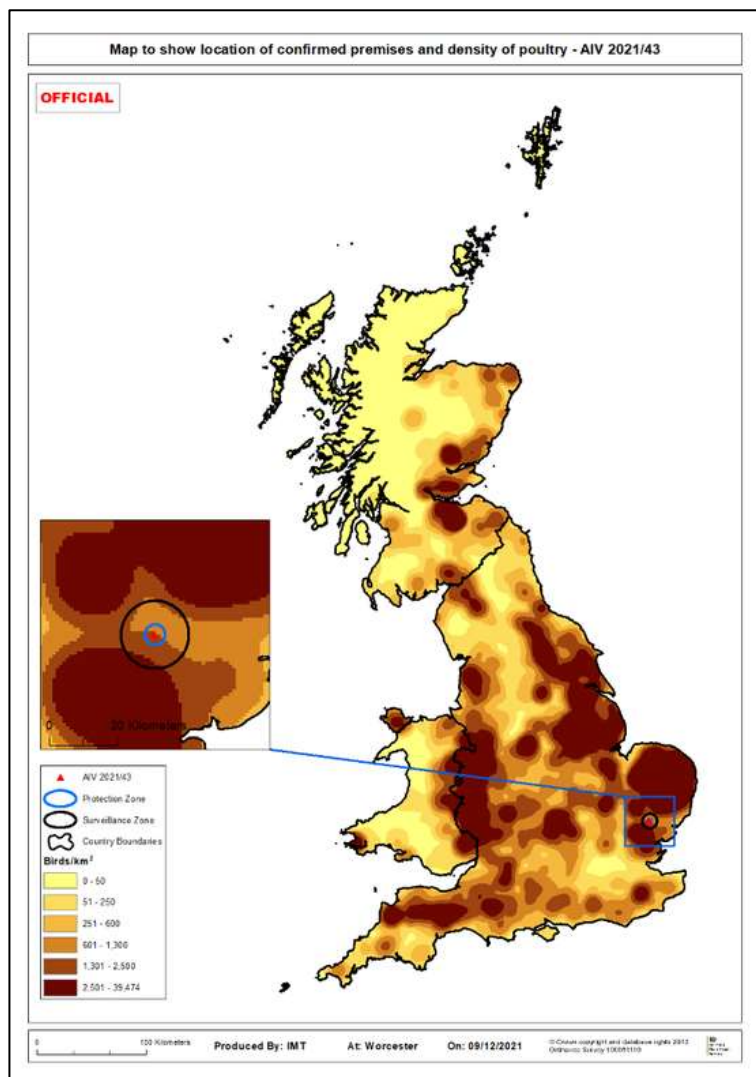


Overview of biosecurity

Disinfectant foot dips were present at multiple sites including entrances to poultry accommodation. A pressure sprayer was used to disinfect the wheels of vehicles entering the site and regular pest control was carried out by a contractor. However, dedicated site clothing and footwear was not used. Gaps were present between the structure and the ground potentially permitting small wild bird and rodent access into the poultry accommodation. Pooling of rainwater outside the housing could have run underneath into the scratching areas. Three ponds were present on the premises.

Map with location in Great Britain and poultry density

Figure 144: Location of IP and poultry density



Overview of the surrounding area

The premises was located in a medium/high poultry density area. Hedges separated the premises from the surrounding arable land.

Ornithological assessment:

Desktop assessment: Not carried out.

Local intelligence: wild ducks and wild guineafowl were observed on the premises.

Clinical picture

03/12/2021 – One hen died in house 1 which three days after the house had been populated (30/11/2021). Over the following three days further deaths occurred but it was not until the 07/12/2021 that mortalities increased to double figures with 22

deaths over 24 hours. Post-mortem examination by a private veterinary surgeon on six carcasses from the 06/12/2022 found necrotic pancreatitis, and petechial haemorrhages on the proventriculus and legs, prompting a report to APHA that notifiable disease was suspected.

On 07/12/2022, 10% of the hens in house 1 were dull. A few had facial oedema and cyanosis of wattle and combs. Mortalities increased over the following two days with 49 on 08/12/2022 and 94 on 09/12/2022.

Timeline

Tracings windows

Source tracings window:

High-risk:	30/11/2021 to 02/12/2021
Likely:	19/11/2021 to 29/11/2021
Precautionary:	15/11/2021 to 18/11/2021

Spread tracings window:

High-risk:	01/12/2021 to 06/12/2021
Likely:	20/11/2021 to 30/11/2021
Precautionary:	16/11/2021 to 19/11/2021

Most likely date of infection: 30/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 145: Source and spread timeline for AIV 2021//43

Source Tracing Window	Spread Tracing Window	Date	
Day 19		14/11/21	
Day 18		15/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		16/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		17/11/21	
Day 15		18/11/21	
Day 14		19/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	20/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	21/11/21	
Day 11	Day 3	22/11/21	
Day 10	Day 4	23/11/21	
Day 9	Day 5	24/11/21	
Day 8	Day 6	25/11/21	
Day 7	Day 7	26/11/21	
Day 6	Day 8	27/11/21	
Day 5	Day 9	28/11/21	
Day 4	Day 10	29/11/21	
Day 3	Day 11	30/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	01/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	02/12/21	
	Day 14	03/12/21	Precautionary onset of clinical signs.
	Day 15	04/12/21	
	Day 16	05/12/21	
	Day 17	06/12/21	Notification of suspicion of disease to APHA. Restrictions served (DPR 2021/102).
	Day 18	07/12/21	APHA investigation and sampling.
	Day 19	08/12/21	HPAI H5N1 confirmed by CVO and given case reference AIV2021-43
	Day 20	09/12/21	
	Day 21	10/12/21	
	Day 22	11/12/21	Culling commenced
	Day 23	12/12/21	Culling completed
	Day 24	13/12/21	
	Day 25	14/12/21	
	Day 26	15/12/21	Preliminary C&D completed
	Day 27	16/12/21	Preliminary C&D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread		

Surveillance activity

PZ (0-3 km)

60 premises with poultry holding between 1-4,700 birds (5 premises with 50 or more birds)

SZ (3-10 km)

68 premises with poultry holding between 1-61,820 birds (11 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for a movement of birds onto the premises (including transport vehicle, equipment and catching team), the private vet, egg collections and several visitors during the high-risk window. This resulted in three visits being completed to poultry premises associated with the source bird premises and a visitor. All tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source with medium uncertainty was indirect contact with infected wild birds.

Assessment and evidence base for the likely source

The timeline suggested that most likely date of infection was the same day hens were introduced into house 1. Tracing activities found no evidence that the hens were infected at source – no clinical signs present in any of the hens at farm of origin or at other farms of destination from this farm. House 4 remained unaffected even though it had also received hens from the same source farm on the same day, suggesting viral contamination of house 1 at the time of hen introduction. Direct contact with wild birds was less likely because hens were confined to the raised slatted area when they became infected. Apart from some gaps between walls and the ground which might have allowed small wild birds access into the lower scratch area, the buildings were in good condition with no gaps that would allow wild bird access. Whole genome sequence of the virus suggests this was an independent introduction event to other poultry outbreaks and likely reflective of the genetic diversity amongst these viruses within wild birds.

Spread investigations: Assessment of potential and likelihood of spread

The likelihood of spread of infection from this IP was assessed as very low likelihood with low uncertainty. Eggs produced during the high-risk tracing period were traced. Movement of people was investigated and concluded as being very low risk.

Remaining uncertainty

Exactly how house 1 became contaminated with virus remains uncertain.

AIV 2021/44, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a commercial turkey breeder rearing unit. It was owned by a large, fully integrated poultry company which had many turkey and broiler rearing and breeding sites across the UK. In addition to the two poultry sheds, the premises also included the local manager's cottage, an office with showers and an incinerator. There was a secure perimeter fence with a locked gate around the poultry houses.

Species and number of each present

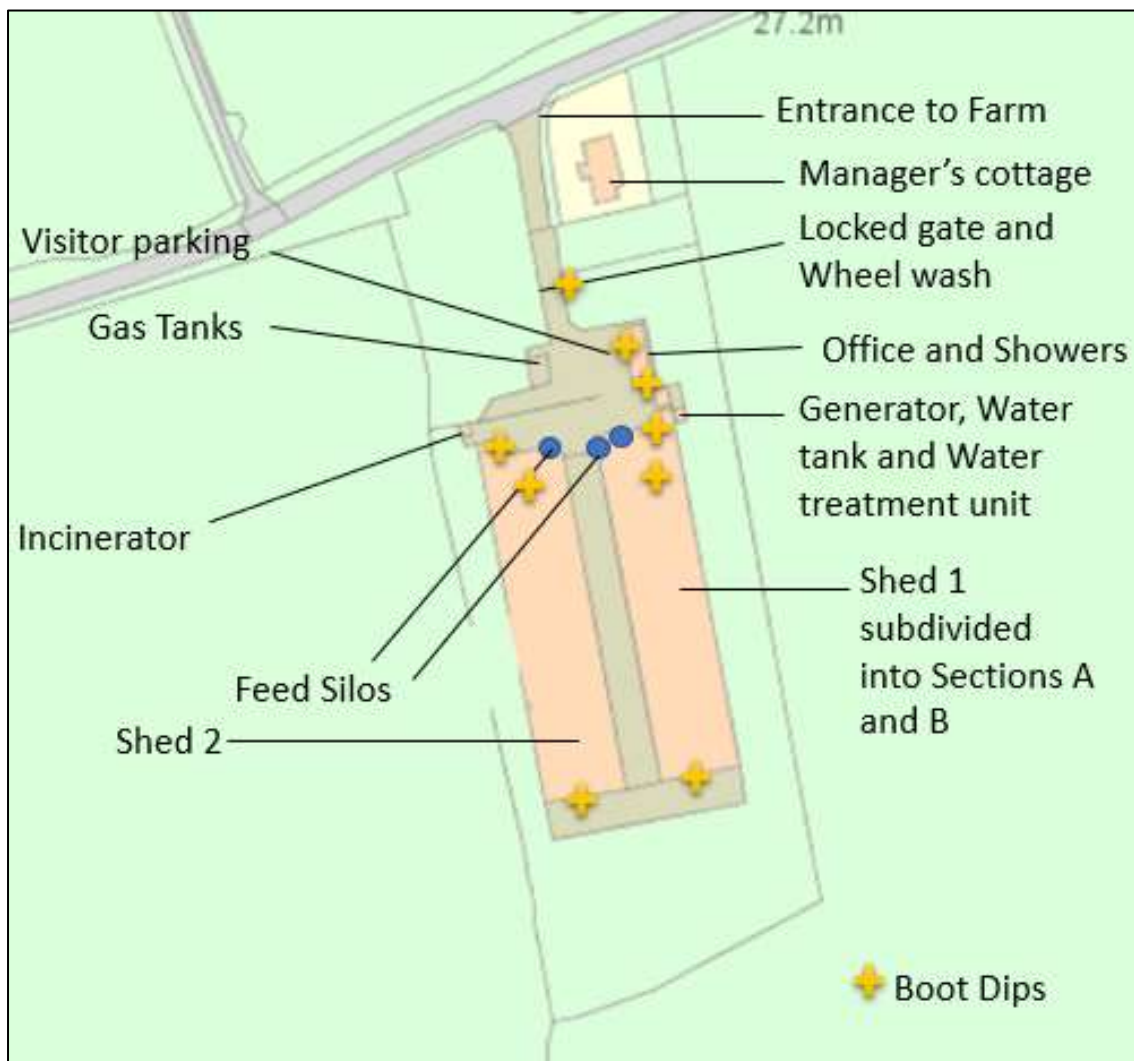
At the time of the report case, only one of two poultry sheds contained birds. There were approximately 4,680 turkeys which were 32 weeks old. They had been placed as day-old poults on 29/04/2021. Usually, the two sheds were populated one week apart, birds were reared to point of lay at 29.5 weeks old and then moved to another site, one week apart. Shed 1 had been depopulated as planned on 15/11/2021 and 16/11/2021. However, the movement from Shed 2 had been delayed because the premises fell within the surveillance zone around another IP at this time.

Description of the housing

There were two poultry sheds that were refurbished three years previously, including installation of new roofs. The houses were entered via a door which led into a general management area. The bird areas were accessed from the management area. The bird area in Shed 1 was divided into two sections. Buildings were well-maintained and the site appeared to be clean and tidy.

Plan of the infected premises

Figure 146: Plan of AIV 2021/44



Overview of biosecurity

On the whole, the unit was considered to have good biosecurity. There was evidence that protocols were in place and were being applied. There were two members of staff dedicated to the unit and company protocol prohibited them from keeping poultry at home. There were two visitors' books, one for people entering the site and another one for people entering the bird areas specifically.

PERSONNEL: The two members of staff used the shower facility for entering and leaving the site. Clothing was dedicated to the site and there were house dedicated wellingtons. Wellingtons were changed again prior to entering the bird areas. The same clothing was worn in both houses. Boot dips were present at the main gate, the office, external house doors and at the entrance to the bird areas. Visitors entering the bird areas had to be 72 hours poultry free and were required to go through the shower facilities on entry and exit. They were provided with site

dedicated clothing and wellingtons. Plastic boot covers were given to visitors for use in the bird areas.

HOUSING: The housing was well maintained and wild birds would not have been able to enter. External doors were sealed with salt in an attempt to prevent earthworms, insects, flies and vermin from entering. Internally, the floor of the management area was covered with disinfectant powder. Each house had its own set of dedicated equipment. Bird scarers were mounted on the roofs.

DELIVERY VEHICLES: There was a wheel wash containing disinfectant and a boot dip for drivers. Vehicles such as feed delivery wagon did not enter the perimeter fence.

FEED: Feed was supplied and delivered by a commercial mill. It was blown into the silos from outside the perimeter fence. Delivery drivers were required to wear disposable boiler suits and overalls during the procedure.

BEDDING: A bulk bedding product for the next flock was blown onto the floors following depopulation and cleansing and disinfection. Bales of wood shavings were used to top up the bedding. These were delivered wrapped in plastic, stacked on a pallet and wrapped in a further outer layer of plastic. The outer layer was subject to cleansing and disinfection and removed prior to storing within the management area of the houses, ready for use.

WATER: Mains supply, stored in sealed header tanks and subject to treatment.

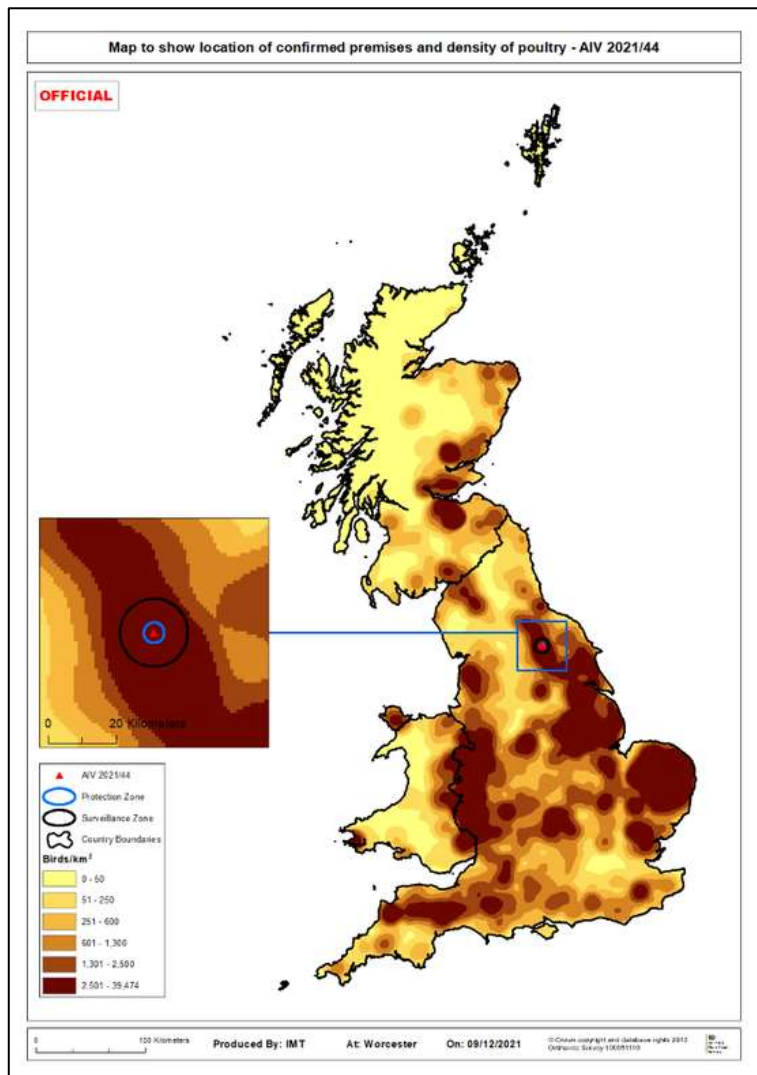
VENTILATION: Air entered through inlet vents in the side walls of the building and was blown out through chimneys in the roof via electric fans. These were covered with 1 cm mesh and baffles to prevent wild bird entry.

ABP: Dead turkeys were bagged and frozen for 48 hours and then incinerated on site.

VERMIN: Control was carried out by a contractor. A mouse had been seen in the entrance room of Shed 2 and mouse droppings were seen on top of the stack of bedding bales inside Shed 2.

Map with location in Great Britain and poultry density

Figure 147: Location of IP and poultry density



Overview of the surrounding area

The unit was in a high poultry density area, but there were no adjacent premises holding poultry or other livestock. Most of the land in the vicinity was for arable use. There was a small stream approximately 500 m to the south but there were otherwise no waterbodies nearby.

Ornithological assessment:

Desktop assessment: Not commissioned but the picture was likely to be similar to that described for other IMT nearby IPs in North Yorkshire, particularly AIV 2021/39. Most nearby waterbodies would have been too small to host aggregations of waterbirds. Wildfowl were likely to be generally common although it was not clear whether any waterbodies hosted aggregations that would have been likely to produce a source of

infection pressure. Waders were unlikely to be common in this landscape and it was not thought that they would move infection from distant sources. Bridge species, wild passerines, woodpigeon and starling were most likely to be involved in risk pathways onto this IP.

Local intelligence: There were occasional sightings of various species of wild birds around the unit. These included herons, crows, robins and sparrows.

Clinical picture

06/12/2021 – three turkeys were found dead and a further five were culled on the same day. The flock appeared otherwise healthy.

07/12/2021 – further mortalities were found and some turkeys were showing signs of being unwell including reduced activity and recumbency. The private vet attended the site and APHA subsequently investigated. By the middle of the day, 60 turkeys had died and a further 20 were displaying dyspnoea, neurological signs, dark wattles, haemorrhages on snood, coughing with blood and lethargy. Those that were clinically examined were found to be pyrexia. The rest of the flock was reported to be lethargic. By the evening, 150 turkeys had died.

Post-mortem findings included generalised congestion, particularly noticeable in the spleen and lungs, mild to moderate petechial haemorrhages on the proventriculus mucosa, severe reddening of the small intestinal mucosa and inflammation of caecum and tonsils.

Prior to the three deaths reported on 06/12/2021, there had only been one death over the period from the 01/12/2021 to 05/12/2021. However, it was possible that the three turkeys which died on 06/12/2021 may have become affected overnight and therefore a precautionary approach was taken and the onset of clinical signs was considered to be 05/12/2021.

Timeline

Tracings windows

Source tracings window:

High-risk:	02/12/2021 to 04/12/2021
Likely:	21/11/2021 to 01/12/2021
Precautionary:	16/11/2021 to 20/11/2021

Spread tracings window:

High-risk:	03/12/2021 to 07/12/2021
Likely:	22/11/2021 to 02/12/2021
Precautionary:	17/11/2021 to 21/11/2021

Most likely date of infection: 02/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 148: Source and spread timeline for AIV 2021/44

Source Tracing Window	Spread Tracing Window	Date	
		14/11/21	
		15/11/21	
Day 19		16/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		17/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		18/11/21	
Day 16		19/11/21	
Day 15		20/11/21	
Day 14		21/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	22/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	23/11/21	
Day 11	Day 3	24/11/21	
Day 10	Day 4	25/11/21	
Day 9	Day 5	26/11/21	
Day 8	Day 6	27/11/21	
Day 7	Day 7	28/11/21	
Day 6	Day 8	29/11/21	
Day 5	Day 9	30/11/21	
Day 4	Day 10	01/12/21	
Day 3	Day 11	02/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	03/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	04/12/21	
	Day 14	05/12/21	Precautionary onset of clinical signs.
	Day 15	06/12/21	3 turkeys found dead (may have died overnight) + 5 culled
	Day 16	07/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021 104). Restrictions served.
	Day 17	08/12/21	HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021 44.
	Day 18	09/12/21	
	Day 19	10/12/21	Culling commenced. VFEI investigation.
	Day 20	11/12/21	
	Day 21	12/12/21	Culling completed
	Day 22	13/12/21	Preliminary C&D completed
	Day 23	14/12/21	Preliminary C&D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these		

Surveillance activity

PZ (0-3 km)

27 premises with poultry holding between 1-240,000 birds (8 premises with 50 or more birds)

SZ (3-10 km)

175 premises with poultry holding between 1-320,000 birds (37 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

A telephone tracing was initiated for the private vet who visited the premises in the high-risk tracing window. No other poultry contacts were identified in relation to this

tracing and biosecurity protocols were verified. The tracing was assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds; this was attributed a high likelihood assessment with low uncertainty.

Assessment and evidence base for the likely source

Tracings investigations did not identify any likely transmission pathways onto this unit. There was only one tracing and this was assessed as being very low risk. Biosecurity protocols for visiting personnel and vehicles were generally considered to be very good.

Although biosecurity for regular personnel and routine management was generally good, it was clear that rodents could enter the sheds and these could have acted as fomites if they were contaminated with virus. There was some speculation that recent storms may have caused malfunction of the roof fans and whether this may have resulted in ingress of wild bird faeces.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

Tracing investigations have shown that all other potential spread pathways were of very low likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/45, Near Aspatria, Allerdale, Cumbria, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a free-range commercial laying unit and access to the ranges was closed on the 28/11/2021 due to the housing order.

On the holding there was also a small flock of laying hens and ducks which had been ranging together before the housing order.

Other businesses operating on site include sale of cereal and of horse bedding, but no deliveries or collections were reported during the high-risk tracing windows.

Species and number of each present

Around 31,000 laying chickens, 37 weeks old.

Additional flock of 29 laying chickens and 3 ducks

Three peacocks, 14 pigs and 150 sheep.

Description of the housing

The site is accessed via two gated driveways. One to the north, next to the commercial laying flock and another to the south, which was usually kept open at all times.

The commercial flock was housed in two equal sized sheds (H1 and H2 with around 15,500 birds in each). The sheds were in a good state of repair and no access points for rodents or wild birds were identified.

There was a single egg packing area and egg store located in House 1 and eggs were passed here from both bird houses via conveyer belt.

The sheds were of metal construction with air inlets on the side and end walls and four extractor fans on the roof of each house.

The area to the front and part of the side of the sheds (mainly where eggs are transferred/collected) and the yard where the feed silos were located was paved with concrete.

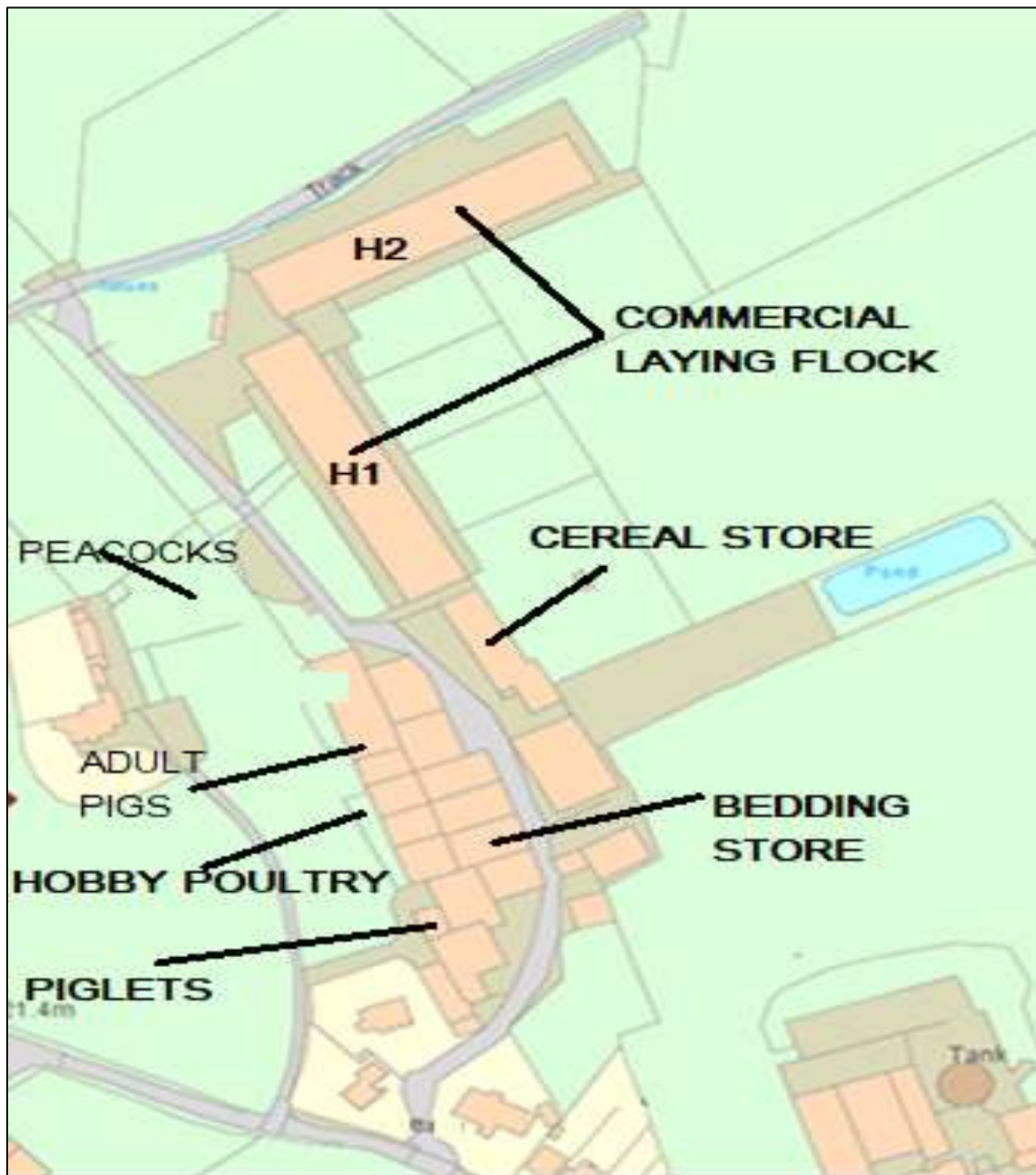
There was a small paddock holding 3 adult pigs and there were 11 piglets in a separate building.

The 29 hobby chickens and 3 ducks were kept in a grass paddock containing a coop within a temporary enclosure. They had been free-range until the housing order came into force on 29/11/2021.

The three free-ranging peacocks were kept in a small paddock between the farmhouse and House 1 of the commercial poultry unit. The farm was surrounded by fields with grazing sheep.

Plan of the infected premises

Figure 149: Plan of AIV 2021/45



Overview of biosecurity

In each house, there are two doors that led from the lobby to the bird area. These had step in barriers and FAM 30 foot dips. The use of dedicated clothing and footwear was reported by the keeper, but its use was not seen during the investigation on site.

There were no written biosecurity protocols and the records kept were incomplete.

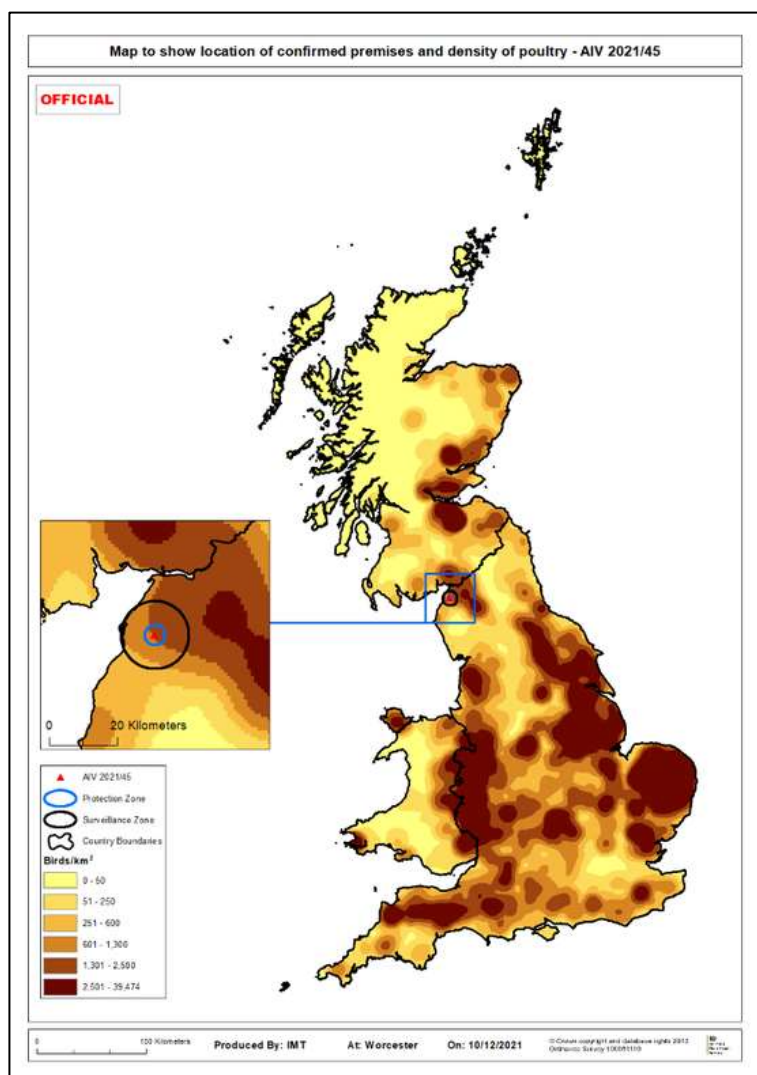
Nine members of staff worked on the commercial unit, including 3 family members who also managed the other livestock on the farm.

Eggs were exclusively collected by one company every 2-3 days and no vehicle wash or disinfection was provided but it was expected that the driver complied with the parent company biosecurity protocol.

Feed was delivered to silos outside of the bird area and there were no ABP collections reported within the precautionary spread or source windows. Water was from the mains.

Map with location in Great Britain and poultry density

Figure 150: Location of IP and poultry density



Overview of the surrounding area

This rural and lowland IP was set in a largely pastoral landscape close to the Solway Firth, including its estuarine and wetland habitats and areas designated to protect wintering waterbirds. Significantly it was very close to an additional unprotected site

known to host a substantial aggregation of waterbirds. The Solway was known to be a very substantial source of infection in wild birds.

Ornithological assessment:

Desktop assessment: An assessment was carried out and indicated that wild birds represented an obvious substantial source of infection pressure.

Wildfowl and waders were abundant as were bridge species such as gulls and corvids.

Both groups of bridge species produce the most significant infection pathways, with gulls perhaps producing the greatest pressure where they move considerable distances between coastal/estuarine habitats, settlements and farmland, as well as scavenging infected carcasses from the coast or at sea.

Wild passerines and Woodpigeon in the area may have supported an indirect infection pathway from waterbirds, acquiring infection from sources of infection close to the IP.

Local intelligence: There was a fenced fishing pond to the east of the farm which was accessible to wild birds. No wild birds were observed in the vicinity of the pond during the investigation although pigeons and starlings were seen flying where the straw and feed were being stored.

Clinical picture

07/12/2021 – Increased mortality with 34 dead chickens in House 2 and a further 100 dead chickens found the following day

In House 2 the feed consumption reduced slightly, and the egg production dropped dramatically from 300 fewer eggs on 07/12/2021 to 2000 fewer on 08/12/2021.

08/12/2021 – In addition to the increased mortality and reduced egg production, changes were seen in the colour of the eggshells with 1 in 10 eggs whiter rather than brown.

Suspicion of notifiable avian disease was reported to APHA and the investigation and disease control restrictions took place and samples were submitted.

House 1 and the hobby flock remained unaffected during all this time and at the time of culling.

Timeline

Tracings windows

Source tracings window:

High-risk: 03/12/2021 to 05/12/2021
 Likely: 22/11/2021 to 02/12/2021
 Precautionary: 18/11/2021 to 21/11/2021

Spread tracings window:

High-risk: 04/12/2021 to 08/12/2021
 Likely: 23/11/2021 to 03/12/2021
 Precautionary: 19/11/2021 to 22/11/2021

Most likely date of infection: 03/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 151: Source and spread timeline for AIV 2021/45

Source Tracing Window	Spread Tracing Window	Date	
Day 18		18/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		19/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		20/11/21	
Day 15		21/11/21	
Day 14		22/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	23/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	24/11/21	
Day 11	Day 3	25/11/21	
Day 10	Day 4	26/11/21	
Day 9	Day 5	27/11/21	
Day 8	Day 6	28/11/21	
Day 7	Day 7	29/11/21	
Day 6	Day 8	30/11/21	
Day 5	Day 9	01/12/21	
Day 4	Day 10	02/12/21	
Day 3	Day 11	03/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	04/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	05/12/21	
	Day 14	06/12/21	Precautionary onset of clinical signs.
	Day 15	07/12/21	
	Day 16	08/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling. Restrictions served.
	Day 17	09/12/21	HPAI H5N1 confirmed
	Day 18	10/12/21	VFEl investigation.
	Day 19	11/12/21	
	Day 20	12/12/21	
	Day 21	13/12/21	Culling commenced.
	Day 22	14/12/21	Culling completed.
	Day 23	15/12/21	Preliminary C&D completed
	Day 24	16/12/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

6 premises with poultry holding between 2-3,877 birds (1 premises with 50 or more birds)

SZ (3-10 km)

35 premises with poultry holding between 2-150,000 birds (13 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations in the high-risk windows included movement of eggs from the IP to the packing centre, staff movements, egg collections (vehicle and driver) and feed deliveries (vehicle and driver).

Source investigations: Hypothesis for the source

The most likely source of the outbreak was considered to be direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

This assessment was based on the following key pieces of evidence:

Birds were housed from 28/11/2021 (within the likely source window) and there was no apparent direct access to poultry by wild birds since then but prior to that, the range was enclosed within single netted fence and direct contact would have been possible.

The fishing pond on site would be attractive and accessible to wild birds.

The open cereal store nearby showed evidence of the presence of bird faeces and pigeons and starlings seen flying in and out.

The biosecurity was poor with no written protocols and workers seen outside poultry sheds wearing the in-house boots and clothing.

Bedding (wood shavings and straw) was last replaced within the likely source window and the straw had been stored uncovered in open barn with no apparent biosecurity protocol.

The 14 pigs were sampled and tested with negative results.

Spread investigations: Assessment of potential and likelihood of spread

Spread tracings were identified and prioritised on a risk basis as follows:

Indirect contact with other domestic susceptible animals was assessed as low likelihood following investigation of staff, egg collections and feed deliveries.

Onward transmission through wildlife was assessed as highly likely as after confirmation of HPAI the keeper initially (this was stopped when discovered the following day) moved bird carcasses and eggs to an uncovered skip in an open shed where wild bird faeces were evident.

Remaining uncertainty

Due to incomplete records, there remained some uncertainty about the biosecurity within the commercial laying flock and the number of vehicles and personal that may have been on site within the likely source window.

AIV 2021/46, Near Annan, Dumfriesshire, Dumfries and Galloway, Scotland

Description of the premises

Overview of the premises and the wider business

This was a hobbyist breeding flock with mixed species and breeds which the owner used to buy and sell to market. Eggs not for hatching were consumed by owner and family only. The last sale was in August 2021 and the last purchase was in October 2021.

Species and number of each present

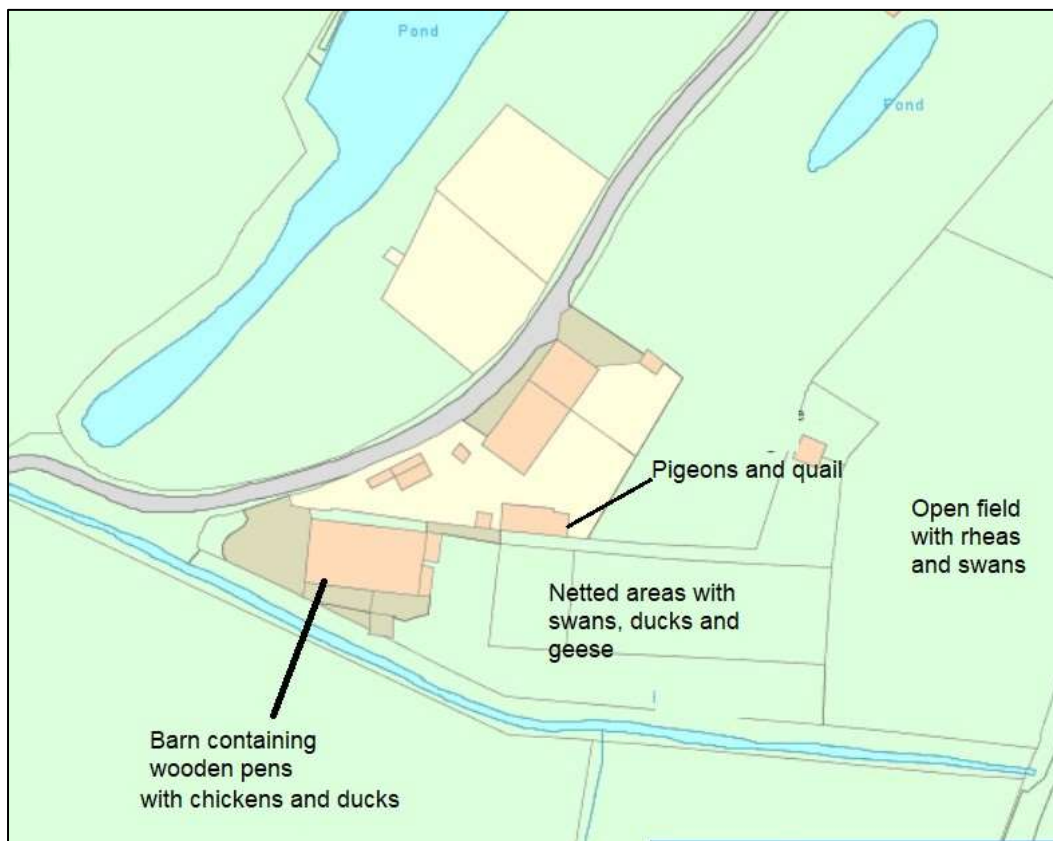
There were approximately 700 birds in total- 30 geese, 100 quail, 10 peacocks, 5 rhea, 10 swans, 50-60 ducks, 300 hens, 200 pigeons and some partridges.

Description of the housing

The hens, pigeons and just under half the ducks were housed in wooden pens with mesh netting within an agricultural barn. These were accessible to wild birds. There were also some pigeon lofts. The geese, quail, peacocks, rhea, swans, partridges and over half the ducks were free range.

Plan of the infected premises

Figure 152: Plan of AIV 2021/46

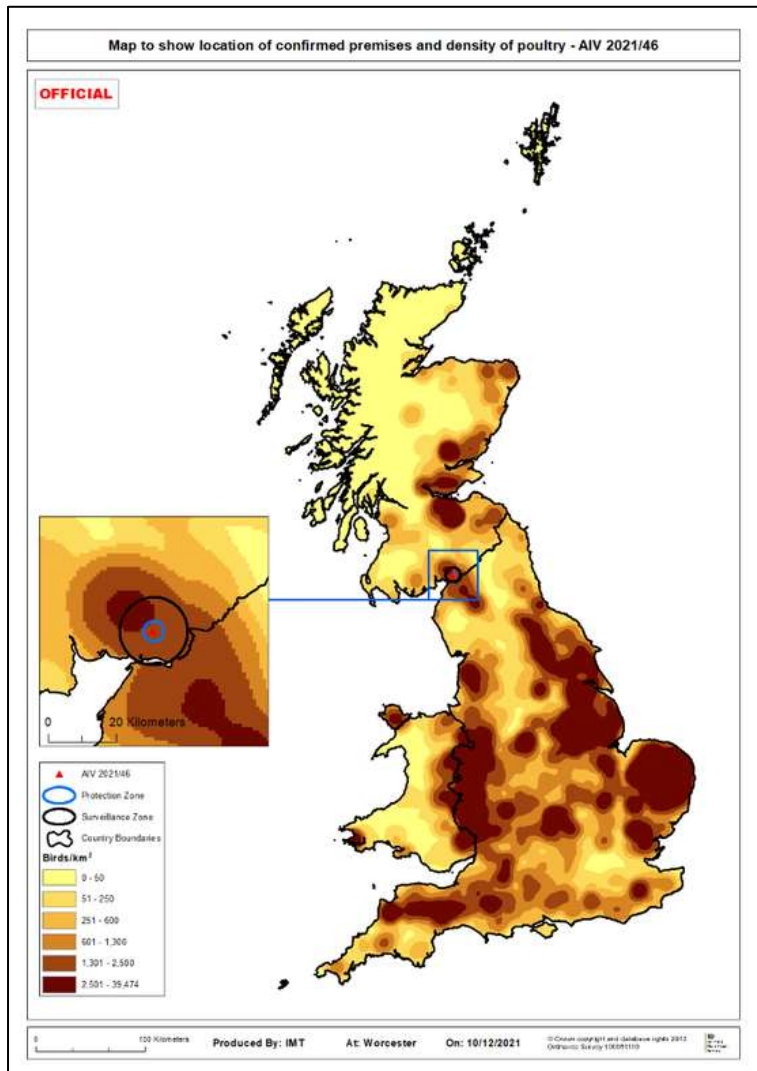


Overview of biosecurity

Biosecurity was considered to be poor with the same waterproofs used for all areas and no foot dips or preventive cleaning of the footwear. There was a high amount of animal movement in and out the barn. Gardens and open fields had grass for foraging and small ponds.

Map with location in Great Britain and poultry density

Figure 153: Location of IP and poultry density



Overview of the surrounding area

The area was a high-density poultry area close to the Solway Firth which was an overwintering site for migratory and native wild birds. During the disease outbreak H5N1 HPAI had been found in dead wild waterfowl in the area. The premises was within a PZ and SZ of other IPs but there were no links to either IP.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: An overwintering site for migratory and native wild birds on the Solway Firth. Migratory waterfowl had not been seen on the premises but moorhens, crows and common garden birds were present.

Clinical picture

07/11/2021 – Two chickens were found dead with no previous clinical signs and no change in food and water intake or egg production.

08/11/2021 – Two chickens, one goose and one duck found dead. Suspicion of avian notifiable disease was reported.

08/11/2021 – Clinical signs of lethargy, conjunctivitis and inappetence were seen at inspection and samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk:	03/12/2021 to 05/12/2021
Likely:	22/11/2021 to 02/12/2021
Precautionary:	17/12/2021 to 21/11/2021

Spread tracings window:

High-risk:	04/12/2021 to 08/12/2021
Likely:	23/11/2021 to 03/12/2021
Precautionary:	18/11/2021 to 22/11/2021

Most likely date of infection: 03/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 154: Source and spread timeline for AIV 2021/46

Source Tracing Window	Spread Tracing Window	Date	
Day 19		17/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		18/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		19/11/21	
Day 16		20/11/21	
Day 15		21/11/21	
Day 14		22/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	23/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	24/11/21	
Day 11	Day 3	25/11/21	
Day 10	Day 4	26/11/21	
Day 9	Day 5	27/11/21	
Day 8	Day 6	28/11/21	
Day 7	Day 7	29/11/21	
Day 6	Day 8	30/11/21	
Day 5	Day 9	01/12/21	
Day 4	Day 10	02/12/21	
Day 3	Day 11	03/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	04/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	05/12/21	
	Day 14	06/12/21	Precautionary onset of clinical signs (birds may have died overnight)
	Day 15	07/12/21	Two hens found dead
	Day 16	08/12/21	5 deaths noted (1 duck, 1 goose and three hens) Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/106). Restrictions served.
	Day 17	09/12/21	Avian Influenza HPAI H5N1 confirmed by CVO with case reference AIV2021-46.
	Day 18	10/12/21	
	Day 19	11/12/21	
	Day 20	12/12/21	Cull started
	Day 21	13/12/21	
	Day 22	14/12/21	Cull completed
	Day 23	15/12/21	Preliminary C and D completed
	Day 24	16/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

36 premises with poultry holding between 1-230,000 birds (6 premises with 50 or more birds)

SZ (3-10 km)

35 premises with poultry holding between 1-40,000 birds (12 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

There had been no movements of animals/birds onto the premises since mid-October.

Direct and indirect contact with wild birds was possible, as some of the birds were not housed.

Wild birds had access to feed and water supplies for resident birds.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty

AIV 2021/47, Near Moffat, Dumfriesshire, Dumfries and Galloway, Scotland

Description of the premises

Overview of the premises and the wider business

This was a small backyard flock. Eggs were used for personal consumption and occasionally given to neighbours.

Species and number of each present

11 chickens and 11 pigeons

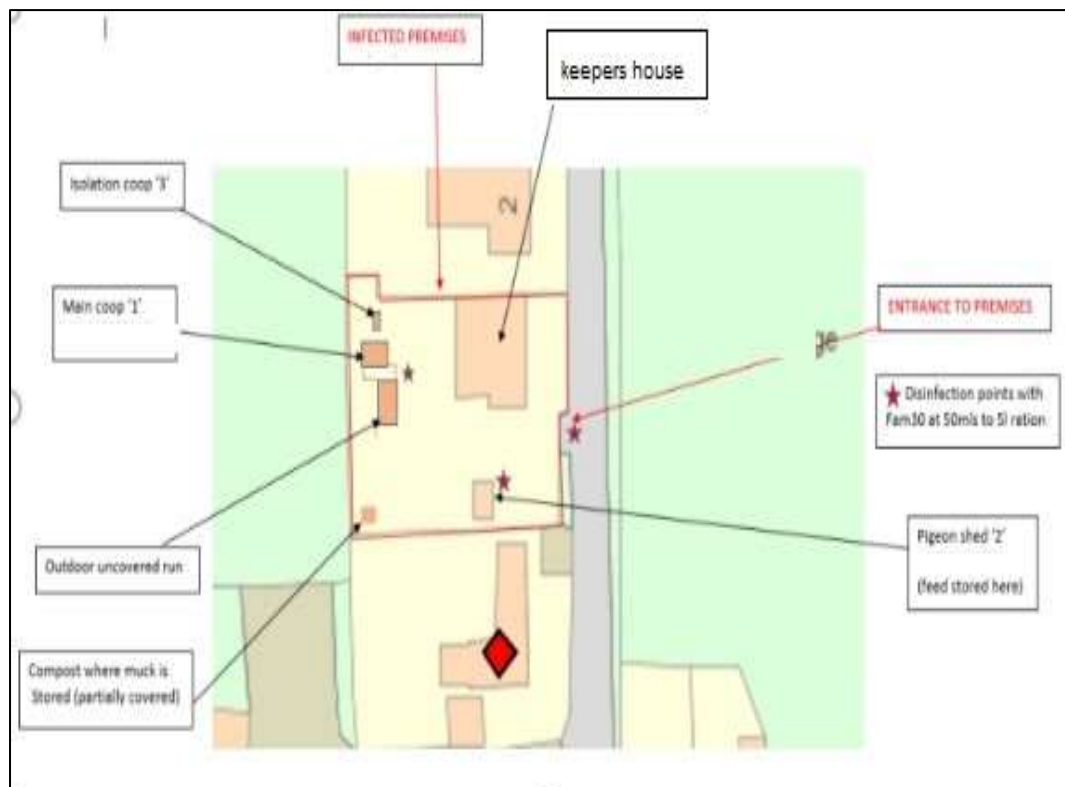
Description of the housing

Chickens were kept in a coop with outdoor access within an unroofed netted enclosure. There was a pond 400 metres away which attracted wild birds.

The pigeons were housed separately from the chickens in a wooden garden shed and had not had any outdoor access for the previous three weeks.

Plan of the infected premises

Figure 155: Plan of AIV 2021/47



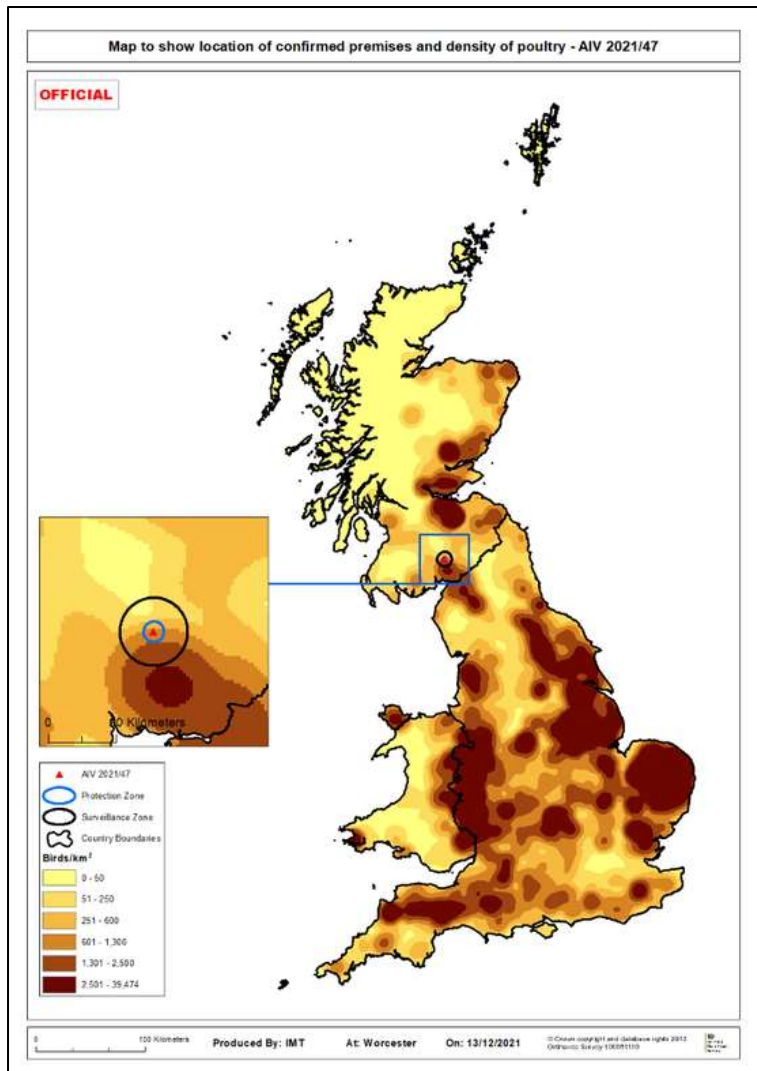
Overview of biosecurity

A shallow foot bath was placed outside the chicken enclosure and used to clean boots when entering and leaving the chicken area. However, approved disinfectants

at the correct concentration were not used. Pheasants, crows and small wild birds had free access to the chicken run and feeders so biosecurity was assessed as poor. There was no disinfection associated with the pigeon house.

Map with location in Great Britain and poultry density

Figure 156: Location of IP and poultry density



Overview of the surrounding area

Arable area with wild peregrines, kites, and buzzards common in the area.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: A pond was nearby which attracted wildfowl.

Clinical picture

05/11/2021 – Egg production dropped by 75%.

06/11/2021 – One chicken was lethargic and died overnight.

09/12/2021 – Some of the birds were very lethargic and off their feed. Six chickens died and suspicion of avian notifiable disease was reported. The four remaining chickens presented with green/yellow watery faeces and samples were taken. The pigeons showed no clinical signs of disease.

Timeline

Tracings windows

Source tracings window:

High-risk:	02/12/2021 to 04/12/2021
Likely:	21/11/2021 to 01/12/2021
Precautionary:	18/11/2021 to 20/11/2021

Spread tracings window:

High-risk:	03/12/2021 to 09/12/2021
Likely:	22/11/2021 to 02/12/2021
Precautionary:	19/11/2021 to 21/01/2021

Most likely date of infection: 02/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 157: Source and spread timeline for AIV 2021/47

Source Tracing Window	Spread Tracing Window	Date	
Day 17		18/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		19/11/21	Start of precautionary spread tracing window (source + 24h).
Day 15		20/11/21	
Day 14		21/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day1	22/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day2	23/11/21	
Day 11	Day3	24/11/21	
Day 10	Day4	25/11/21	
Day 9	Day5	26/11/21	
Day 8	Day6	27/11/21	
Day 7	Day7	28/11/21	
Day 6	Day8	29/11/21	
Day 5	Day9	30/11/21	
Day 4	Day10	01/12/21	
Day 3	Day11	02/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day12	03/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day13	04/12/21	
	Day14	05/12/21	Keeper noted an egg drop 4 per day to 1 per day. Precautionary onset of clinical signs.
	Day15	06/12/21	1 hen ill
	Day16	07/12/21	hen dead overnight.
	Day17	08/12/21	hens appear less interested in food
	Day18	09/12/21	Six hens found dead. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/108). Restrictions served.
	Day19	10/12/21	Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-47.
	Day20	11/12/21	Cull commenced
	Day21	12/12/21	Cull completed. Preliminary C and D completed
	Day22	13/12/21	Preliminary C and D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from		

Surveillance activity

PZ (0-3 km)

15 premises with poultry holding between 1-26 birds (0 premises with 50 or more birds)

SZ (3-10 km)

8 premises with poultry holding between 1-58 birds (1 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Direct and indirect contact with wild birds was possible as the chicken run was uncovered. Waterfowl gathered at a pond nearby.

Biosecurity was inadequate to prevent contamination of the chicken run by the keepers' footwear.

Spread investigations

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/48, Near Highworth, Swindon, Wiltshire, England

Description of the premises

Overview of the premises and the wider business

This was a non-commercial mixed flock of ducks and chickens. The eggs were consumed by the family or given to a neighbour.

Species and number of each present

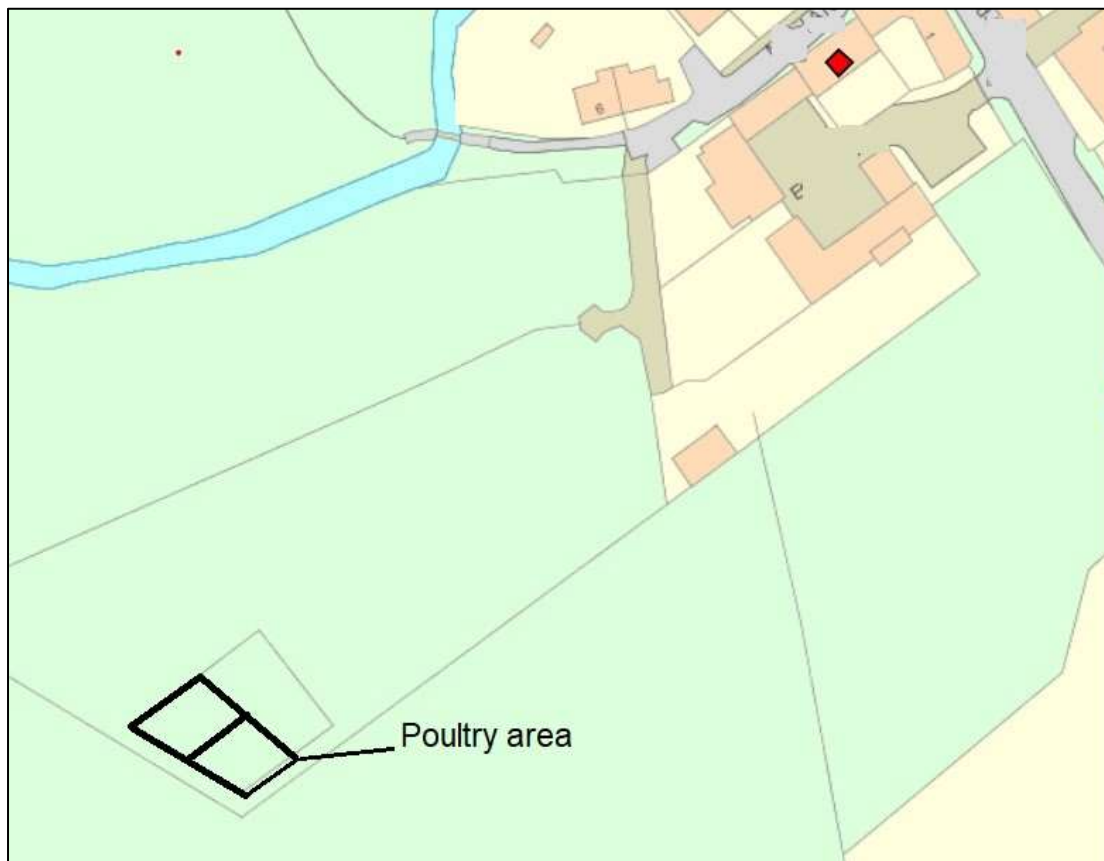
39 chickens and eight ducks.

Description of the housing

The bird area was fenced and covered in 2 x 2 inch net and separated into two adjacent areas. One for chickens and ducks (also with a small pond) and the other for a separate group of 10 chickens. Feed and water were supplied in uncovered containers outside the coops.

Plan of the infected premises

Figure 158: Plan of AIV 2021/48



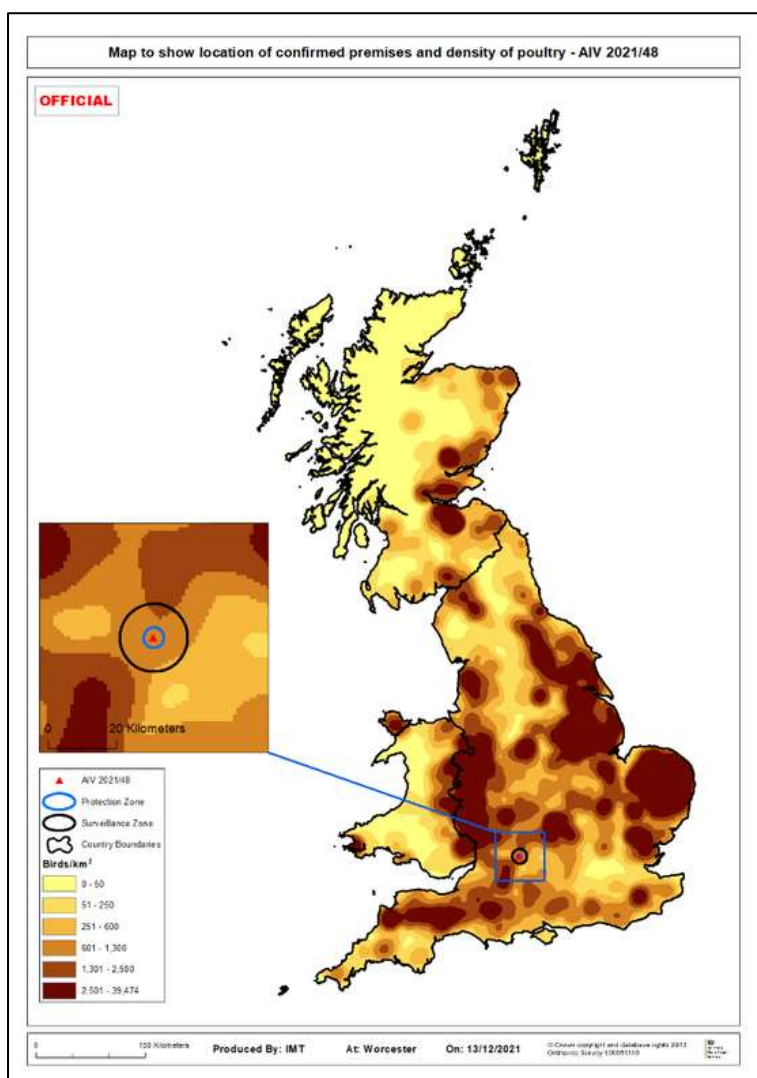
Overview of biosecurity

The biosecurity was assessed as poor. The netting mesh was large enough to allow contact between birds in each area and with wild birds. Small wild birds had been seen in the pens with the poultry. Feed and water were provided in uncovered containers allowing contamination by wild bird droppings.

The foot dip was not refreshed frequently and used non-Defra approved disinfectant. Only the owners entered the bird area but without using dedicated footwear or clothing. Vermin traps were in use.

Map with location in Great Britain and poultry density

Figure 159: Location of the IP and poultry density



Overview of the surrounding area

The premises was about 300 m from the river Thames and on the other side there were some artificial lakes that attracted swans which had been flying over the poultry enclosures.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Near the river Thames and artificial lakes. Many wild birds nearby and small birds had been seen inside the netting with the poultry.

Clinical picture

08/12/2021 – Three chickens were found dead. No previous clinical signs or egg drop.

09/12/2021 – Nine more chickens were found dead, three were lethargic with torticollis and one was recumbent. Suspicion of notifiable disease was reported.

Timeline

Tracings windows

Source tracings window:

High-risk:	04/12/2021 to 06/12/2021
Likely:	23/11/2021 to 03/12/2021
Precautionary:	18/11/2021 to 22/11/2021

Spread tracings window:

High-risk:	05/12/2021 to 09/12/2021
Likely:	24/11/2021 to 04/12/2021
Precautionary:	19/11/2021 to 23/11/2021

Most likely date of infection: 04/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 160: Source and spread timeline for AIV 2021/48

Source Tracing Window	Spread Tracing Window	Date	
Day 21		16/11/21	
Day 20		17/11/21	
Day 19		18/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		19/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		20/11/21	
Day 16		21/11/21	
Day 15		22/11/21	
Day 14		23/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	24/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	25/11/21	
Day 11	Day 3	26/11/21	
Day 10	Day 4	27/11/21	
Day 9	Day 5	28/11/21	
Day 8	Day 6	29/11/21	
Day 7	Day 7	30/11/21	
Day 6	Day 8	01/12/21	
Day 5	Day 9	02/12/21	
Day 4	Day 10	03/12/21	
Day 3	Day 11	04/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	05/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	06/12/21	
	Day 14	07/12/21	Precautionary onset of clinical signs.
	Day 15	08/12/21	
	Day 16	09/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/105). Restrictions served. VFEI investigation carried out by case vet.
	Day 17	10/12/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-48.
	Day 18	11/12/21	Culling commenced and completed. Preliminary C&D completed.
	Day 19	12/12/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

29 premises with poultry holding between 3-108,000 birds (3 premises with 50 or more birds)

SZ (3-10 km)

56 premises with poultry holding between 1-4,000 birds (10 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

There were large numbers of wild birds in the area and direct and indirect contact with wild birds was possible through the netting. The feed and water were uncovered and biosecurity was inadequate to prevent contamination of the poultry enclosure.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty

AIV 2021/49, Near Clifford, Hereford and South Herefordshire, Herefordshire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial turkey grower unit contracted to a large integrated company rearing turkey stags to finishing weight.

There were usually three crops per year on an all-in-all-out basis. This crop placed in August and was due to be depopulated imminently.

Species and number of each present

8400 turkeys.

Description of the housing

The site consisted of six sheds holding from 950 to 1650 birds per shed. Shed 2 shared an airspace with sheds 1 and 3.

It was built in the 1980s and had a secure perimeter fence. The unit operated on an all-in all-out system, with external contractors being used to carry out the cleansing and disinfection in between crops, with a turnaround time of 2-3 days. No litter was removed from the sheds until the end of the crop.

Plan of the infected premises

Figure 161: Plan of AIV 2021/49



Overview of biosecurity

Biosecurity was generally considered to be fair, with up-to-date visitors' book and production records. The buildings were relatively well maintained and the houses had dedicated staff and boots. There was a double barrier to access the houses although issues indicating likely vermin access were identified.

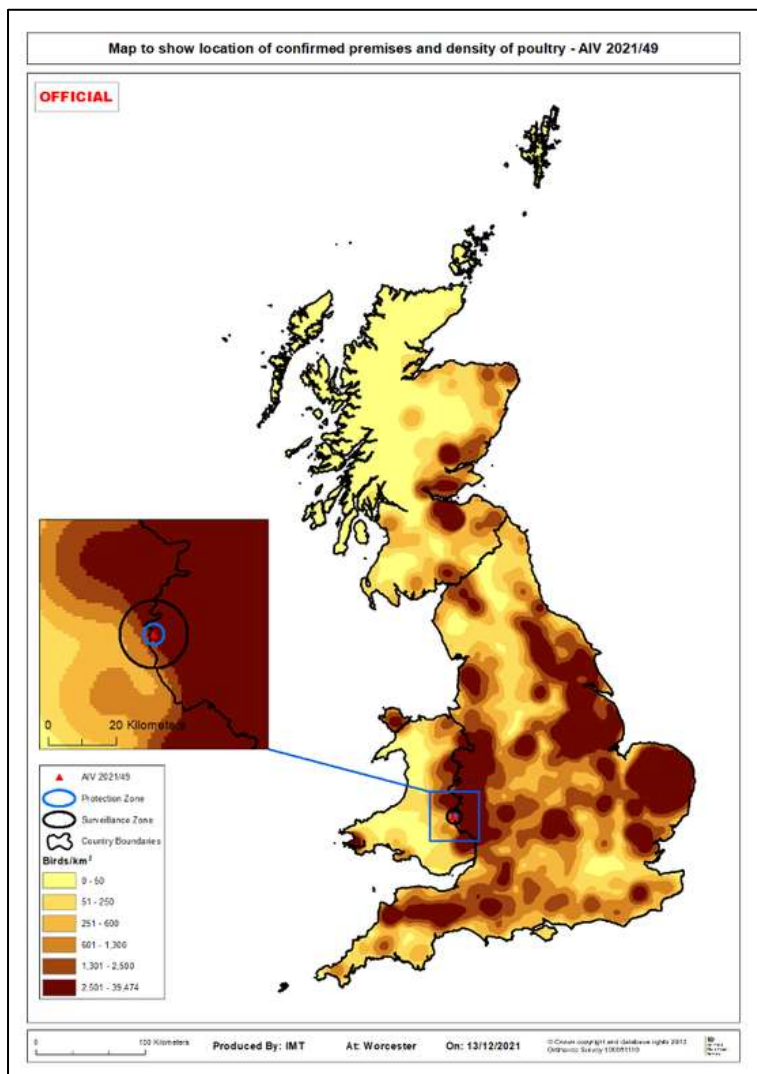
However, apart from boots, there was no dedicated protective clothing and the boot dips used non-Defra approved disinfectant. The straw bedding store was accessible to wild birds during the day.

The farmer managed the flock himself and had no contact with other poultry. There were no shared personnel or shared equipment.

Only the feed lorry entered the premises and a wheel wash was used. The driver had no contact with the birds.

Map with location in Great Britain and poultry density

Figure 162: Location of IP and poultry density



Overview of the surrounding area

The site was located immediately adjacent to the river Wye, on the border between England and Wales. On the opposite side of the river was a flood plain where waterfowl were present all year round, with an increase in numbers over the winter months.

Ornithological assessment:

Desktop assessment: Located in the floodplain of the Wye and surrounded by much woodland, wild birds of many types were likely to be abundant. The main findings were that wild birds were a likely source of infection pressure and that Passerines in particular, were likely to be abundant around the IP and represented the most likely infection pathway into housed poultry where biosecurity was inadequate.

Local intelligence: The farmer reported geese, swans and ducks as the main species, with over 300 swans seen regularly. The farmer reported that the geese have been quiet over the few days before his birds showed clinical signs.

Clinical picture

08/12/2021 – the farmer noted that the birds in shed 2 (containing 1600 birds) appeared slightly quieter than usual.

09/12/2021 – eight turkeys from shed 2 were found dead. The farmer contacted his PVS who visited the farm that afternoon. A further 15 deaths occurred in that shed during the day and post-mortem examination showed petechial haemorrhages of the pancreas, myocardium, lungs and spleen. The PVS then reported suspicion of notifiable avian disease.

At the APHA investigation, the remaining birds in shed 2 were lethargic and showing signs of ataxia, torticollis, watery green diarrhoea, and swollen heads with 100% morbidity. Feed and water intake had decreased over the previous 24 hrs. The clinical picture in shed 1 was beginning to deteriorate with affected birds showing signs of listlessness and reduced feed/water intake, but with no mortality at that time. The birds in sheds 3, 4, 5 and 6 were unaffected at the time of the visit. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk: 04/12/2021 to 06/12/2021
 Likely: 23/11/2021 to 03/12/2021
 Precautionary: 18/11/2021 to 22/11/2021

Spread tracings window:

High Risk: 05/12/2021 to 09/12/2021
 Likely: 24/11/2021 to 04/12/2021
 Precautionary: 19/11/2021 to 23/11/2021

Most likely date of infection: 04/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 163: Source and spread timeline for AIV 2021/49

Source Tracing Window	Spread Tracing Window	Date	
Day 20		17/11/21	
Day 19		18/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		19/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		20/11/21	
Day 16		21/11/21	
Day 15		22/11/21	
Day 14		23/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	24/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	25/11/21	
Day 11	Day 3	26/11/21	
Day 10	Day 4	27/11/21	
Day 9	Day 5	28/11/21	
Day 8	Day 6	29/11/21	
Day 7	Day 7	30/11/21	
Day 6	Day 8	01/12/21	
Day 5	Day 9	02/12/21	
Day 4	Day 10	03/12/21	
Day 3	Day 11	04/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	05/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	06/12/21	
	Day 14	07/12/21	Precautionary onset of clinical signs.
	Day 15	08/12/21	
	Day 16	09/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/111). Restrictions served.
	Day 17	10/12/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-49.
	Day 18	11/12/21	VFEI investigation.
	Day 19	12/12/21	
	Day 20	13/12/21	Culling started.
	Day 21	14/12/21	
	Day 22	15/12/21	
	Day 23	16/12/21	Preliminary C & D completed
	Day 24	17/12/21	Preliminary C & D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

16 premises with poultry holding between 1-62 birds (1 premises with 50 or more birds)

SZ (3-10 km)

43 premises with poultry holding between 2-160,000 birds (14 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing enquiries were initiated for the private vet, an electrician, ABP collection and a feed delivery. All tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds with high likelihood/ medium uncertainty.

Assessment and evidence base for the likely source

There was a significant wild bird population (resident and migratory) nearby adjacent river, identified as likely AI infection source and several risk factors were identified for indirect contact with wild birds:

Non-approved disinfectant in the foot dips and evidence of wild bird faeces on the concrete hard-standing at the back of houses 1, 2 and 3. Access of small wild birds to feed/bedding stores was possible and vermin were known to be present on the farm. No dedicated clothing was used apart from the boots.

There had been no moves of any animals/products on or off during tracings window and all other potential source pathways were investigated and assessed as very low likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/50, Near Washington, Sunderland, Tyne & Wear, England

Description of the premises

Overview of the premises and the wider business

This was a wildlife reserve that belonged to a national wildfowl conservation charity. The 105-acre site was located on the banks of the River Wear between Newcastle and Sunderland and provided home to a substantial number of native wildfowl, as well as being a temporary reserve for migratory birds (which arrive anytime from September through to January). It was also home to a collection of captive wildfowl kept for conservation/breeding and education purposes, including endangered species.

Following a thorough epidemiological investigation at the site the extent of the infected premises was limited to a series of linked enclosures where the captive birds had contact either by direct mixing, by beak to beak contact through a wire mesh barrier or indirect contact via the flow of water through the series of enclosures.

The extent of the reserve is shown in Figure 1 and the assessed infected premises (IP) is detailed in Figure 2.

Species and number of each present

There were 121 species of captive birds on this site prior to the report case with a total of 1886 birds present. The breakdown of species is given in Annex 1.

Besides the captive birds in the collection there were various wild birds that regularly used the site.

Description of the housing

The designated IP was a series of six outdoor enclosures, that were either downstream from the infected enclosure or connected by direct or indirect beak to beak contact with birds present in enclosure 3 where the H5N1 HPAI infected birds were identified.

These pens were as follows:

Upstream Enclosures:

Enclosure 1: Contained 10 Rosy-bills and 8 White-faced Whistling Ducks. No possibility of beak to beak contact with the infected enclosure (3) but could have had beak to beak contact with the enclosure 2 when they were out.

Enclosure 2: Contained 2 Screamers which were kept housed most of the time but let out when the weather was good. There was potential for beak to beak contact with ducks in the infected enclosure (3) when not housed. A second fence was put up when disease was suspected, so beak to beak contact was no longer possible after 09/11/21.

Affected enclosure:

Enclosure 3: a single group of 29 ducks from different species: (North American Wood Duck, Paradise Shelduck, Spectacle Duck, Southern Black-Bellied Whistling Duck and Philippine Duck), kept in an open pen surrounded by a single fence.

Downstream enclosures:

Enclosure 4: 61 Chilean flamingos that were normally present in this enclosure had been permanently housed since 01/11/21 in a high biosecurity building and did not share a water supply with the affected enclosure 3 birds. As a result, they were specifically excluded from the designated IP however, there were some ducks in the outside part of the enclosure (11 Baer's Pochards and 2 Paradise Shelducks) that would have received water from the infected pen and could also have had direct beak to beak contact with the infected birds.

Enclosure 5: Empty enclosure.

Enclosure 6: Two Andean Geese, no possibility of beak-to-beak contacts with ducks in the affected enclosure but located downstream.

The captive birds in these enclosures were all pinioned and could not escape from their enclosures.

Plan of the infected premises

Figure 164: Plan of the affected premises

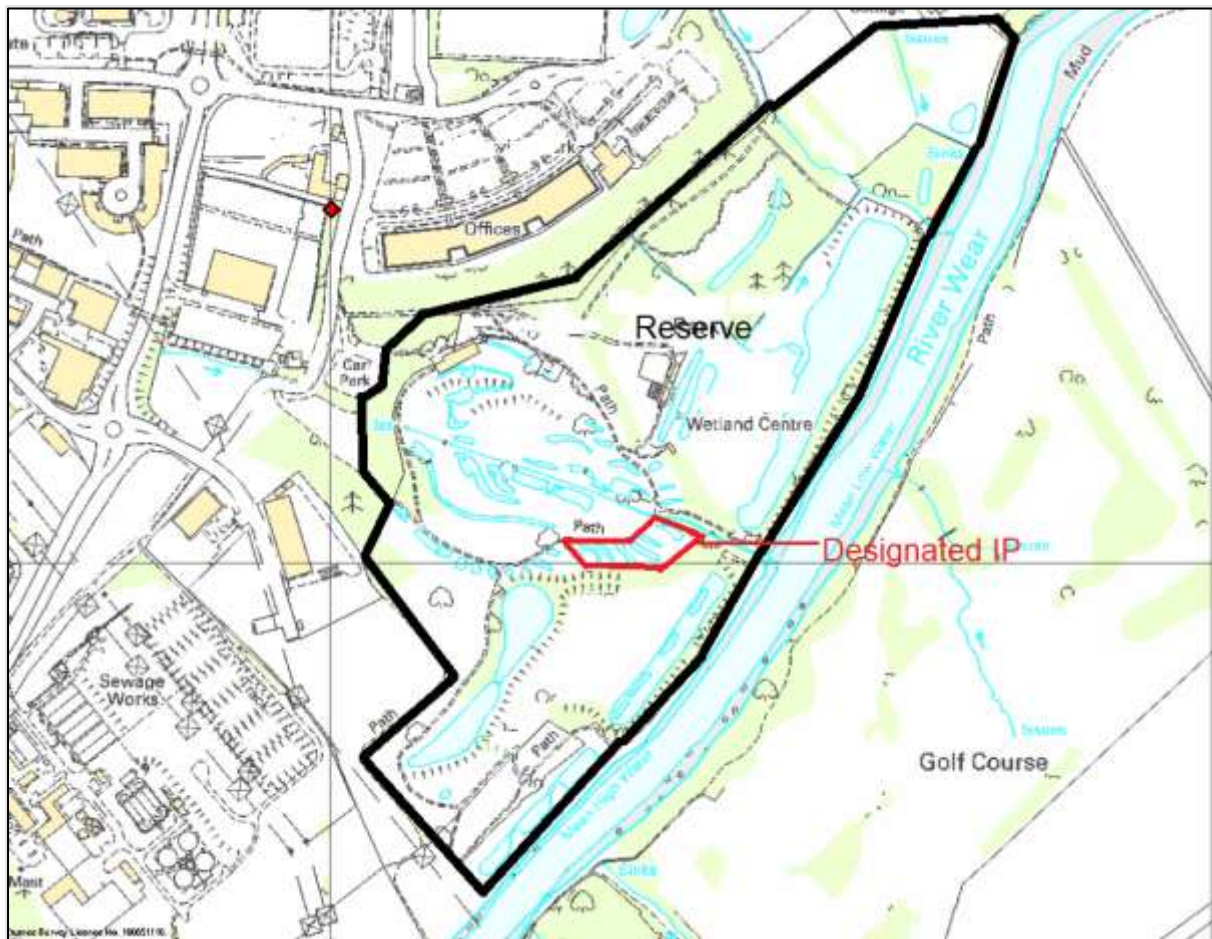
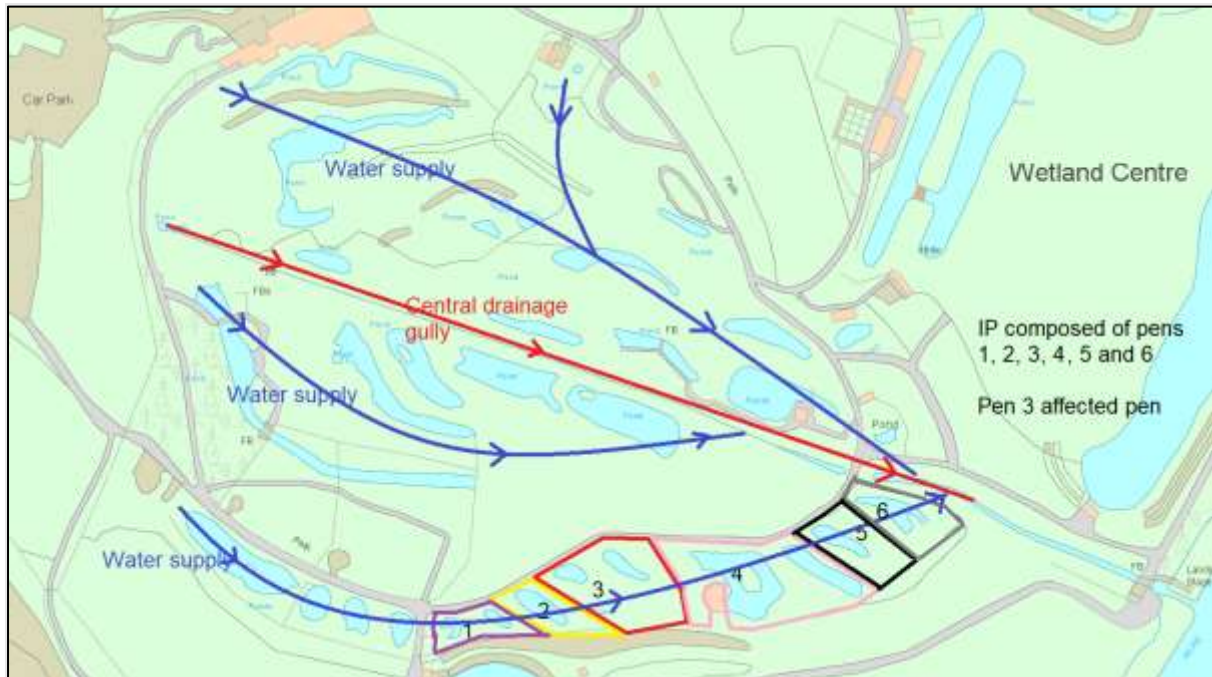


Figure 165: Plan of designated infected premises (AIV 2021/50) showing location of enclosures plus details of water supply and drainage



Overview of biosecurity

Given the nature of this premises with open enclosures, preventing the incursion of wild birds was difficult. Indeed, the wider site was in an area where wild birds were expected to congregate. Feeding practices were managed to try and limit wild bird contact.

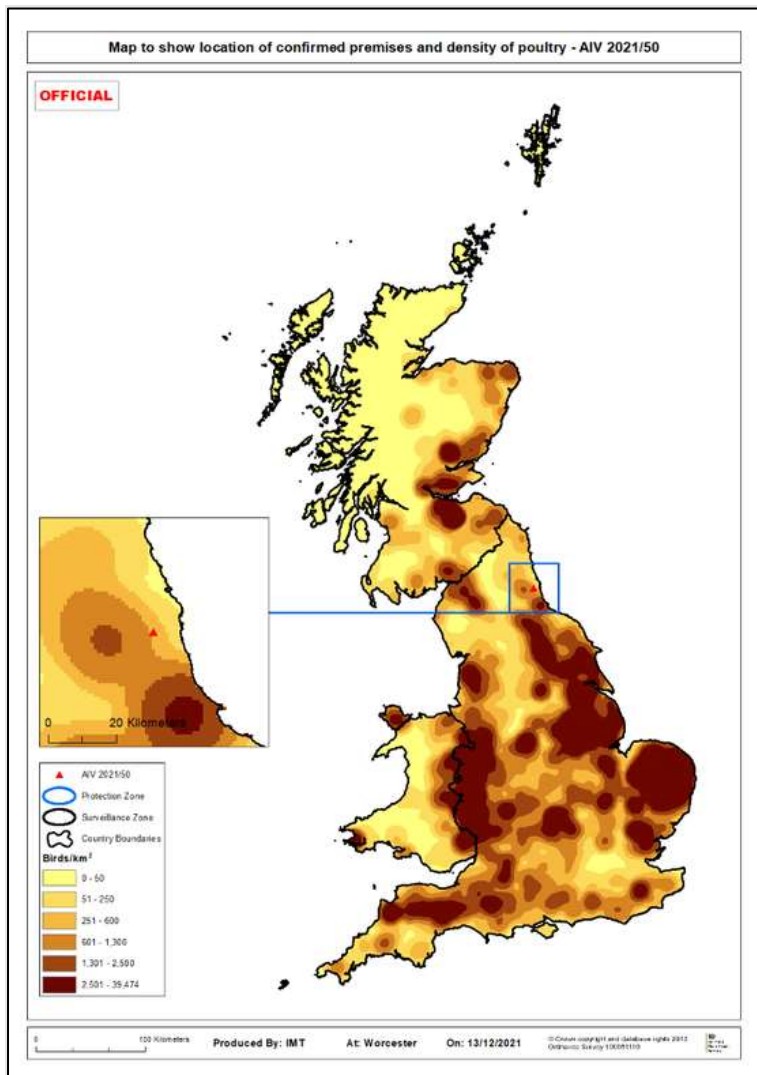
Biosecurity was aimed at preventing the onward spread (either direct or indirect) from an infected enclosure to any other enclosure. This was achieved by:

1. limiting the staff that worked with and handled the birds,
2. reducing the need to enter the enclosures such as by feeding from the walkway,
3. robust biosecurity processes to enter and leave the enclosures by the use of dedicated PPE and
4. appropriate cleansing and disinfection procedures.

Contact between the captive birds and the visiting public was prevented as the birds were pinioned and unable to leave their enclosures. Some birds (flamingos) were fully housed as soon as the likelihood of avian influenza incursion increased.

Map with location in Great Britain and poultry density

Figure 166: Location of IP and poultry density



Overview of the surrounding area

The reserve was situated close to the North Sea coast in a mainly urban setting sandwiched between the town of Washington, the River Wear and Sunderland. Small areas of agriculture and recreational land were interspersed between the urban areas and provided a potential habitat for birds.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: At the time of year of the disease incursion various species were seen around the centre. Approximately 600 Curlews, 100 Red Shank, 100-120 gulls of various species, 10-12 ducks, 3-4 Mute Swans were seen using the wider reserve.

Avian Influenza had previously been confirmed in two wild Black Headed Gulls found dead in the reserve on the 29th and 30th of November 2021.

Clinical picture

09/12/2021 – Suspicion of Avian Influenza was reported to APHA when a batch of five duck carcasses from the reserve collection were examined at the veterinary facilities of the organisation. These ducks were part of a single group of 29 ducks from different species: (North American Wood Duck, Paradise Shelduck, Spectacle Duck, Southern Black-Bellied Whistling Duck and Philippine Duck), kept in an open enclosure (number 3) surrounded by a single fence.

A certain level of mortality was expected at the centre during the winter, particularly following a spell of bad weather. Routine practice was to freeze the carcasses and then transport them for post-mortem examination PME at the earliest opportunity. Avian Influenza was not suspected by the keepers prior to PME.

Lesions suggestive of avian influenza were seen in four of the five carcasses, including pulmonary haemorrhages, pancreatic necrosis, congested liver and myocardial petechia. Clinical signs reported included mild neurological signs such as head tremors, inability to walk and vision impairment.

The first death of one of the ducks with lesions suggestive of avian influenza was on 01/12/2021.

On 10/12/2021 an APHA investigation was carried out and 23 ducks were reported as being present in the affected pen. Three additional ducks died following sampling so that by the 11/12/2021 there were 20 birds present.

All the ducks in the affected pen were culled while the birds in the remaining pens in the designated IP were spared from culling on the basis of their conservation value, clinically inspected and sampled on two occasions 21 days apart with negative results.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/11/2021 to 30/11/2021
Likely:	17/11/2021 to 27/11/2021
Precautionary:	N.B. Starts after likely source tracing window due to delayed reporting.

Spread tracings window:

High-risk:	29/11/2021 to 10/12/2021
Likely:	18/11/2021 to 28/11/2021
Precautionary:	Starts after likely spread tracing window due to delayed reporting.

Most likely date of infection: 28/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 167: Source and spread timeline for AIV 2021/50

Source Tracing Window	Spread Tracing Window	Date	
Day 14		17/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/11/21	Start of likely spread tracing window (source tracing window +24h). Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 12	Day 2	19/11/21	Start of precautionary spread tracing window (source + 24h).
Day 11	Day 3	20/11/21	
Day 10	Day 4	21/11/21	
Day 9	Day 5	22/11/21	
Day 8	Day 6	23/11/21	
Day 7	Day 7	24/11/21	
Day 6	Day 8	25/11/21	
Day 5	Day 9	26/11/21	
Day 4	Day 10	27/11/21	
Day 3	Day 11	28/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/11/21	
	Day 14	01/12/21	Precautionary onset of clinical signs. Initial captive duck carcase collected and frozen prior to PME at remote veterinary facility.
	Day 15	02/12/21	
	Day 16	03/12/21	
	Day 17	04/12/21	
	Day 18	05/12/21	
	Day 19	06/12/21	
	Day 20	07/12/21	
	Day 21	08/12/21	
	Day 22	09/12/21	PME of 5 carcasses collected at Wild Bird Reserve from 01/12/2021 to 09/11/2021. Notification of suspicion of disease to APHA. Restrictions served. (DPR 2021/110)
	Day 23	10/12/21	APHA investigation and sampling. Restrictions served in writing.
	Day 24	11/12/21	Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-50.
	Day 25	12/12/21	VFEI investigation carried out. Rare and endangered species identified. VRA regards extent of the defined infected premises
	Day 26	13/12/21	
	Day 27	14/12/21	
	Day 28	15/12/21	
	Day 29	16/12/21	
	Day 30	17/12/21	
	Day 31	18/12/21	Cull started and completed. Preliminary C and D completed
	Day 32	19/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

CBMCZ (0-3 km)

28 premises with poultry holding between 1-142 birds (4 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were initiated for a movement of carcasses for post-mortem examination and a visitor. Biosecurity and disposal procedures for the carcasses were

verified and investigations for the visitor required no further action. Both tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There had been no movements on of captive birds or feed during the likely and high-risk source windows.

Direct and indirect contact with wild birds was assessed as being high likelihood with low uncertainty as two dead wild gulls found on the reserve on 29/11/2021 and 30/11/2021 were found to have been infected with HPAI H5N1. The captive bird enclosures were not netted allowing direct and indirect contact between wild birds and the captive collection.

Indirect contact with domestic/captive birds was assessed as very low likelihood with medium uncertainty as one member of staff had two call ducks at home that were pre-emptively euthanised prior to APHA being able to carry out a tracing investigation. No clinical signs had been noted by the owner.

Spread investigations: Assessment of potential and likelihood of spread

The only birds moved off the site were carcasses that were transported to the reserve's veterinary facility for PME. The biosecurity practiced allowed an assessment of disease spread by this route to be considered to be very low risk.

The likelihood of transmission of disease from the IP via wildlife was considered as not higher than the background risk.

All other spread pathways were assessed as being very low risk.

Remaining uncertainty

The infection status of the call ducks kept at home could not be assessed as they were culled before the tracing investigation.

Annex 1: Species on the affected premises AIV 2021/50

Number	Common Name	Taxonomic name	TOTAL			Total	IUCN Status
			M	F	U		
1	Southern screamer	<i>Chauna torquata</i>	5	3	0	8	LC
2	Black-billed whistling duck	<i>Dendrocygna arborea</i>	1	2	3	6	NT
4	Black-bellied whistling duck	<i>Dendrocygna autumnalis</i>	1	1	0	2	LC
5	Plumed whistling duck	<i>Dendrocygna eytoni</i>	5	6	0	11	LC
6	Spotted whistling duck	<i>Dendrocygna guttata</i>	9	3	1	13	LC
7	Lesser/Indian whistling duck	<i>Dendrocygna javanica</i>	1	1	8	10	LC
8	White-faced whistling duck	<i>Dendrocygna viduata</i>	12	6	0	18	LC
9	African white-backed duck	<i>Thalassornis leuconotus</i>	3	5	0	8	LC
10	HYBRID	<i>Anser</i>	1	0	7	8	-
11	White-fronted goose	<i>Anser albifrons</i>	8	8	0	16	LC
12	Greenland white-fronted goose	<i>Anser albifrons flavirostris</i>	11	10	0	21	LC
13	Pink-footed goose	<i>Anser brachyrhynchus</i>	2	2	0	4	LC
14	Lesser snow goose	<i>Anser caerulescens</i>	5	9	0	14	LC
15	Emperor goose	<i>Anser canagicus</i>	6	4	9	19	NT
16	Lesser white-fronted goose	<i>Anser erythropus</i>	11	6	0	17	VU
17	Bean goose	<i>Anser fabalis</i>	3	4	0	7	LC
18	Bar-headed goose	<i>Anser indicus</i>	0	1	0	1	LC
19	Atlantic brant goose	<i>Branta bernicla hrota</i>	2	2	0	4	LC
20	Black brant	<i>Branta nigricans orientalis</i>	7	3	0	10	LC
21	Red-breasted goose	<i>Branta ruficollis</i>	6	14	3	23	VU
22	Ne-ne	<i>Branta sandvicensis</i>	19	22	0	41	VU
23	Richardson's cackling goose	<i>Branta hutchinsii</i>	3	4	0	7	LC
24	Cereopsis goose	<i>Cereopsis novaehollandiae</i>	1	0	0	1	LC
25	Coscoroba swan	<i>Coscoroba</i>	0	2	0	2	LC
26	Bewick's swan	<i>Cygnus columbianus bewickii</i>	2	2	10	14	LC
27	Black-necked swan	<i>Cygnus melanocoryphus</i>	2	2	0	4	LC
28	Freckled duck	<i>Stictonetta naevosa</i>	16	16	0	32	LC
29	Mandarin duck	<i>Aix galericulata</i>	7	2	0	9	LC
30	Hybrid	<i>Anas</i> HYBRID	1	0	0	1	-

Number	Common Name	Taxonomic name	TOTAL			Total	IUCN Status
			M	F	U		
31	Northern pintail	Anas acuta	13	3	0	16	LC
32	Cape teal	Anas capensis	0	0	22	22	LC
33	Chestnut teal	Anas castanea	1	0	0	1	LC
34	Red-billed pintail	Anas erythrorhyncha	0	2	9	11	LC
35	South Georgian pintail	Anas georgica	5	0	0	5	LC
36	Brown pintail	Anas georgica spinicauda	0	0	2	2	LC
37	Aylesbury Duck	Anas platyrhynchos domestic *	2	0	0	2	-
38	Rouen force duck	Anas platyrhynchos domestic rouen_force	0	2	0	2	-
39	Call duck	Anas platyrhynchos domestic call	5	2	0	7	-
40	Indian runner duck	Anas platyrhynchos domestic indian_runner *	3	0	0	3	-
41	Khaki campbell duck	Anas platyrhynchos domestic khaki_campbell	0	1	0	1	-
42	American black duck	Anas rubripes	4	0	0	4	LC
43	South African black duck	Anas sparsa	4	5	0	9	LC
44	Pacific black duck	Anas superciliosa	0	0	8	8	LC
45	South African yellow-billed duck	Anas undulata	0	0	6	6	LC
46	Laysan duck	Anas laysanensis	1	7	0	8	CR
47	Hawaiian duck	Anas wyvilliana	8	4	0	12	EN
48	Chinese spot-billed duck	Anas zonorhyncha	4	4	0	8	LC
49	Lesser scaup	Aythya affinis	5	7	0	12	LC
50	Redhead	Aythya americana	14	16	0	30	LC
51	Australian white-eye	Aythya australis	9	9	0	18	LC
52	Baer's pochard	Aythya baeri	31	19	0	50	CR
53	Ring-necked duck	Aythya collaris	11	15	0	26	LC
54	Tufted duck	Aythya fuligula	1	0	0	1	LC
55	European greater scaup	Aythya marila	17	17	0	34	LC
56	Ferruginous duck	Aythya nyroca	7	6	0	13	NT
57	Canvasback	Aythya valisineria	10	8	1	19	LC
58	Bufflehead	Bucephala albeola	12	12	0	24	LC
59	European common goldeneye	Bucephala clangula	26	32	0	58	LC
60	Barrow's goldeneye	Bucephala islandica	1	3	0	4	LC

Number	Common Name	Taxonomic name	TOTAL			Total	IUCN Status
			M	F	U		
61	Ringed teal	Callonetta leucophrys	9	14	0	23	LC
62	Australian wood duck	Chenonetta jubata	7	1	0	8	LC
63	Andean goose	Chloephaga melanoptera	1	1	0	2	LC
64	Greater magellan goose	Chloephaga picta leucoptera	1	1	0	2	LC
65	Ashy-headed goose	Chloephaga poliocephala	1	2	0	3	LC
66	Ruddy-headed goose	Chloephaga rubidiceps	2	1	0	3	LC
67	Blue-winged goose	Cyanochen cyanoptera	1	1	0	2	VU
68	Black-headed duck	Heteronetta atricapilla	17	13	0	30	LC
69	Marbled teal	Marmaronetta angustirostris	1	0	9	10	VU
70	Red-breasted merganser	Mergus serrator	1	1	0	2	LC
71	Orinoco goose	Neochen jubata	4	2	0	6	LC
72	African pochard	Netta erythrophthalma brunnea	2	2	0	4	LC
73	Rosybill	Netta peposaca	12	4	0	16	LC
74	Red-crested pochard	Netta rufina	1	5	0	6	LC
75	White-headed duck	Oxyura leucocephala	8	2	5	15	EN
76	Maccoa duck	Oxyura maccoa *	9	10	0	19	VU
77	Argentine ruddy duck	Oxyura vittata	8	5	4	17	LC
78	African comb duck	Sarkidiornis melanotos	4	4	0	8	LC
79	American Comb duck	Sarkidiornis sylvicola	1	6	0	7	LC
80	European eider	Somateria mollissima	17	9	0	26	LC
81	South African shelduck	Tadorna cana	1	2	0	3	LC
82	Ruddy shelduck	Tadorna ferruginea	1	1	0	2	LC
83	Common shelduck	Tadorna	1	1	0	2	LC
84	Australian shelduck	Tadorna tadornoides	1	2	0	3	LC
85	American wigeon	Anas americana	4	3	0	7	LC
86	Falcated duck	Mareca falcata	4	1	0	5	NT
87	Eurasian wigeon	Mareca penelope	5	1	0	6	LC
88	Chiloe wigeon	Mareca sibilatrix	1	0	34	35	LC
89	Gadwall	Mareca strepera	2	2	0	4	LC
90	Shoveler hybrid	Spatula	0	2	0	2	-
91	Northern shoveler	Spatula clypeata	5	1	0	6	LC
92	Red shoveler	Spatula platalea	7	6	0	13	LC
93	Garganey	Spatula querquedula	3	3	0	6	LC
94	New Zealand shoveler	Spatula rhynchotis variegata	8	10	0	18	LC

Number	Common Name	Taxonomic name	TOTAL			Total	IUCN Status
			M	F	U		
95	Puna teal	<i>Spatula puna</i>	5	3	0	8	LC
96	Spectacled duck	<i>Speculanas specularis</i>	1	1	0	2	LC
97	Baikal teal	<i>Sibirionetta formosa</i>	3	1	0	4	LC
98	Crested duck	<i>Lophonetta specularioides</i>	3	3	0	6	LC
99	White-winged duck	<i>Asarcornis scutulata</i>	5	6	0	11	EN
100	Radjah shelduck	<i>Radjah</i>	2	0	0	2	LC
101	Hooded merganser	<i>Lophodytes cucullatus</i>	8	11	0	19	LC
102	Smew	<i>Mergellus albellus</i>	12	7	0	19	LC
103	Magpie goose	<i>Anseranas semipalmata</i>	3	11	0	14	LC
104	Lesser flamingo	<i>Phoeniconaias minor</i>	20	17	0	37	NT
105	Andean flamingo	<i>Phoenicoparrus andinus</i>	7	13	0	20	VU
106	James' flamingo	<i>Phoenicoparrus jamesi</i>	1	0	0	1	NT
107	Chilean flamingo	<i>Phoenicopterus chilensis</i>	46	50	28	124	NT
108	Greater flamingo	<i>Phoenicopterus roseus</i>	43	58	166	267	LC
109	Caribbean Flamingo	<i>Phoenicopterus ruber</i>	55	49	70	174	LC
110	Grey crowned-crane	<i>Balearica regulorum</i>	0	1	0	1	EN
111	Common crane	<i>Grus</i>	0	0	2	2	LC
112	Little egret	<i>Egretta garzetta</i>	1	0	0	1	LC
113	Pink-backed pelican	<i>Pelecanus rufescens</i>	1	1	0	2	LC
114	Eurasian oystercatcher	<i>Haematopus ostralegus</i>	2	3	0	5	NT
115	Pied avocet	<i>Recurvirostra avosetta</i>	4	4	24	32	LC
116	Ringed plover	<i>Charadrius hiaticula</i>	0	2	0	2	LC
117	Black-tailed godwit	<i>Limosa</i>	6	8	0	14	NT
118	Redshank	<i>Tringa totanus</i>	12	14	0	26	LC
119	Spoon-billed sandpiper	<i>Calidris pygmaea</i>	5	3	0	8	CR
120	Ruff	<i>Calidris pugnax</i>	6	5	0	11	LC
121	Bearded reedling	<i>Panurus biarmicus</i> *	5	1	0	6	LC
TOTAL			750	705	431	1886	

AIV 2021/51, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a commercial laying hen and rearing unit and was part of a large integrated poultry company.

A further seven premises associated with the company subsequently became IPs:

1. AIV 2021/53*
2. AIV 2021/54
3. AIV 2021/57
4. AIV 2021/62
5. AIV 2021/64
6. AIV 2021/65
7. AIV 2021/66*

**AIV 2021/53 & AIV 2021/66 were linked to the company by feed deliveries and egg collections but were otherwise separately managed and did not share staff with the company.*

There were an additional eleven poultry premises within the company structure that did not become IPs (breeding, laying and/or rearing sites).

A main egg packing centre receiving eggs from most of the company sites (and many other independent producers) was located approximately 11 km away.

A second egg packing centre was present adjacent to AIV 2022/62 and packaged eggs from that site.

The IP was one of the main sites for the company and contained several poultry sheds, the administrative office, stores, staff facilities including a canteen and clocking in point for staff working on both the IP and other surrounding sites. There was also a retail site for eggs being sold to the public, a tray washing facility and two private dwelling houses (see Figure 168).

The tray wash facility received dirty plastic egg trays, cassettes and pallets from the first egg packing centre mentioned above and consigned clean trays back out to company farms and other producers supplying eggs to the packing centre.

Staff were generally assigned to particular sheds but cover was provided by “floating” or agency staff when required (such as agency staff were used in the enriched colony units from 01/12/2021 after four staff had left the company’s employment).

Some staff and maintenance staff would work across different company premises in the local area. Different staff worked in the egg packing house and the egg tray wash facility.

Species and number of each present

Approximately 400,000 free-range organic laying and rearing and caged laying hens were distributed between several houses around the site.

Description of the housing

The premises was a complex site comprising different enterprises using colony cage, flat deck barn and single and multi-tier systems.

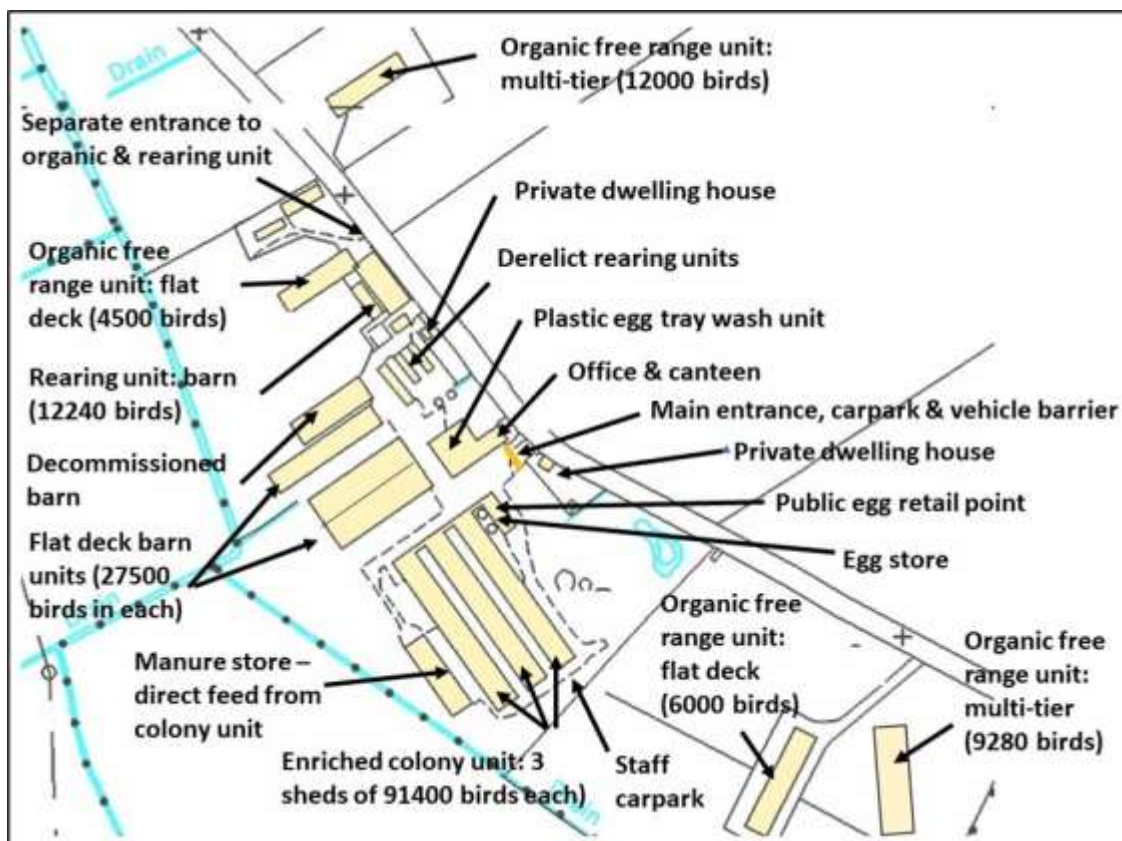
Enriched colony unit containing affected caged layers. There were three multi-tier units (1-3) within the same building and adjacent to each other. Each contained around 91000 birds.

Organic laying sheds. There were four single-tier units all separate and scattered across the site. They contained between 4000 – 12000 birds each.

Plan of the infected premises

Barns: There were four single-tier units also scattered across the site. They contained between 10000 – 27000 birds.

Figure 168: Plan of the infected premises AIV 2021/51



Overview of biosecurity

Overall, biosecurity on this site was not considered to be effective in several areas.

The main central area of the IP had concreted areas accessed via a vehicle barrier for which drivers had the code. Those without the code needed to request access from the office. There was a disinfectant foot dip at the side of the barrier and a sprayer for vehicles but pedestrians/members of the public had free access to the site via gaps at the sides of the barrier. This included the area near to the colony unit, to buy eggs from the retail point. There was no foot dip here.

For the other gates on the main area of the site and those that led to the outlying rearing and organic units, there were hand pump sprays of disinfectant to disinfect vehicle wheels. However, the roads were chalk surfaced and very muddy except at the main gate and this would have reduced the effectiveness of wheel disinfection.

Drivers delivering feed, egg trays and collecting eggs or carcasses were not supervised.

Personnel working on other nearby sites parked outside the barrier, walked in to clock in at the machine in the canteen where lockers and showers were also available

Visitor books were not used.

The required biosecurity practices were documented and included staff being required to disinfect their outdoor footwear and either put on over boots or change boots and put on disposable overalls on entering all individual poultry areas. Boots and overalls were required to be changed if moving to a different shed.

However, there was evidence that protocols were not being fully adhered to.

All units had a double hygiene barrier system, but it was seen that these were not being effectively used. Staff working on the site were seen to not change boots or overalls when moving around the site and visibly contaminated boots were present in the staff canteen.

Staff working on other sites accessed the canteen to clock in for their shift and there would be cross over between this foot traffic and workers coming from sheds including the affected enriched colony units. This would have led to the potential for cross-contamination and onward transmission of infection to other farms.

Contaminated equipment modules and crates previously used to deliver hens to farms from the rearing units were seen on site.

Documentation including visitor logs and frequency of foot dip replenishment was not immediately available.

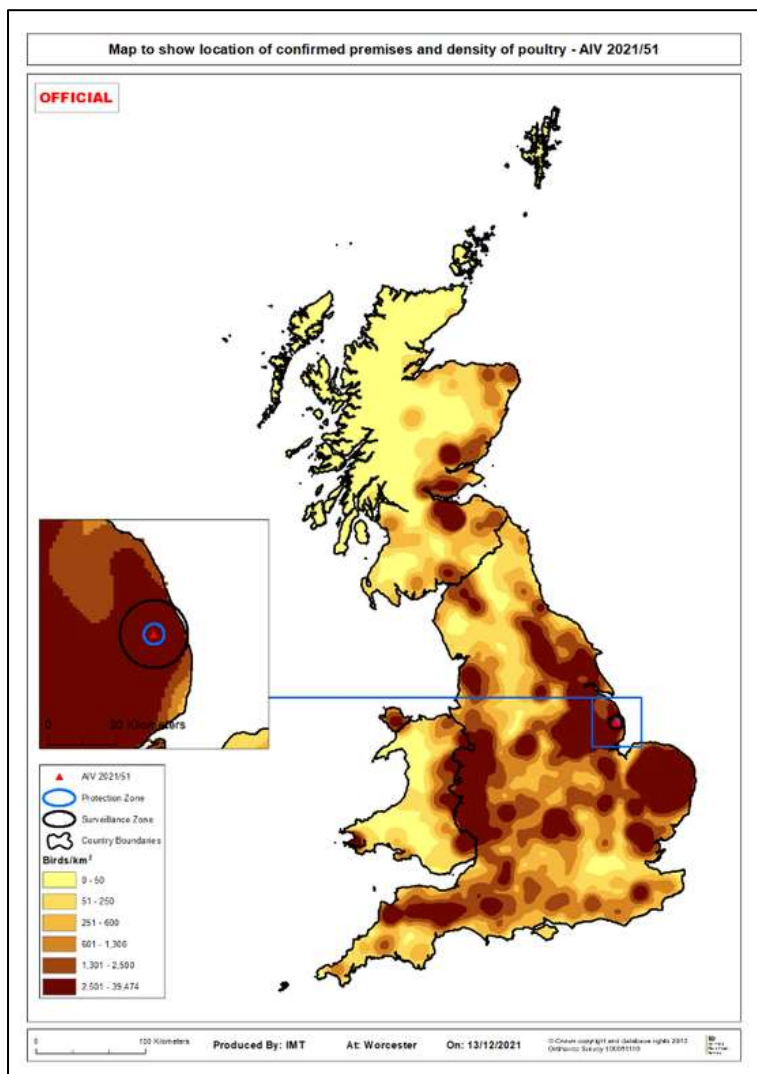
Covers on the manure belts taking waste from the colony units to the adjacent muck shed were missing or removed in several places and the area under the belt transferring the manure to the manure store was grossly contaminated with muck around two feet deep in places.

Vermin control was undertaken in house. However, there was broken equipment, old cars and other debris lying in various areas on the site potentially providing a habitat/cover for vermin. Rats (live and dead) were seen during the APHA epidemiological investigation visit and there was contamination with cat faeces in several places adjacent to colony sheds

Potential access for vermin and wild birds appeared possible in several areas (such as missing manure belt covers).

Map with location in Great Britain and poultry density

Figure 169: Location of IP and poultry density



Overview of the surrounding area

The IP was in a high poultry density area. AIV 2021/53 was located approximately 750 metres to the north of the IP and AIV 2021/64 was approximately 1800 metres to the southeast.

There was a flooded quarry, now used for recreational angling, approximately 1500 metres to the southeast of the IP.

There were several water-filled ditches in the vicinity.

Ornithological assessment:

Desktop assessment: Wildfowl were likely to have been abundant and provide significant sources of infection. Bridge species were considered likely to be abundant and presented the most likely potential infection pathway onto the site. As well as producing significant infection pressure at free-range sites these wild birds may have produced infection pressure for housed production systems too.

Waders and other water birds were likely to be abundant. Though not considered to contribute to sources of infection here, some may have exploited the ranges of the IPs and enabled indirect infection pathways by contaminating surfaces.

Local intelligence: No wild birds were seen at the time of the APHA visit but there had been reports of wild ducks and geese roosting in nearby fields to the east of the farm. This was described as unusual at the time of year.

Pigeons had occasionally been seen in the poultry sheds but nothing unusual had been reported recently.

Clinical picture

08/12/2021 – a significant increase in mortality was first noticed in colony unit 3 (birds aged 21-23 weeks old) with over 7,500 birds dead. Lethargy was the only other observed clinical sign.

09/12/2021 – The private veterinary surgeon visited the farm on and carried out post-mortem examinations with unremarkable findings. Suspicion of notifiable avian disease was reported.

10/12/2021 – at the APHA investigation, it was noted that 20% of the birds on unit 2 were lethargic and depressed in general and not vocalising. Multiple deaths were observed inside the cages, but no other clinical signs were seen. On unit 3, 100% of the birds were depressed, hunched and not vocalising. Most cages contained 2-3 dead birds out of 10-12 in each cage. Birds examined had fluid in trachea and nares, cyanotic hocks, gasping, swollen eyes, cyanotic wattle and comb, and diarrhoea.

Samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk: 02/12/2021 to 04/12/2021
 Likely: 21/11/2021 to 01/12/2021
 Precautionary: 18/11/2021 to 20/11/2021

Spread tracings window:

High-risk: 03/12/2021 to 10/12/2021
 Likely: 22/11/2021 to 02/12/2021
 Precautionary: 19/11/2021 to 21/11/2021

Most likely date of infection: 02/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 170: Source and spread timeline for AIV 2021/51

Source Tracing Window	Spread Tracing Window	Date	
Day 17		18/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		19/11/21	Start of precautionary spread tracing window (source + 24h).
Day 15		20/11/21	
Day 14		21/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	22/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	23/11/21	
Day 11	Day 3	24/11/21	
Day 10	Day 4	25/11/21	
Day 9	Day 5	26/11/21	
Day 8	Day 6	27/11/21	
Day 7	Day 7	28/11/21	
Day 6	Day 8	29/11/21	
Day 5	Day 9	30/11/21	
Day 4	Day 10	01/12/21	
Day 3	Day 11	02/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	03/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	04/12/21	
	Day 14	05/12/21	Precautionary onset of clinical signs based on production records.
	Day 15	06/12/21	
	Day 16	07/12/21	
	Day 17	08/12/21	
	Day 18	09/12/21	Notification of suspicion of disease to APHA. Verbal restrictions served.
	Day 19	10/12/21	APHA investigation and sampling (DPR 2021/112). Restrictions served.
	Day 20	11/12/21	HPAI H5N1 confirmed (AIV 2021/51).
	Day 21	12/12/21	
	Day 22	13/12/21	
	Day 23	14/12/21	Culling commenced.
	Day 24	15/12/21	
	Day 25	16/12/21	Culling completed.
	Day 26	17/12/21	
	Day 61	21/01/22	
	Day 62	22/01/22	Preliminary C&D completed.
	Day 63	23/01/22	Preliminary C&D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

33 premises with poultry holding between 3-393,000 birds (8 premises with 50 or more birds)

SZ (3-10 km)

128 premises with poultry holding between 1-215,500 birds (19 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were instructed for movements of eggs, egg trays from an egg tray washing facility, farm workers, other company staff and maintenance personnel, vehicles, feed, ABP, and general waste. All traced premises linked within the immediate company network had already been placed under restrictions due to concurrent infection or established commercial links. Where a premises became an IP, tracing activities were superseded. The other premises remained under restrictions until, following a veterinary visit, the risk was assessed as very low.

A heap of manure that was moved off the IP was traced and assessed as being very low risk.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds.

Assessment and evidence base for the likely source

The ornithological assessment identified wild birds (especially bridging species) as a likely source of infection pressure.

Ducks and geese/other waterfowl had been observed roosting in nearby fields in the area recently.

The nearby quarry and several water-filled ditches would have attracted wild birds and there was potential for ingress of wild bird droppings via unmeshed roof vents and missing manure belt covers.

Areas of accumulated debris around the site would have provided cover for rodents, which had been seen on the site.

Biosecurity measures across the site generally were assessed as likely to lack effectiveness and could have allowed infection to be walked into the fully housed birds in the colony units where disease was first seen.

Spread investigations: Assessment of potential and likelihood of spread

The likelihood of direct spread to other poultry premises was assessed as low as there had reportedly been no movements of live birds from the site during the high-risk spread window.

The likelihood of spread via indirect contact with the IP was assessed as being high with medium uncertainty as a result of multiple contacts with other sites (via staff movements, egg, ABP and manure collections, delivery of washed egg trays, feed deliveries etc.) and initial issues with timely provision of accurate records to allow rapid tracing of contacts, with the fact that several linked premises subsequently became IPs within a short timescale.

Onward transmission through wildlife: Risk likely not higher than the background risk.

Remaining uncertainty

The precise incursion pathway introducing infection onto this site remains uncertain.

Also, whether subsequent IPs were the result of onward transmission from this IP (via staff movements, egg, ABP and manure collections, delivery of washed egg trays, feed deliveries etc.) or were the result of independent incursions from infected wild birds is uncertain.

AIV 2021/52, Near Willington, South Derbyshire, Derbyshire, England

Description of the premises

Overview of the premises and the wider business

This was a non-commercial small holding with 109 mixed species birds. Eggs were used for home consumption only. There were no movements on and off the site except by the owner to feed and water the poultry. The owner's house was approximately four miles away.

Species and number of each present

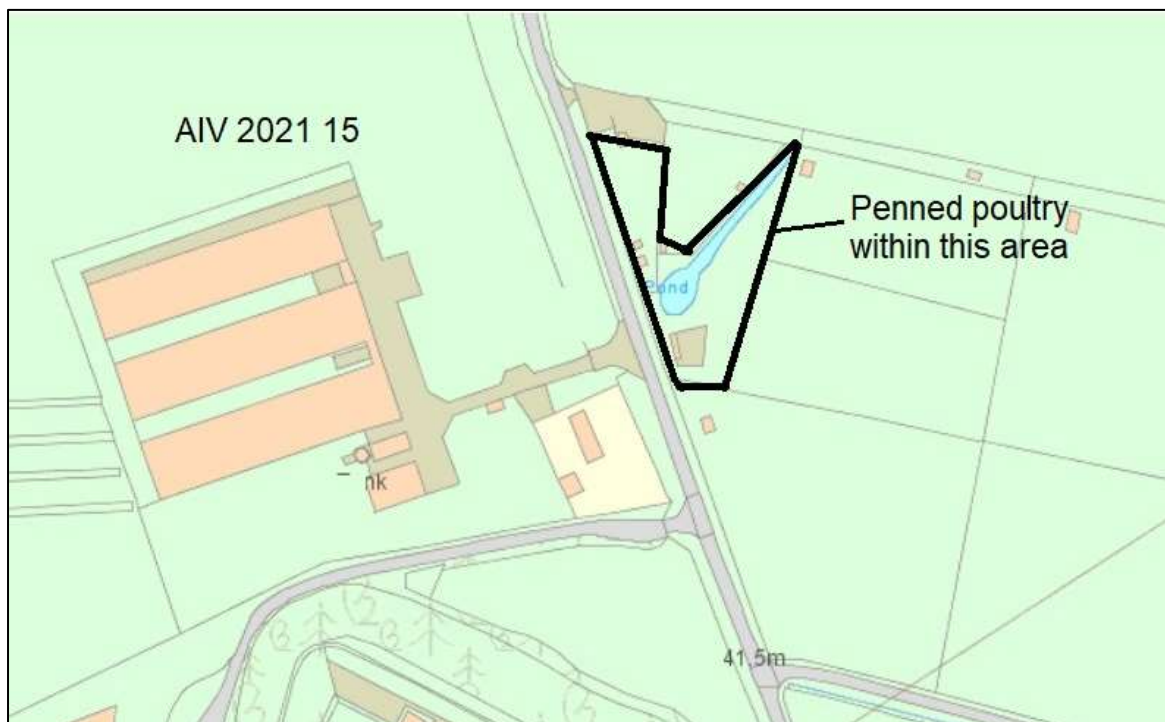
56 chickens, two quail, 30 geese and 21 ducks

Description of the housing

The geese were kept in a wooden hut with access to a wired run covered with netting. The ducks were housed in two wired, enclosures, both covered with netting, one of which additionally had a tarpaulin cover. The chickens were housed in 13 wooden and wired runs with coops. There was a nearby pond that wild birds would have access to.

Plan of the infected premises

Figure 171: Plan of AIV 2021/52

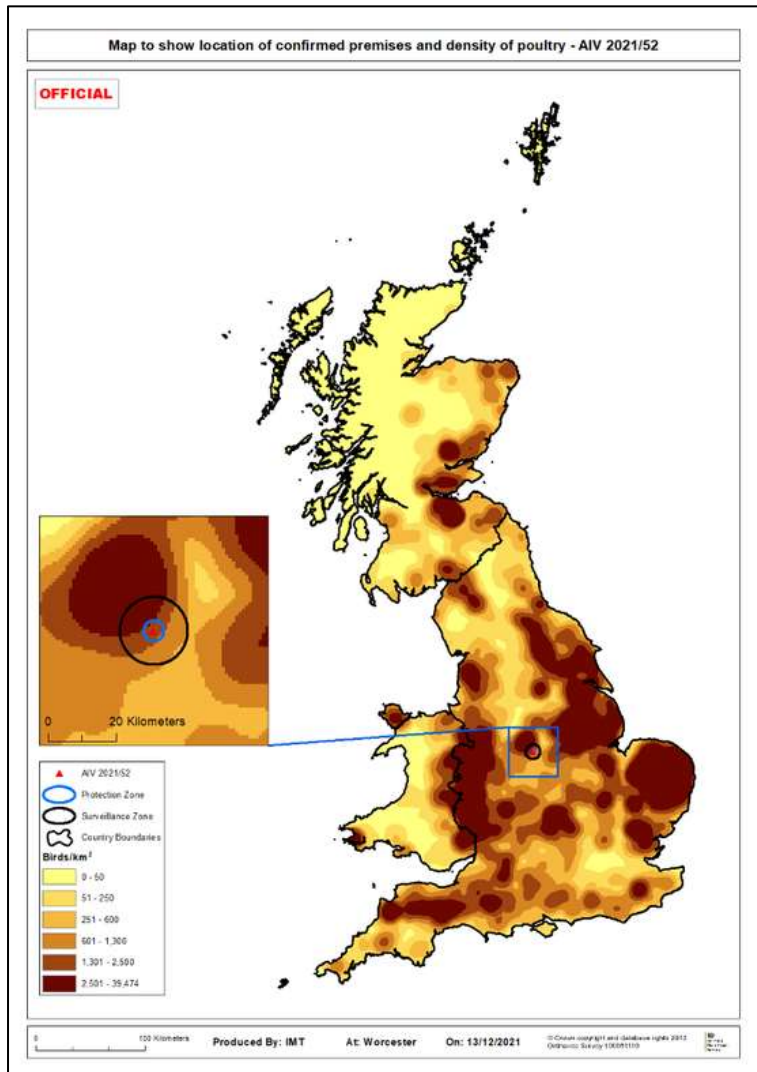


Overview of biosecurity

The level of biosecurity was low. There was a gated entrance, use of disinfectant, but the housing allowed indirect contact with wild birds.

Map with location in Great Britain and poultry density

Figure 172: Location of IP and poultry density



Overview of the surrounding area

The premises was between the river Trent and the Trent & Mersey Canal. It was an area of high poultry density area and within 100 metres of AIV 2021/15, a commercial flock of turkeys which had been culled by 22/11/2021.

Ornithological assessment:

Desktop assessment: An ornithological assessment for AIV 2021 15 indicated a likely infection pressure from wild birds.

Local intelligence: Nearby waterways attracted wildfowl and this premises was within the protection zone of AIV 2021/15.

Clinical picture

07/12/2021 – APHA protection zone surveillance visit and sampling. No deaths or clinical signs seen in any of the birds. Twenty ducks (10 from each group) sampled – all PCR negative. 30 geese sampled and results PCR positive for H5.

09/12/2021 – One goose was found dead with no prior clinical signs.

10/12/2021 – Early laboratory results indicated the need for further sampling and restrictions were served. No clinical signs were seen or reported by the owner. No change in feed or water consumption was noted.

11/12/2021 – Results of resampling of 20 geese gave positive PCR results allowing confirmation of HPAI H5N1.

Timeline

Tracings windows

Source tracings window:

High-risk:	26/11/2021 to 30/11/2021
Likely:	21/11/2021 to 25/11/2021
Precautionary:	19/11/2021 to 20/11/2021

Spread tracings window:

High-risk:	27/11/2021 to 10/12/2021
Likely:	22/11/2021 to 26/11/2021
Precautionary:	20/11/2021 to 21/11/2021

Most likely date of infection: 26/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 173: Source and spread timeline for AIV 2021/52

Source Tracing Window	Spread Tracing Window	Date	
Day 11		19/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 10		20/11/21	Start of precautionary spread tracing window (source + 24h).
Day 9		21/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 8	Day 1	22/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 7	Day 2	23/11/21	
Day 6	Day 3	24/11/21	
Day 5	Day 4	25/11/21	
Day 4	Day 5	26/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak - based on serology results from sampling on 10/12/21 and discussion with the lab: 10-14 days to demonstrate serological titres observed).
Day 3	Day 6	27/11/21	Start of high risk spread tracing window (source +24h).
Day 2	Day 7	28/11/21	
Day 1	Day 8	29/11/21	
Day 0	Day 9	30/11/21	
	Day 10	01/12/21	
	Day 11	02/12/21	
	Day 12	03/12/21	
	Day 13	04/12/21	
	Day 14	05/12/21	
	Day 15	06/12/21	
	Day 16	07/12/21	PZ surveillance sampling visit - no clinical suspicion of disease.
	Day 17	08/12/21	
	Day 18	09/12/21	1 goose died
	Day 19	10/12/21	Notification of suspicion of disease to APHA (non-negative PZ sampling PCR result). APHA investigation and follow-up sampling (DPR 2021/113). Restrictions served.
	Day 20	11/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV2021/52.
	Day 21	12/12/21	
	Day 22	13/12/21	Culling commenced.
	Day 23	14/12/21	Culling completed. Preliminary C&D completed.
	Day 24	15/12/21	Preliminary C&D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

51 premises with poultry holding between 1-78,000 birds (eight premises with 50 or more birds)

SZ (3-10 km)

287 premises with poultry holding between 1-80,000 birds (24 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds

Assessment and evidence base for the likely source

Ducks and geese did not have access to the ponds; however, whilst their enclosures were fully netted only one of the duck enclosures had an additional tarpaulin cover and as such allowed potential indirect contact with wild birds (such as faecal material or feathers falling in from above through the net covering..

Fomites or air borne spread from the nearby infected premises was considered less likely as the cull was completed on 22/11/2021 (with preliminary C&D being considered effective on 24/11/2021) This was prior to the (***precautionary*** – based on follow-up sampling of the geese) likely infection date for this IP of 26/11/2021.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2021/53, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial, free-range, chicken laying premises that also reared its own birds. All poultry had been housed since 29/11/2021.

The IP had a sister farm, also a commercial free-range laying premises, about 3 miles away and under the same ownership. It was initially restricted as a contact premises, but later confirmed as AIV 2021/66. Both IPs were part of an independent, egg producing company, under the same ownership.

Eggs from both premises were collected by a local multisite commercial laying company, within which several other concurrent clustered AI outbreaks were identified.

It operated an all-in all-out system, with day-old chicks being placed, reared in the rearing house, and later sent as pullets for production to the laying houses in the IP itself, or in the sister farm.

Species and number of each present

11,700 laying hens

11,000 rearing chickens

Description of the housing

The poultry accommodation consisted of 3 houses:

House 4 and House 5 held free-range laying hens, which had been housed since 29/11/2021. There were 9,000 hens in shed 5 and 2,700 hens in shed 4. Hens in these two groups were 26 weeks of age.

The rearing shed, which held 11,000 birds aged 6 weeks old, being reared to point of lay.

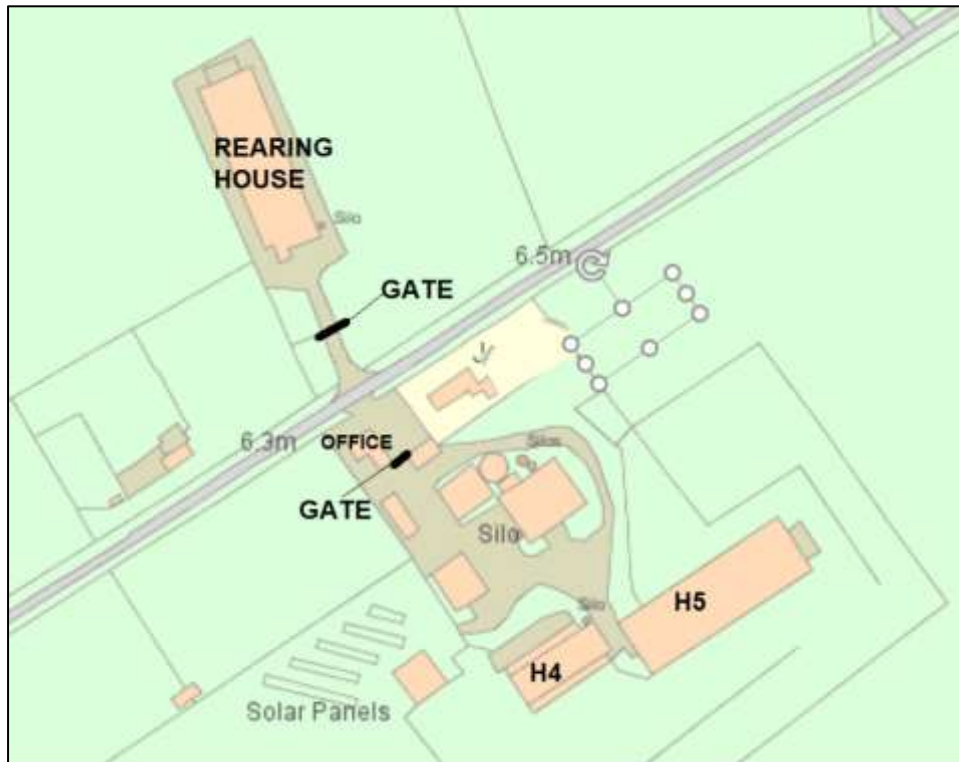
The houses were single, flat deck, wooden sheds of old construction, with natural ventilation, with nesting boxes in the middle of the laying sheds.

The buildings were reasonably well maintained, but house 5 had gaps under the access gates, which would have allowed vermin or excess rainwater to enter the

building. The rearing house had a single damaged point in the ceiling, that was likely to allow contaminated rainwater in.

Plan of the infected premises

Figure 174: Plan of AIV 2021/53



Overview of biosecurity

The IP was comprised of several buildings on both sides of the main road including:

1. A visitors' parking area concreted and unsecured.
2. An office building outside the farmyard, used for administrative purposes and with no biosecurity facilities.
3. The main farmyard had restricted access, with a locked gate and perimeter fence, which included a number of outbuildings (both for poultry and arable activities) and bird houses 4 and 5.

The rearing shed was in a second farm area across the road, which had restricted access with a locked gate and perimeter fence.

Four staff members worked in the two farms and none of them kept any other poultry/birds.

There was a brief generic biosecurity procedure, but it lacked sufficient detail to ensure effective risk mitigation. There was no clear written procedure or restrictions on the movement of personnel within the IP (or between IP and sister farm) and staff were not generally dedicated to specific farm activities. From 11/12/2021, staff were

dedicated to one of the two farms, following an outbreak of HPAI in one of the local farms.

There was a visitor book, which appeared to be up to date, but it did not record staff movements between the sister premises. Staff wore clean clothing/overalls and boots (or boot covers) on the farm. Disposable overalls were available and were supposed to be changed between going to rearing shed and the rest of IP, as well as between IP and sister farm, but it was not clear how well this was implemented.

The main farmyard was not concreted, and held puddles of rainwater. The small, concreted areas by the poultry shed showed moss/algae and were not routinely cleaned or disinfected. Wild birds were seen around the yard and in the storage areas.

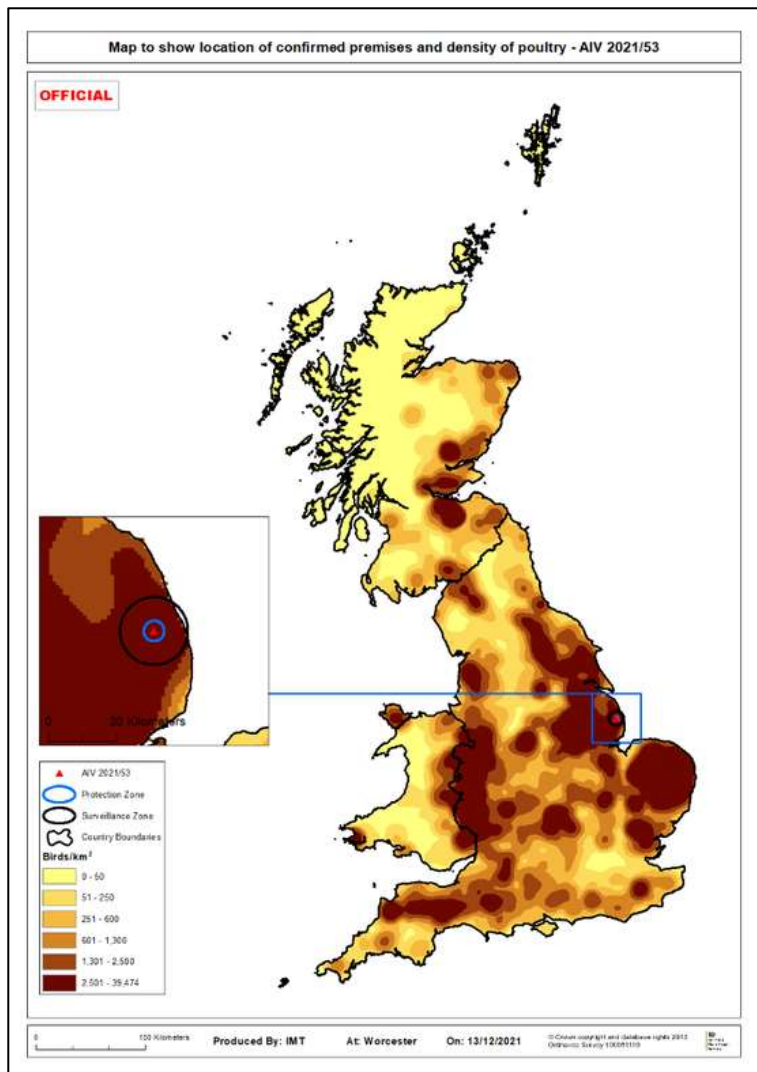
There was a double biosecurity barrier system in the poultry houses, with foot dips at the entrances to each of the houses (outside) and again inside reception before entering the poultry area. There were hand sanitisers and a demarcation of dirty and clean areas, where boots were changed before entering the sheds.

External vehicles (egg collection, feed, ABP) needed to enter the perimeter of the farm and drive to the relevant areas, close to the poultry accommodation. While there were C&D facilities (boot dip and spray with disinfectant FAM 30) by both gates, the biosecurity procedure was not specific on when and how to C&D vehicles and compliance with any C&D of external vehicles was not monitored. The biosecurity procedure did not detail the routes within farm, nor suitable locations for vehicle operations and C&D of relevant areas.

Bedding (wood shavings) were stored inside in plastic wrapping. The egg service areas appeared well maintained and tidy.

Map with location in Great Britain and poultry density

Figure 175: Location of IP and poultry density



Overview of the surrounding area

This IP was in an area of high poultry density, and also within the PZ of AIV/2021/51 and the SZ of AIV/2021/54.

Ornithological assessment:

Desktop assessment: This was a combined assessment covering seven IPs – five in relative geographical proximity (AIV 2021/51, 53, 57, 58, 64) and two more distant (AIV 2021/54 and 62). Despite the unusual separation of these sites, this was an otherwise simple landscape. The assessment concluded that wild birds were a likely source of infection pressure.

Local intelligence: wild birds were seen within the farm (straw store) during the investigation.

Clinical picture

11/12/2021 – sudden mortality of 130 birds in house 5 led to a report of suspicion of avian disease. At inspection, birds were lethargic, with cyanotic wattles and combs, some with slight head oedema and slight ocular discharge. No diarrhoea, neurological or respiratory signs were reported. Mortality also started in the rearing shed and samples were submitted.

12/12/2021 – 968 more birds died in house 5. Disease was also observed in House 4 with 24 birds recorded dead.

Timeline

Tracings windows

Source tracings window:

High-risk:	05/12/2021 to 07/12/2021
Likely:	24/11/2021 to 04/12/2021
Precautionary:	20/11/2021 to 23/11/2021

Spread tracings window:

High-risk:	06/12/2021 to 11/12/2021
Likely:	25/11/2021 to 05/12/2021
Precautionary:	21/11/2021 to 24/11/2021

Most likely date of infection: 05/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 176: Source and spread timeline for AIV 2021/53

Source tracing Window	Spread Tracing Window	Date	
Day 18		20/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		21/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		22/11/21	
Day 15		23/11/21	
Day 14		24/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	25/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	26/11/21	
Day 11	Day 3	27/11/21	
Day 10	Day 4	28/11/21	
Day 9	Day 5	29/11/21	Birds housed.
Day 8	Day 6	30/11/21	
Day 7	Day 7	01/12/21	
Day 6	Day 8	02/12/21	
Day 5	Day 9	03/12/21	
Day 4	Day 10	04/12/21	
Day 3	Day 11	05/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	06/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	07/12/21	
	Day 14	08/12/21	Precautionary onset of clinical signs based on production records.
	Day 15	09/12/21	
	Day 16	10/12/21	
	Day 17	11/12/21	130 birds found dead in morning. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/116). Restrictions served.
	Day 18	12/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/53.
	Day 19	13/12/21	
	Day 20	14/12/21	
	Day 21	15/12/21	
	Day 22	16/12/21	
	Day 23	17/12/21	Culling commenced and completed.
	Day 24	18/12/21	Preliminary C&D completed.
	Day 25	19/12/21	Preliminary C&D considered effective.
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

33 premises with poultry holding between 3-393,000 birds (9 premises with 50 or more birds)

SZ (3-10 km)

139 premises with poultry holding between 1-215,500 birds (21 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for egg collections and movements of personnel and 3 traced premises were identified. All were already under restrictions, due to established

commercial links, and tracing activities at 2 were superseded when they became IPs. The third premises was assessed as being very low risk following a veterinary inspection more than 21 days after contact with the IP.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds, assessed as highly likely with medium uncertainty.

Assessment and evidence base for the likely source

Ornithological assessment identified wild birds as a likely source of infection pressure and the farm attracted wild birds.

Biosecurity was insufficient given that the poultry houses were old, of wooden construction and puddles of rainwater present outside. There were also gaps in doors/ceiling which could have allowed ingress of rain/surface water and/or vermin.

There were also potential biosecurity breaches allowing staff to walk infection into housing and there were with several other clustered IPs linked through egg collections and feed deliveries which could have led to contamination of the environment.

Spread investigations: Assessment of potential and likelihood of spread

Staff movements to the sister premises were identified during the spread window and it later became AIV 2021/66.

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/54, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial free-range and organic laying premises, part of a large local integrated laying enterprise. It was located within the surveillance zone (SZ) of two other affected premises AIV 2021/51 and AIV 2021/53 belonging to the same company.

The birds originated from another premises under the same ownership.

Species and number of each present

36,000 chicken hens

Description of the housing

Although the IP normally operated as a free-range site, all birds had been housed since 29/11/2021.

The poultry accommodation comprised 4 houses:

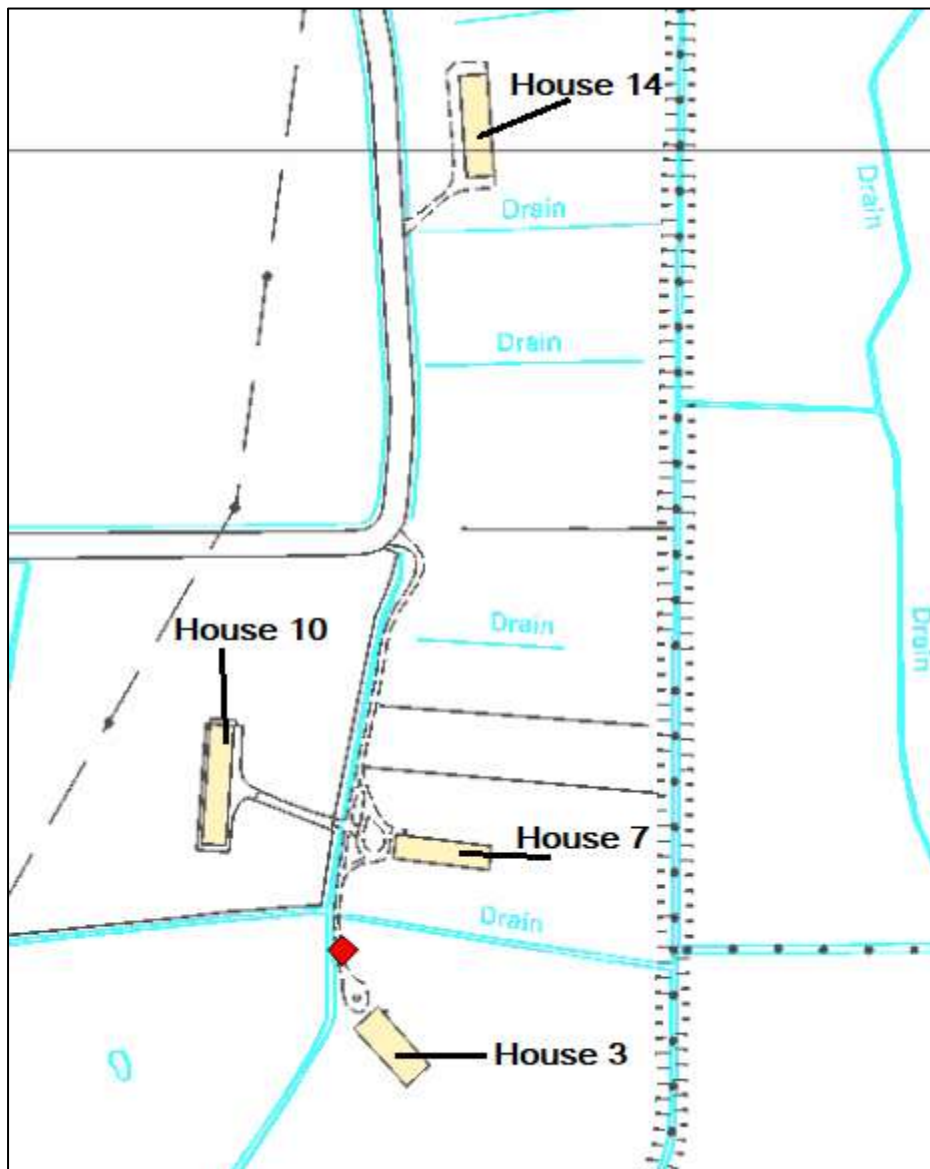
1. House 3 (the affected house) contained 8,016 hens (41-weeks old). The building was rented by the company. It was a wooden house of old construction, and appeared to be in poor condition. It was a flatbed type house, with a metallic sandwich structure, raised plastic bed with lower running floor and wooden flap holes.
2. The remaining 3 houses were owned by the company. They were of more recent construction and appeared to be in better condition.
3. House 7 was a multi-tier type with 16,000 hens (40 weeks old). It had a manure belt, being the only house in which manure was regularly removed during production.
4. Houses 10 and 14 were flat bed type with nesting boxes in the middle, each housing 6000 organic hens (22 and 63 weeks old respectively), with metallic flap holes.

House 14 was located away from the other three houses and had separate access

All 4 houses were serviced by the same staff and had natural ventilation.

Plan of the infected premises

Figure 177: Plan of AIV 2021/54



Overview of biosecurity

The biosecurity was assessed as poor.

The affected house building (House 3) were dated, and the surrounding area was not concreted. There were large openings of more than 5 cm wide at the majority of the wooden flap holes, providing easy access points for wildlife and wild birds into the hens' enclosure.

There was no site dedicated footwear, and no evidence that overalls were changed between houses, or that dip points were used for footwear.

Foot dips were present at the entrance of each of the 4 houses, but not at one of the 2 doors leading to the interior of the affected house, which only had a disinfectant

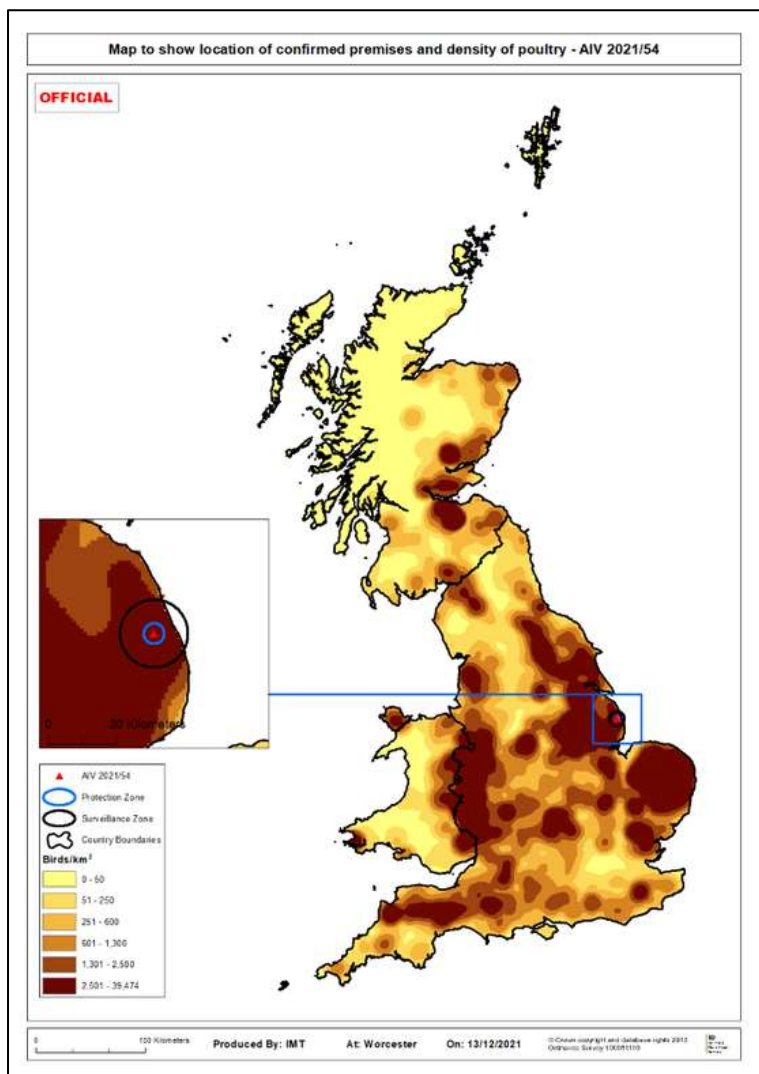
carpet at the entrance of the door. This appeared to be dry and was covered with bird droppings.

Manual sprayers were present at the site entrance, but there was uncertainty on whether egg and feed trucks followed disinfection protocols on entry, prior to movement around the site. There was no monitoring of vehicle C&D, and no records were kept.

The management reported heavy rain and strong winds the previous week and that the houses may have been flooded.

Map with location in Great Britain and poultry density

Figure 178: Location of IP and poultry density



Overview of the surrounding area

This IP was in an area of high poultry density and within the surveillance zone of two other affected premises: AIV 2021/51 and AIV 2021/53, belonging to the same company as this IP.

Ornithological assessment:

Desktop assessment: Ornithological assessment identified wild birds as being the likely source of infection pressure.

Local intelligence: No additional info.

Clinical picture

11/12/2021 – Suspicion of notifiable avian disease was reported to APHA by the private veterinary surgeon following increased mortality in House 3. The owner had noticed 4 dead birds and some sick birds on 09/12/2021, 27 dead birds on 10/12/2021 and over 100 deaths on 11/12/2021.

At the APHA investigation, approximately 25% of birds in the affected house (House 3) showed clinical signs including lethargy, respiratory distress, diarrhoea, and swollen eyelids, earlids and comb/wattles. There was cyanotic discoloration of some dead birds in the chest area and combs. Samples were submitted.

12/12/2021- there were over 450 deaths in total.

14/12/2021- the disease appeared to spread to House 7, with 82 deaths before the site was depopulated.

Timeline

Tracings windows

Source tracings window:

High-risk:	05/12/2021 to 07/12/2021
Likely:	24/11/2021 to 04/12/2021
Precautionary:	20/11/2021 to 23/11/2021

Spread tracings window:

High-risk:	06/12/2021 to 11/12/2021
Likely:	25/11/2021 to 05/12/2021
Precautionary:	21/11/2021 to 24/11/2021

Most likely date of infection: 05/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 179: Source and spread timeline for AIV 2021/54

Source Tracing Window	Spread Tracing Window	Date	
Day 18		20/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		21/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		22/11/21	
Day 15		23/11/21	
Day 14		24/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	25/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	26/11/21	
Day 11	Day 3	27/11/21	
Day 10	Day 4	28/11/21	
Day 9	Day 5	29/11/21	Birds housed.
Day 8	Day 6	30/11/21	
Day 7	Day 7	01/12/21	
Day 6	Day 8	02/12/21	
Day 5	Day 9	03/12/21	
Day 4	Day 10	04/12/21	
Day 3	Day 11	05/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	06/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	07/12/21	
	Day 14	08/12/21	Precautionary onset of clinical signs - based on production records.
	Day 15	09/12/21	
	Day 16	10/12/21	
	Day 17	11/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/118). Restrictions served.
	Day 18	12/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/54.
	Day 19	13/12/21	
	Day 20	14/12/21	
	Day 21	15/12/21	
	Day 22	16/12/21	
	Day 23	17/12/21	
	Day 24	18/12/21	
	Day 25	19/12/21	
	Day 26	20/12/21	Cull commenced and completed.
	Day 27	21/12/21	
	Day 63	26/01/22	
	Day 64	27/01/22	Preliminary C&D completed.
	Day 65	28/01/22	Preliminary C&D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

28 premises with poultry holding between 1-100,000 birds (4 premises with 50 or more birds)

SZ (3-10 km)

158 premises with poultry holding between 1-393,000 birds (24 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were instructed for movements of eggs, farm workers, other company staff and maintenance personnel, feed, ABP, and muck. Most traced premises had already been placed under restrictions due to concurrent infection or commercial links. Where a premises became an IP, tracing activities were superseded. The other premises remained under restrictions until, following a veterinary inspection, the risk was assessed as low.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Indirect contact with infected wild birds was assessed as highly likely with medium uncertainty. Ornithological assessment identified wild birds as the likely source of infection pressure, the affected house was poorly maintained and biosecurity was poor. Heavy rainfall was reported during the source window.

However, indirect introduction from other domestic flock could not be ruled out and was assessed as being medium likelihood, with medium uncertainty. The IP was geographically close to AIV/2021/51 (approximately 1 km) and AIV/2021/53 (approximately 3 km) and linked by commercial operations (egg collection, feed delivery, ABP collections, staff sharing). Egg trays from the IP appear to be regularly washed at AIV/2021/51 and moved back to the IP.

Spread investigations: Assessment of potential and likelihood of spread

Indirect contact with other domestic susceptible species in the parent company cluster was assessed as medium likelihood with medium uncertainty, with shared staff between the different IPs remaining a plausible transmission route.

Only 1 spread tracing of a feed lorry was identified for this case (beyond the wider cluster tracings). This was investigated and subsequently closed.

Remaining uncertainty

As stated, some uncertainty on the likely source pathway remains. This is explored further in the cluster report.

AIV 2021/55, Near Middleton-in-Teesdale, County Durham, Durham, England

Description of the premises

Overview of the premises and the wider business

This was a non-commercial back yard flock of 12 birds. Eggs were eaten by the owners or gifted to friends. They also kept four alpacas as pets.

Species and number of each present

12 chickens, four alpacas

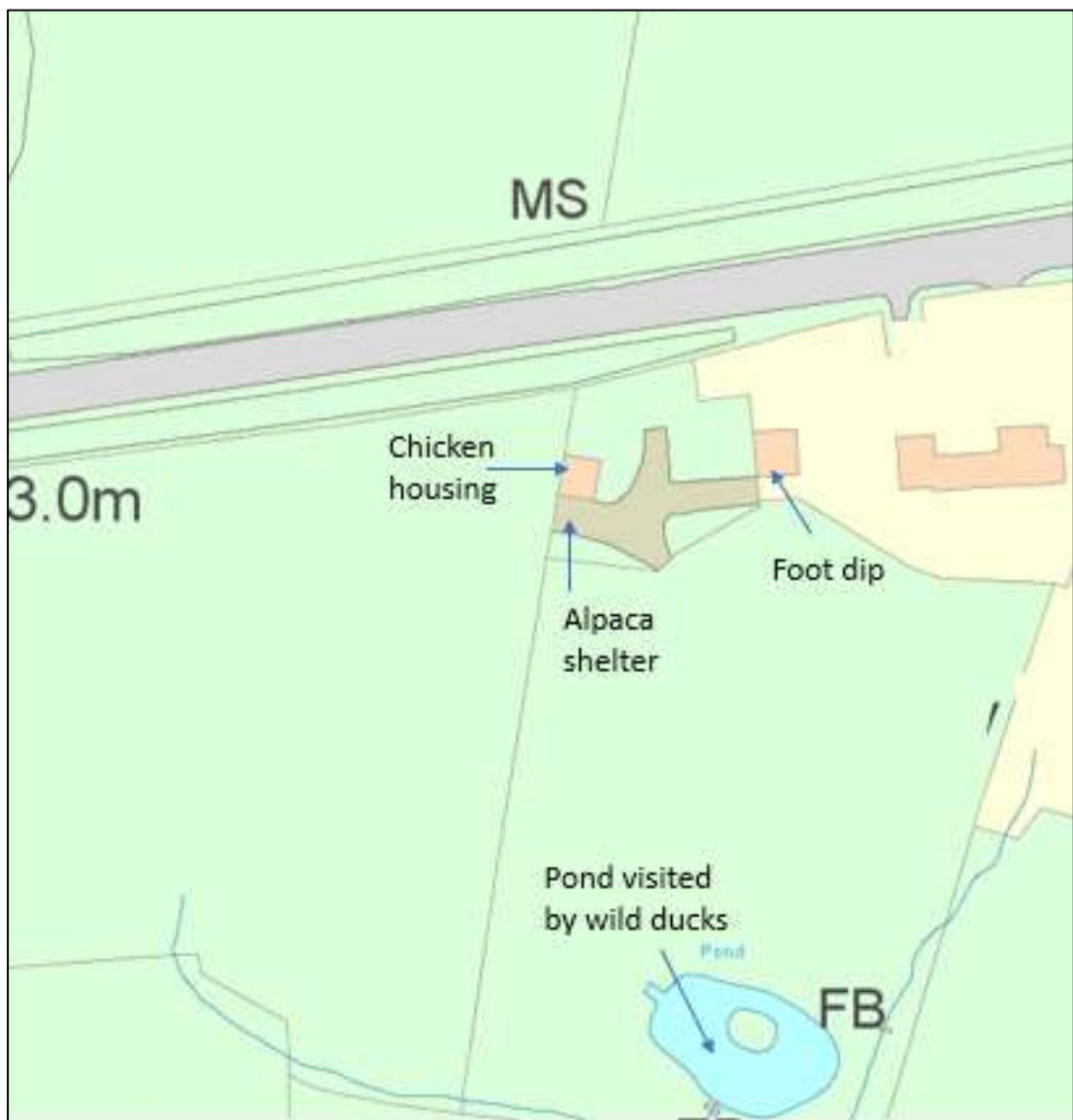
Description of the housing

The site included the owner's garden and a paddock containing a pond. The owner fed 50-60 wild ducks daily on this pond.

The chickens were free ranging a week ago but had since been kept in a hen house with access to an uncovered run. The alpacas were free-ranging and housed next to the chickens.

Plan of the infected premises

Figure 180: Plan of AIV 2021/55

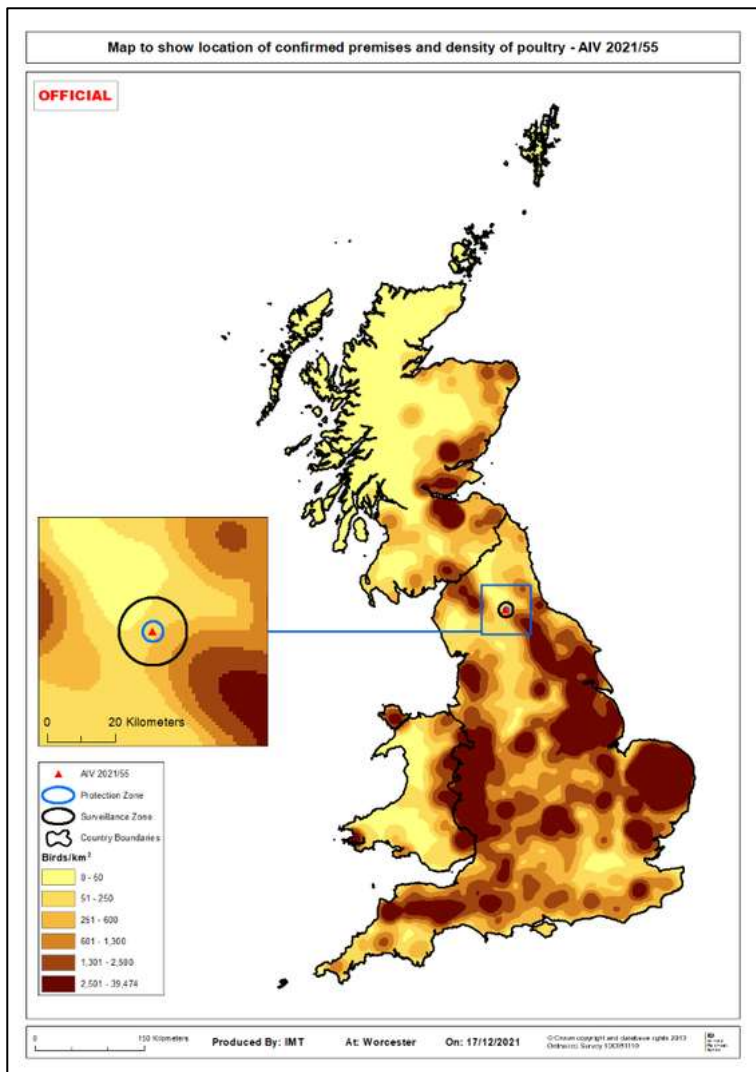


Overview of biosecurity

The chicken run was uncovered and non-Defra approved disinfectant was used in the foot dip. The chickens were free ranging a week ago so direct contact with wild ducks was possible. Fomite introduction was possible via the alpacas and the owner. There were no movements on or off during the tracing windows.

Map with location in Great Britain and poultry density

Figure 181: Location of IP and poultry density.



Overview of the surrounding area

The site was in a rural location surrounded by fields with a river and small town within 0.5 km.

Ornithological assessment:

Desktop assessment: Not conducted

Local intelligence: Wild ducks lived on a pond in same paddock as the chickens.

Clinical picture

05/12/2021 – One older chicken was found dead. Death was likely to have been age related.

10/12/2021 – Two chickens found dead with no prior clinical signs.

11/12/2021 – Three more chickens found dead with no prior clinical signs. Suspicion of avian notifiable disease was reported.

12/12/2021 – During the APHA visit, one bird had a cyanotic comb, wattle and head oedema. Samples were taken and the owner culled the birds on welfare grounds.

Timeline

Tracings windows

Source tracings window:

High-risk:	05/12/2021 to 07/12/2021
Likely:	24/11/2021 to 04/12/2021
Precautionary:	20/11/2021 to 23/11/2021

Spread tracings window:

High-risk:	06/11/2021 to 11/12/2021
Likely:	25/11/2021 to 05/12/2021
Precautionary:	21/11/2021 to 24/11/2021

Most likely date of infection: 05/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 182: Source and spread timeline for AIV 2021/55

Source Tracing Window	Spread Tracing Window	Date	
		17/11/21	
		18/11/21	
		19/11/21	
Day 18		20/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		21/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		22/11/21	
Day 15		23/11/21	
Day 14		24/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	25/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	26/11/21	
Day 11	Day 3	27/11/21	
Day 10	Day 4	28/11/21	
Day 9	Day 5	29/11/21	
Day 8	Day 6	30/11/21	
Day 7	Day 7	01/12/21	
Day 6	Day 8	02/12/21	
Day 5	Day 9	03/12/21	
Day 4	Day 10	04/12/21	
Day 3	Day 11	05/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	06/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	07/12/21	
	Day 14	08/12/21	Precautionary onset of clinical signs.
	Day 15	09/12/21	
	Day 16	10/12/21	2 chickens found dead (may have died overnight)
	Day 17	11/12/21	3 chickens found dead. Notification of suspicion of disease to APHA. Verbal restrictions served (DPR 2021 119)
	Day 18	12/12/21	APHA investigation and sampling Hard copy of restrictions served.
	Day 19	13/12/21	
	Day 20	14/12/21	H5N1 confirmed by CVO based on PCR results with case reference AIV 2021 55. All birds were dead so culling not required.
	Day 21	15/12/21	Preliminary C&D completed
	Day 22	16/12/21	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

25 premises with poultry holding between 1-291 birds (two premises with 50 or more birds)

SZ (3-10 km)

Seven premises with poultry holding between 12-8,000 birds (two premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

The pond in the paddock was regularly visited by wild ducks and the chickens had not been housed until recently. The chicken run was uncovered and the biosecurity was poor leading to a high likelihood of indirect contact with wild birds.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty

AIV 2021/56, Near Pocklington, East Yorkshire, East Riding of Yorkshire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial duck finishing unit contracted to a national duck-meat company. It consisted of four sheds and straw storage. The IP was part of a wider farm business which included one other duck finishing unit (separately managed) and a large arable enterprise. The other duck premises also became an IP (AIV 2021/42) on 07/12/2021.

Species and number of each present

Approximately 40,000 meat Peking cross ducks that were always housed.

Description of the housing

The four sheds were built in 1997 and were identical in design. They comprised a small breeze-block dwarf wall to approximately 60 cm and then closed wooden boarding to the roof. Ventilation was natural with inlets on the side walls and outlets on the roof controlled by a thermostat. Side inlets were covered with mesh which had gaps to allow the shutter mechanism to pass through. In some cases, these gaps were sufficient to allow entry of wild birds.

Plan of the infected premises

Figure 183: Plan of AIV 2021/56



Overview of biosecurity

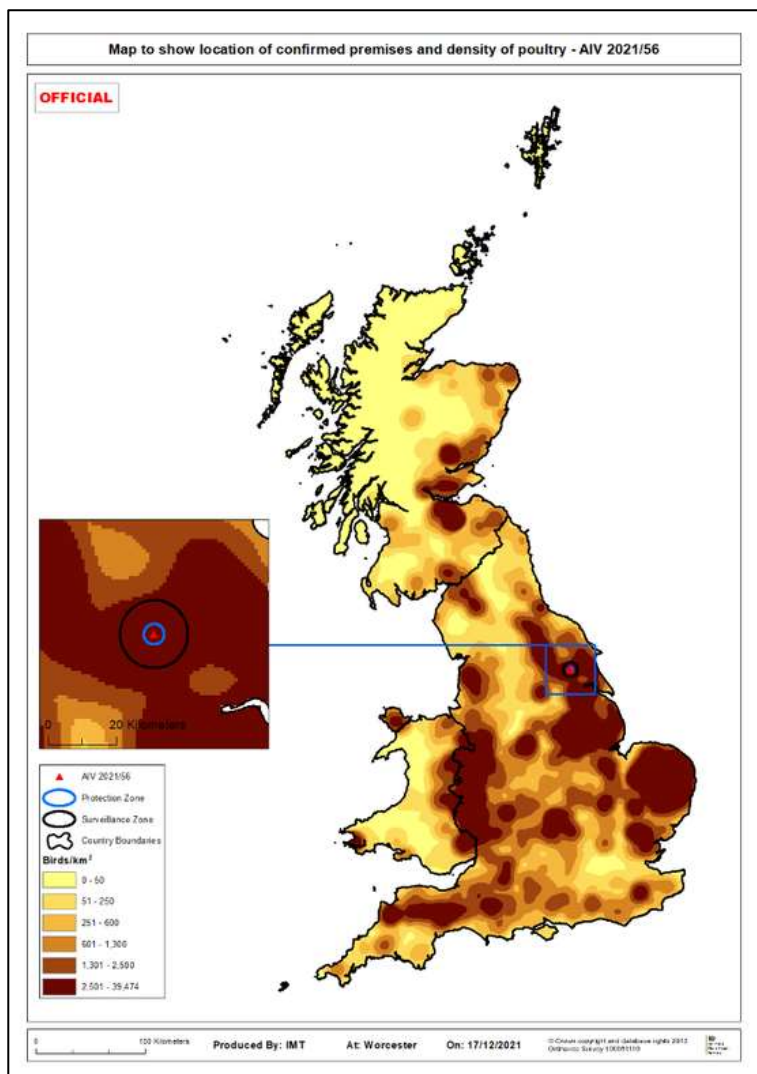
Biosecurity was assessed as good in some areas, but with a notable major breach. The good areas included a hard outer shell with fencing and locked gate around the premises. There was a visitors' car park away from the sheds near the office and clear delineation of clean-dirty areas. ABP was moved to the bottom of the lane for collection. The sheds themselves were in good condition. Foot dips and PPE were in operation and there were no shared staff with the company's other duck premises.

The major breach was the bedding-up process. The home-grown straw was stored unwrapped in an uncovered barn allowing free access to wild birds and signs of wild birds were seen at the APHA investigation. The straw was loaded into a straw chopper and tractor, which was then driven through the duck shed. Whilst driving, the gable-end doors were left open. This process allowed for contaminated straw to be used, wild birds to have free access when the doors were open and indirect spread from the tractor and machinery as it was not cleansed or disinfected effectively between sheds.

Since disclosure of AIV 2021/42, biosecurity measures had been increased on the unit with more frequent disinfection of farm vehicles and disposable PPE in use for the site. Movements on and off the site were kept as minimal as possible.

Map with location in Great Britain and poultry density

Figure 184: Location of IP and poultry density



Overview of the surrounding area

The IP was located on the lower slopes of a small hill, with a small coppice near the top. It was surrounded by arable land with several small watercourses nearby. There were also fields of game cover in the surrounding area. The region had a high poultry density. The farm was within the PZ of AIV 2021/42, and the direct distance between the two was approximately 1.2 km.

Ornithological assessment:

Desktop assessment: For this IP the conclusion was that wild birds presented a possible source of infection pressure. There were no significant waterbodies close to the IP and it was unlikely that wildfowl or waders would approach the IP as it was

barren. Bridge species were likely to be common and appeared to be the most likely pathway.

Local intelligence: At the APHA investigation, bird faeces, feathers and dust baths were observed in the open-sided straw shed.

Clinical picture

11/12/2021 – ducks appeared to be weak in the evening.

12/12/2021 – 60 birds had died and 10 were culled in House 1. This represented a notable increase from the normal mortality rate. Many of the remaining birds appeared lethargic and there was a noticeable drop in water consumption. Suspicion of notifiable disease was reported.

13/12/2021 – at the APHA investigation, a further 40 birds had died and 60 were culled.

Clinical examination of the birds detected cloacal temperatures ranging from 40.5 °C to 43 °C (normal range 40-41 °C). Neurological signs were observed, including sternal recumbency, weak necks and some head tremors. There was a generalised decrease in noise/activity in the flock. Feed consumption was reported to have halved, and water consumption was reduced from 7 m³ to 3 m³. No post-mortem examination was carried out.

Mortality stopped being recorded in the days following disclosure of HPAI, however at inspection by APHA at 11 am on 15/12/2021, it was assessed that there were 9350 live birds in House 1, of which 463 were affected. Houses 2, 3 & 4 are recorded as having 24, 18 and 246 affected birds respectively.

Timeline

Tracings windows

Source tracings window:

High-risk:	08/12/2021 to 10/12/2021
Likely:	27/11/2021 to 07/12/2021
Precautionary:	21/11/2021 to 26/11/2021

Spread tracings window:

High-risk:	09/02/2021 to 12/12/2021
Likely:	28/11/2021 to 08/12/2021
Precautionary:	22/11/2021 to 27/12/2021

Most likely date of infection: 08/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 185: Source and spread timeline for AIV 2021/56

Source Tracing Window	Spread Tracing Window	Date	
Day 20		21/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19	Day 1	22/11/21	Start of precautionary spread tracing window (source + 24h).
Day 18	Day 2	23/11/21	
Day 17	Day 3	24/11/21	
Day 16	Day 4	25/11/21	
Day 15	Day 5	26/11/21	
Day 14	Day 6	27/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 7	28/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 8	29/11/21	
Day 11	Day 9	30/11/21	
Day 10	Day 10	01/12/21	
Day 9	Day 11	02/12/21	
Day 8	Day 12	03/12/21	
Day 7	Day 13	04/12/21	
Day 6	Day 14	05/12/21	
Day 5	Day 15	06/12/21	
Day 4	Day 16	07/12/21	
Day 3	Day 17	08/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 18	09/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 19	10/12/21	
	Day 20	11/12/21	Precautionary onset of clinical signs.
	Day 21	12/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/120). Restrictions served.
	Day 22	13/12/21	
	Day 23	14/12/21	H5N1 confirmed by CVO with case reference AIV2021-56.
	Day 24	15/12/21	
	Day 25	16/12/21	Culling started
	Day 26	17/12/21	
	Day 27	18/12/21	
	Day 28	19/12/21	Culling completed
	Day 29	20/12/21	Preliminary C & D applied
	Day 30	21/12/21	Preliminary C & D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

19 premises with poultry holding between 1-40,000 birds (4 premises with 50 or more birds)

SZ (3-10 km)

71 premises with poultry holding between 1-204,800 birds (31 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

The only tracing identified within the high-risk window was one feed delivery which was assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct/indirect from wild birds.

Assessment and evidence base for the likely source

Infected wild birds were the most likely source. Although the unit had good biosecurity, the bedding-up process presented a number of possible pathways. The potential for spread from AIV 2021/42 was investigated thoroughly and there was no clear pathway.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were investigated with no further action needed.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/57, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

The IP was a commercial free range laying chicken holding. The IP was part of a wider poultry company in which several other IPs were identified.

The birds had been housed since 29/11/2021 (over 6 weeks before confirmation of this outbreak). The IP operated as an all-in-all out-batch system

Species and number of each present

96,000 chickens, including 31,000 laying hens and 65,000 pullets

Description of the housing

Hens were housed in two houses approximately 400 metres apart.

1. House 5 contained 15,500 (52-weeks old) white laying hens.
2. House 6 contained 15,500 (39-weeks old) brown laying hens.

The houses with hens were multi-tier wooden sheds with ceiling fans, split into several sections by metal fencing, with runs on either side of the sheds. There was an egg room at the front of the shed with two access doors to the birds (no foot dips inside).

The laying hens were separate from the rearing units and had their own dedicated staff. These did however, also work on other sites owned by the company.

There were 4 rearing houses, each split into 2 floors:

Back Lane 1 – 25,000 pullets 7-weeks old. Housed in the upper floor only

Back Lane 2 – empty

Back Lane 3 – empty

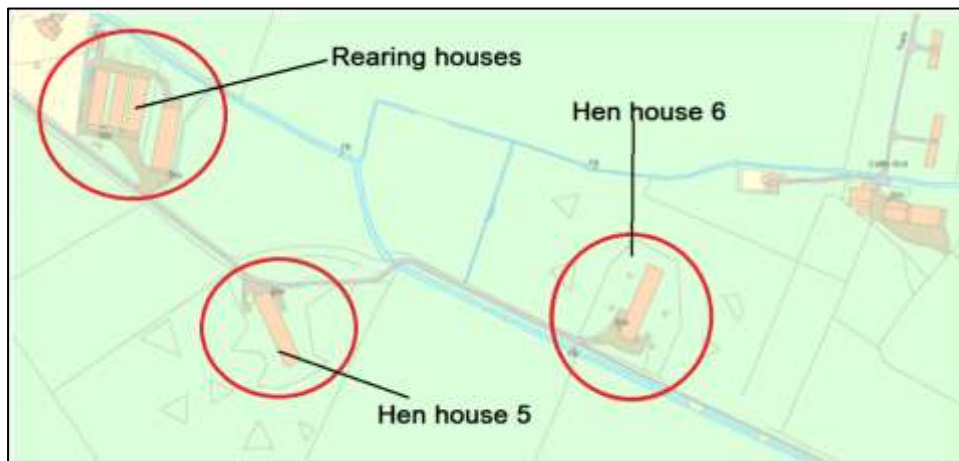
Back Lane 4 – 40,000 pullets 3-weeks old.

The buildings themselves looked worn in parts with gaps that may have provided access to rodents and small birds.

Ventilation was provided by side vents, some of which were not in a good state of repair.

Plan of the infected premises

Figure 186: Plan of AIV 2021/57

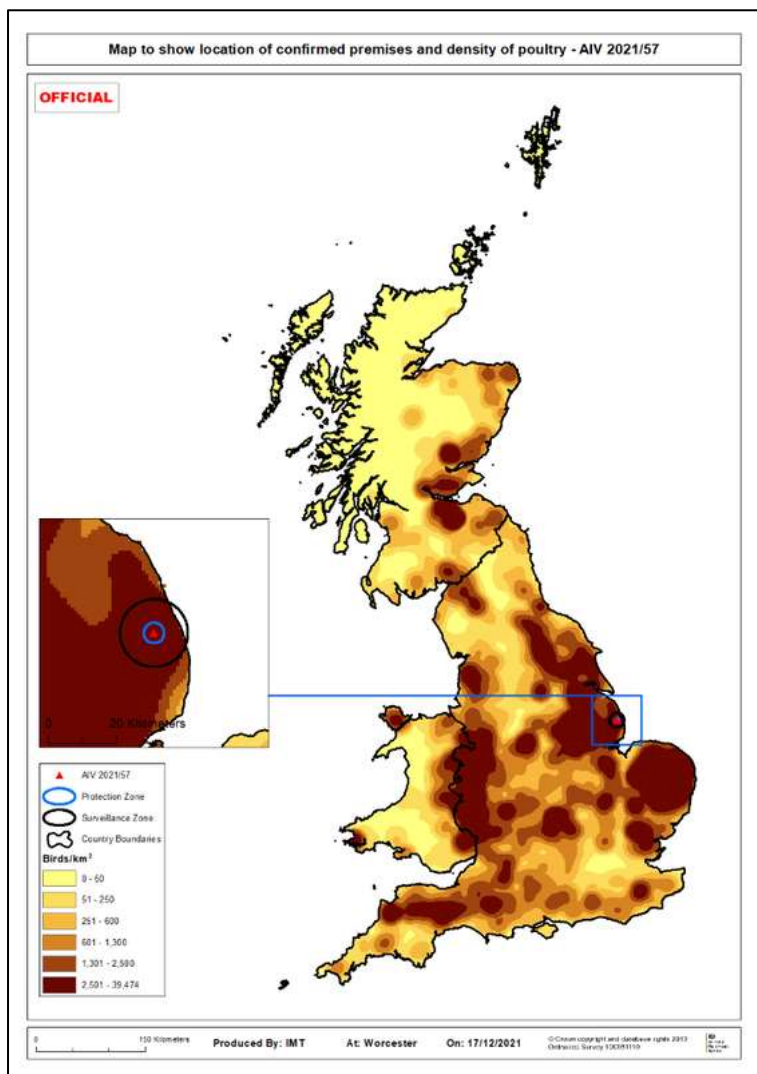


Overview of biosecurity

Biosecurity measures on the IP were described as poor. Although the rearing units had separate staff from the layers, staff dedicated to rearing or laying units moved between other sites owned by the company. There was no visitor book. There was a disinfectant spray at the main entrance. The staff had dedicated overalls and there were disposable overshoes when entering the bird sheds. There were foot dips at the main door to the houses but not inside. No records of movement of company lorries on site (egg and litter collection, feed deliveries) were kept.

Map with location in Great Britain and poultry density

Figure 187: Location of IP and poultry density



Overview of the surrounding area

The IP was in a high poultry density area.

Ornithological assessment:

Desktop assessment: A combined assessment covering seven IPs – five in relative geographical proximity (AIV 2021/51, AIV 2021/53, AIV 2021/57, AIV 2021/58, AIV 2021/64) and two more distant (AIV 2021/54, AIV 2021/62) was conducted and concluded that wild birds were a likely source of infection pressure.

Local intelligence: There were abundant wild birds around, with waterways running through the site.

Clinical picture

12/12/2021 – a sudden increase in mortality occurred in House 5 (76 dead hens in the evening) and suspicion of notifiable avian disease was reported. No other signs or changes in the production records were noted by the farm manager and no changes were observed in House 6 at the time of the report.

13/12/2021 – At the APHA investigation, mortality had increased in House 5 to 160 dead birds. There were also 19 dead hens in House 6 and 160 dead pullets in rearing House 1. Some birds were showing clinical signs, including lethargy and neurological symptoms, diarrhoea and watery discharge from mouth/nostrils. No changes were noted on production records or water consumption. The pullets in the rearing House 4 appeared to be unaffected. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	07/12/2021 to 09/12/2021
Likely:	26/11/2021 to 06/12/2021
Precautionary:	21/11/2021 to 25/11/2021

Spread tracings window:

High:	08/12/2021 to 13/12/2021
Likely:	27/11/2021 to 07/12/2021
Precautionary:	22/11/2021 to 26/11/2021

Most likely date of infection: 07/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 188: Source and spread timeline for AIV 2021/57

Source Tracing Window	Spread Tracing Window	Date	
Day 19		21/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		22/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		23/11/21	
Day 16		24/11/21	
Day 15		25/11/21	
Day 14		26/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	27/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	28/11/21	
Day 11	Day 3	29/11/21	Birds housed.
Day 10	Day 4	30/11/21	
Day 9	Day 5	01/12/21	
Day 8	Day 6	02/12/21	
Day 7	Day 7	03/12/21	
Day 6	Day 8	04/12/21	
Day 5	Day 9	05/12/21	
Day 4	Day 10	06/12/21	
Day 3	Day 11	07/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	08/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	09/12/21	
	Day 14	10/12/21	Precautionary onset of clinical signs - based on production records.
	Day 15	11/12/21	
	Day 16	12/12/21	Notification of suspicion of disease to APHA (DPR 2021/121). Verbal restrictions served.
	Day 17	13/12/21	APHA investigation and sampling (DPR 2021/121). Restrictions served.
	Day 18	14/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/57.
	Day 19	15/12/21	
	Day 20	16/12/21	
	Day 21	17/12/21	
	Day 22	18/12/21	
	Day 23	19/12/21	
	Day 24	20/12/21	
	Day 25	21/12/21	Culling commenced and completed.
	Day 26	22/12/21	
	Day 65	30/01/22	
	Day 66	31/01/22	Preliminary C&D completed.
	Day 67	01/02/22	Preliminary C&D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

35 premises with poultry holding between 2-393,000 birds (9 premises with 50 or more birds)

SZ (3-10 km)

139 premises with poultry holding between 1-215,500 birds (20 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were instructed for movements of eggs, farm workers and maintenance personnel, feed, ABP, and muck. All traced premises had already been placed under restrictions due to concurrent infection or commercial links. Where a premises became an IP, tracing activities were superseded. The other premises remained under restrictions until, following a veterinary inspection, the risk was assessed as low.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Ornithological assessment identified wild birds as a likely source of infection pressure. Some water filled ditches and water pooling on areas of yards attracted wild birds to the IP. Buildings were worn and ventilation covers had some gaps with potential for rodent ingress. Poor biosecurity was reported.

Indirect introduction from domestic flock infection was assessed as medium likelihood with medium uncertainty, as there were links (egg collections, staff, feed deliveries) identified between the different IPs from the same company and biosecurity was poor.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

Indirect spread from domestic flock infection was assessed as medium likelihood with medium uncertainty, as there were links (egg collections, staff, feed deliveries) identified between the different IPs from the same company and biosecurity was poor.

Remaining uncertainty

As noted in source and spread assessments.

AIV 2021/58, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

This was a broiler-breeder premises owned and operated by a large integrated broiler company. The eggs produced were sent to the company's hatchery.

Species and number of each present

14,800 broiler-breeders (Ross 308); 10 hens to one cockerel.

Description of the housing

The premises consisted of three houses. House 1 was a separate building of brick construction with a moss-covered roof. It had nest boxes down the middle facing either way with nipple drinkers and feeders on both sides. There was one row of cockerel pens at far end of each side.

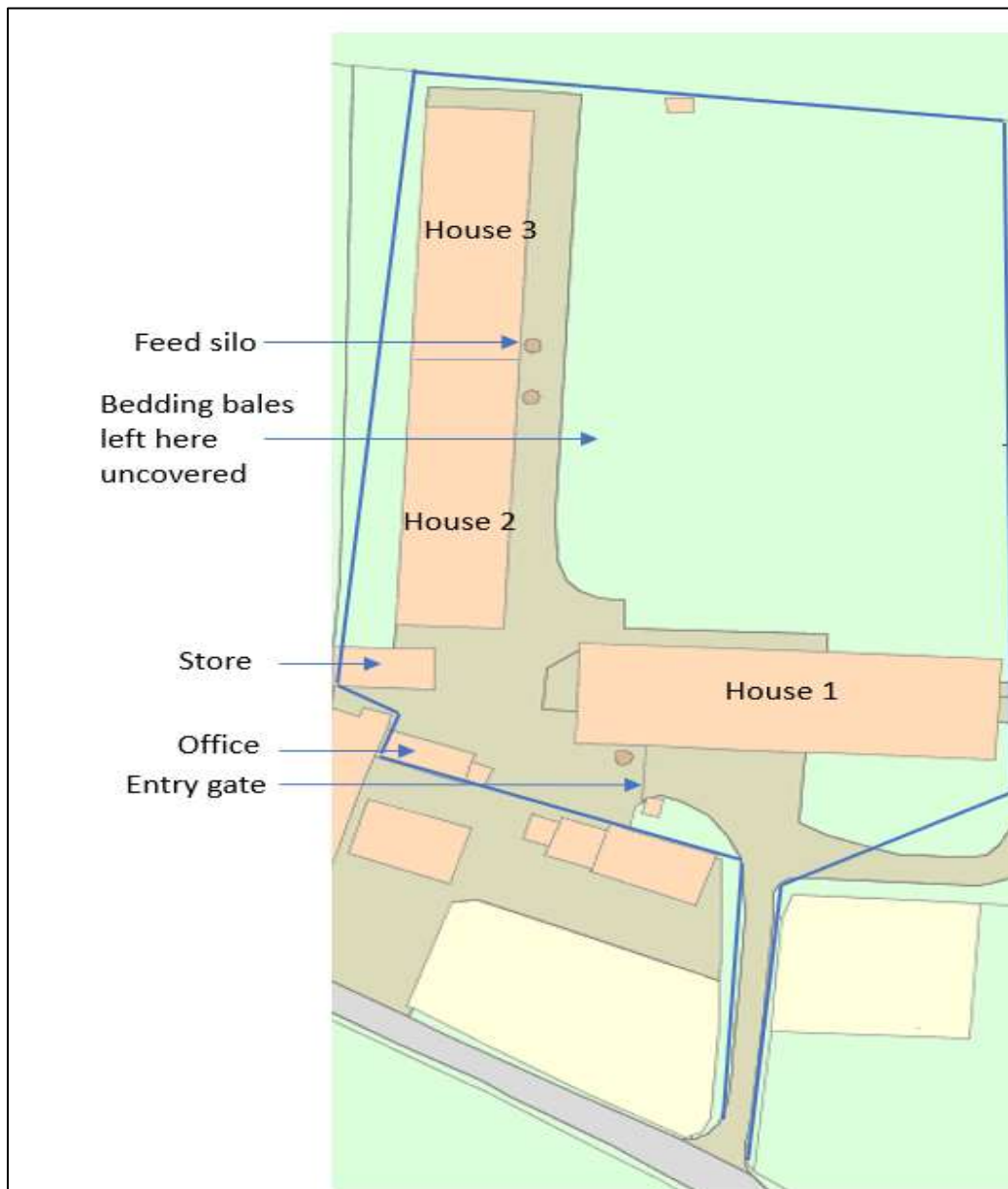
Houses 2&3 were in one long building separated in the middle by a shared lobby and egg sorting area. This building was approximately 40 years old with the same internal setup as house 1. Birds were permanently housed and litter was topped up once a week.

Eggs were collected from the nest boxes by a conveyer belt and moved to the lobby of house 1 and the shared lobby of 2 & 3. The eggs were then packed onto trolleys and remained in the lobbies until collected by the egg lorry.

Both buildings operated the same active ventilation system with inlet fans on the sides and outlets on the roof.

Plan of the infected premises

Figure 189: Plan of AIV 2021/58



Overview of biosecurity

There was a shed at the entry to premises for staff and visitors to sign in and to change into farm-specific footwear and paper boiler suits. There were no showering facilities. Regular workers as well as visitors signed in and out. There was a foot dip at the exit of the changing shed and foot dips at the entrances to all houses. There were boot changing stations in the lobby of each house and no boots worn outdoors were worn in the bird areas. Houses 2 and 3 shared a lobby so the same boots could have been worn in both houses.

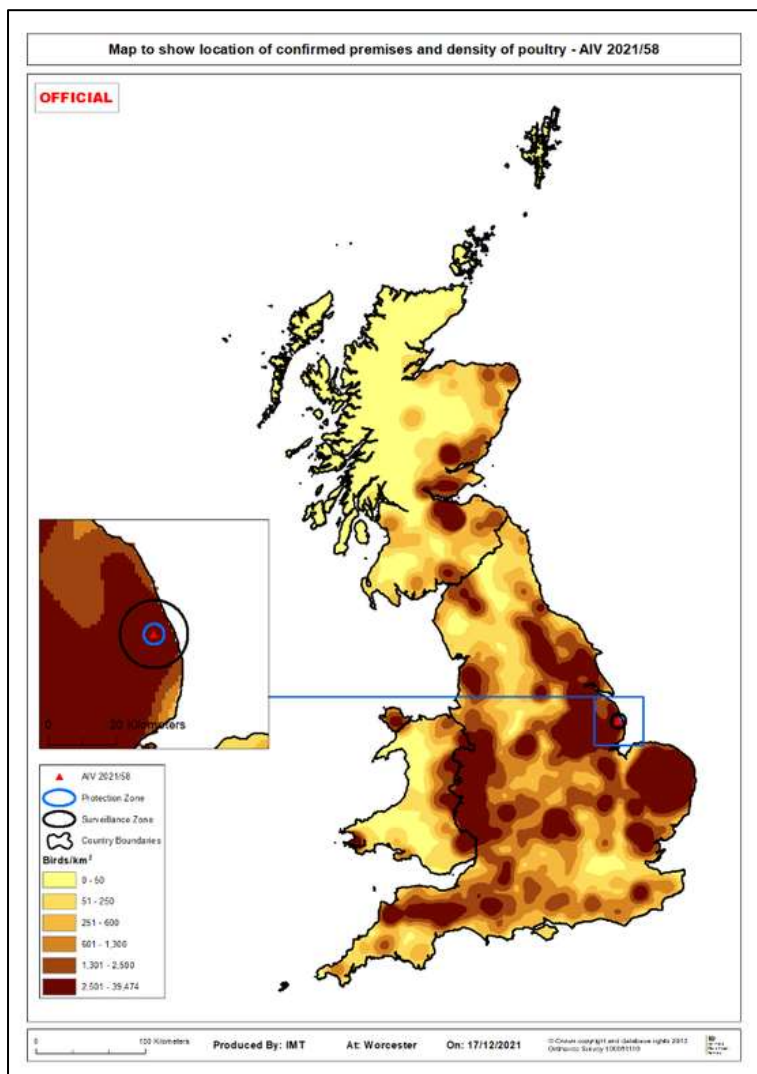
The egg collection lorry underwent C and D when entering and leaving.

There were no obvious signs or reports of water ingress into the buildings. The most recent pest-control visit was carried out on 09/12/2021 and noted only a very small amount of bait taken by mice in the lobby of 2 and 3.

Litter was stored in the lobby areas or outside on pallets. Each bale was individually wrapped. There was a protocol for each bale to undergo C and D before being brought into the lobby of the house but there remains some uncertainty to how closely this was followed on all occasions.

Map with location in Great Britain and poultry density

Figure 190: Location of IP and poultry density



Overview of the surrounding area

The premises was within the PZ of AIVs 2021/53, 54 and 57 but there were no epidemiological links and they were two different companies. This was an area of high poultry density of broilers, turkeys and layers. The land immediately around the site was arable and permanent grass for dairy cattle.

There was a large pond 3.5 km to the east of the IP approximately 0.7 hectare in surface area.

Ornithological assessment:

Desktop assessment: The ornithological assessment of this area concluded that wildfowl presented a significant infection pressure. The IP lay between the Wash and the Humber, so it was likely that a significant number of wildfowl moved along this corridor. However, it was unlikely that they played a role in a housed unit such as this. More likely was infection from a bridge species such as gulls (Laridae) and corvids (Corvidae), which are both bold species and regularly visit farms for foraging. Gulls do travel long distances in a day, so could easily carry infection from the Wash, Humber or the east coast.

Clinical picture

12/12/2021 – First deaths occurred overnight in house 2 with 70 found dead on morning of 13/12/2021. Suspicion of disease was reported immediately to APHA. By the afternoon of 13/12/2021 a further 70 birds were dead (mortality rate of 2.8%). A number were showing clinical signs ranging from recumbency, swollen heads, respiratory signs to nervous signs. When sampled, scouring and pyrexia were evident. Dead birds had discolouration of wattle and comb.

Houses 1 and 3 remained unaffected at this point. The rate of mortality slowed on 14/12/2021, but by 16/12/2021 it had increased again.

Timeline

Tracings windows

Source tracings window:

High-risk:	09/12/2021 to 11/12/2021
Likely:	28/11/2021 to 08/12/2021
Precautionary:	22/11/2021 to 27/11/2021

Spread tracings window:

High-risk:	10/12/2021 to 13/12/2021
Likely:	29/11/2021 to 09/11/2021
Precautionary:	23/11/2021 to 28/11/2021

Most likely date of infection: 09/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 191: Source and spread timeline for AIV 2021/58

Source Tracing Window	Spread Tracing Window	Date	
Day 20		22/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		23/11/21	Start of precautionary spread tracing window (source + 24h).
Day 18		24/11/21	
Day 17		25/11/21	
Day 16		26/11/21	
Day 15		27/11/21	
Day 14		28/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	29/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	30/11/21	
Day 11	Day 3	01/12/21	
Day 10	Day 4	02/12/21	
Day 9	Day 5	03/12/21	
Day 8	Day 6	04/12/21	
Day 7	Day 7	05/12/21	
Day 6	Day 8	06/12/21	
Day 5	Day 9	07/12/21	
Day 4	Day 10	08/12/21	
Day 3	Day 11	09/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	10/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	11/12/21	
	Day 14	12/12/21	Precautionary onset of clinical signs.
	Day 15	13/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/122). Restrictions served.
	Day 16	14/12/21	H5N1 confirmed by CVO with case reference AIV2021-58.
	Day 17	15/12/21	
	Day 18	16/12/21	
	Day 19	17/12/21	Culling started
	Day 20	18/12/21	Culling completed
	Day 21	19/12/21	Preliminary C and D applied
	Day 22	20/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

26 premises with poultry holding between 2-22,700 birds (5 premises with 50 or more birds)

SZ (3-10 km)

139 premises with poultry holding between 1-393,000 birds (25 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for a pest control worker, the private vet and egg collection to the company hatchery. The hatchery was visited and after their biosecurity and egg disposal procedures were verified, the tracing was assessed as being very low risk

and closed. No other poultry contacts were identified for the pest control and private vet investigations and both were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect wild bird contact.

Assessment and evidence base for the likely source

There was no apparent access for wild birds into the affected sheds and personal biosecurity appeared good. The most probable route of entry was through poor C and D of the bedding bales that were brought in from the outside pallets. No further infected premises within the company were identified so source from another premises via the egg-collection lorry was unlikely.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/59, Near Market Bosworth, Hinckley & Bosworth, Leicestershire, England

Description of the premises

Overview of the premises and the wider business

This was a non-commercial small holding containing mixed poultry and a small number of other non-susceptible species. Any eggs were used for personal consumption only.

Species and number of each present

Five peacocks, 15 ducks, two geese, 25 chickens and three guinea fowl.

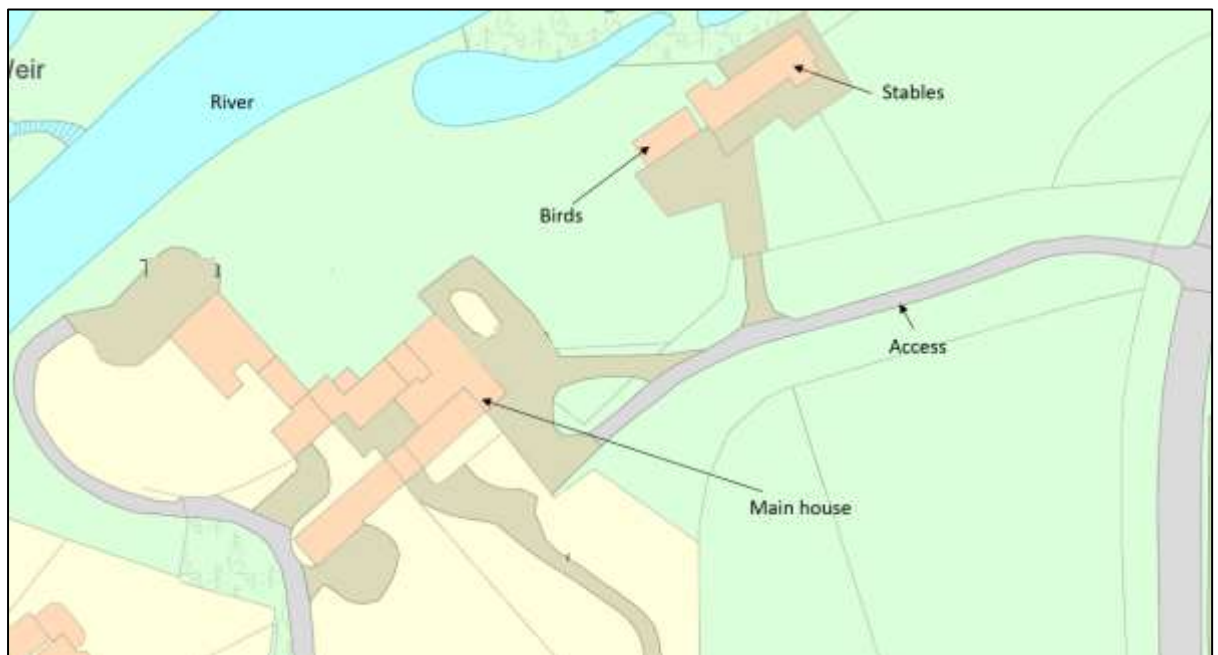
Six sheep, three goats, three ponies and two horses.

Description of the housing

The poultry were free ranging until 29/11/2021 (peacocks until 04/12/2021). They were then housed in separate pens in shared airspace in one large shed. Wildfowl lived on a pond on the site, 10 metres from the shed and could access feed in the shed.

Plan of the infected premises

Figure 192: Plan of AIV 2021/59

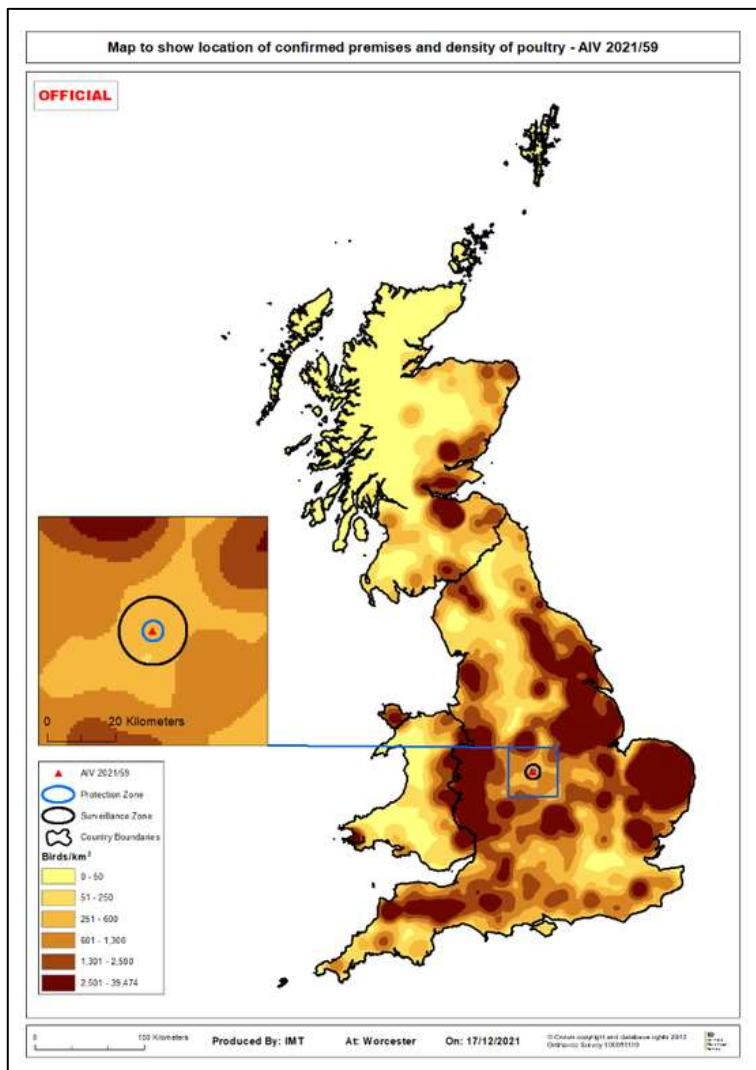


Overview of biosecurity

Biosecurity was poor with no routine use of foot dips or dedicated clothing. Wild birds continued to access the birds shed. There were no movements on or off during the tracing windows.

Map with location in Great Britain and poultry density

Figure 193: Location of IP and poultry density



Overview of the surrounding area

The site was on the edge of a village in an area of medium poultry density.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Resident wildfowl lived on a pond on the premises and were able to access the poultry shed after the birds were housed.

Clinical picture

11/12/2021 – One peacock was seen to be lethargic.

12/12/2021 – The sick peacock and two others died

13/12/2021 – Two chickens and one guineafowl died. Suspicion of avian notifiable disease was reported and restrictions were served.

14/12/2021 – Report case investigation and samples were taken. The two remaining peacocks were lethargic with pale diarrhoea and reduced appetite. Two chickens were lethargic but the geese and ducks showed no clinical signs.

Timeline

Tracings windows

Source tracings window:

High-risk:	08/12/2021 to 10/12/2021
Likely:	27/11/2021 to 07/12/2021
Precautionary:	22/11/2021 to 26/11/2021

Spread tracings window:

High-risk:	09/12/2021 to 13/12/2021
Likely:	28/11/2021 to 08/12/2021
Precautionary:	23/11/2021 to 27/11/2021

Most likely date of infection: 08/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 194: Source and spread timeline for AIV 2021/59

Source Tracing Window	Spread Tracing Window	Date	
Day 21		20/11/21	
Day 20		21/11/21	
Day 19		22/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		23/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		24/11/21	
Day 16		25/11/21	
Day 15		26/11/21	
Day 14		27/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	28/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	29/11/21	
Day 11	Day 3	30/11/21	
Day 10	Day 4	01/12/21	
Day 9	Day 5	02/12/21	
Day 8	Day 6	03/12/21	
Day 7	Day 7	04/12/21	
Day 6	Day 8	05/12/21	
Day 5	Day 9	06/12/21	
Day 4	Day 10	07/12/21	
Day 3	Day 11	08/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	09/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	10/12/21	
	Day 14	11/12/21	Precautionary onset of clinical signs.
	Day 15	12/12/21	
	Day 16	13/12/21	Notification of suspicion of disease to APHA. Restrictions served. (DPR 2021/123)
	Day 17	14/12/21	APHA Investigation and sampling
	Day 18	15/12/21	Avian Influenza H5N1 confirmed by CVO and given case reference AIV2021-59
	Day 19	16/12/21	Culling completed
	Day 20	17/12/21	
	Day 21	18/12/21	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

16 premises with poultry holding between 2-702 birds (1 premises with 50 or more birds)

SZ (3-10 km)

59 premises with poultry holding between 2-5,096 birds (11 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Before housing the birds had opportunity for direct contact with wild birds on the duck pond. After housing, the wild ducks still entered the shed for feed and water.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty

AIV 2021/60, Near Wem, North Shropshire, Shropshire, England

Description of the premises

Overview of the premises and the wider business

This was a mixed poultry smallholding. The birds were organic and free-range.

Species and number of each present

250 chickens (200 laying hens and 50 broiler chickens)

20 geese

6 sheep

Description of the housing

Outdoor netted pens in five groups within three different areas (as in map below):
Group A – affected group– 65 laying hens, in a fenced but uncovered paddock, accessible to wild birds. There was a shed for birds to lay eggs in and for housing overnight.

Group B – 65 laying hens, in the same field, in a similar paddock with shed, separated by a 10 metres gap from group A.

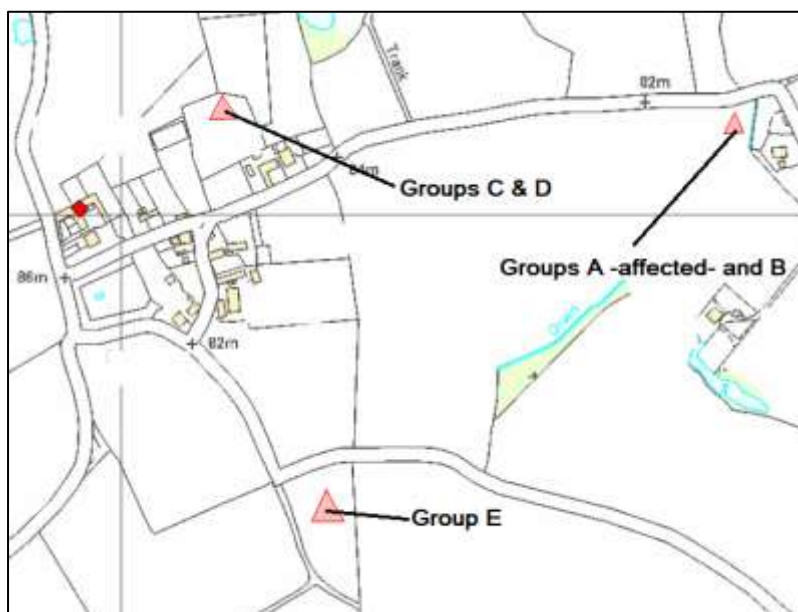
Group C – 70 laying hens in a field next to the farmhouse about 0.5 miles from group A. Divided into three groups, each in a separate fenced pen with a shed for laying.

Group D – 20 geese also next to the farmhouse, in a paddock.

Group E – 50 meat chickens. Kept outside in a separate field 0.5 miles from group A.

Plan of the infected premises

Figure 195: Plan of AIV 2021/60

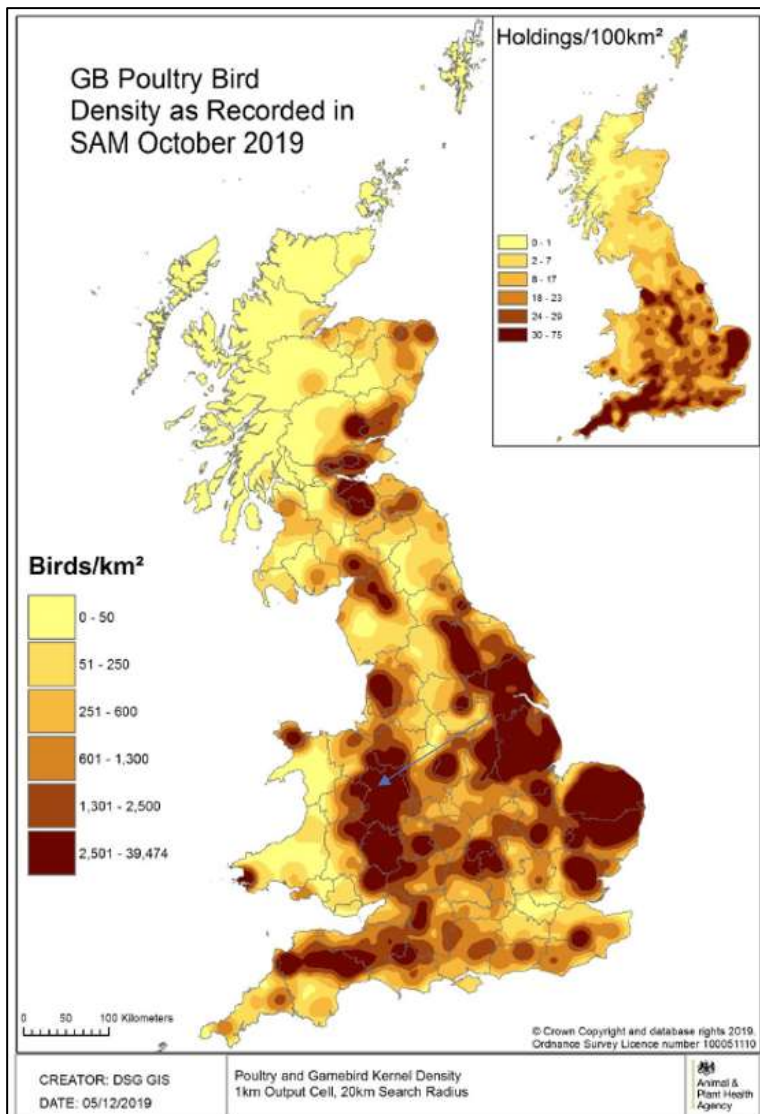


Overview of biosecurity

Biosecurity measures were basic. The enclosures were not covered allowing open access to wild birds. Feed and water were provided outside and accessible to wild birds. Some footbaths with disinfectant were present.

Map with location in Great Britain and poultry density

Figure 196: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: A wild goose carcass found 5 miles away on 30/11/2021 and sampled as part of the wild bird surveillance programme, tested positive for HPAI H5N1. The keeper reports that many wild birds roosted in trees close to the affected pen.

Clinical picture

13/12/2021 – six out of 60 laying hens in Group A died suddenly. They showed signs of watery diarrhoea but no discoloration of comb/wattle. Of the remaining live birds in this group, two birds were huddled and the rest showed no clinical signs. The other birds on the premises were well.

14/12/2021 – five more birds died and five others were dull, depressed and off their food. Suspicion of notifiable avian disease was reported.

At the APHA investigation the same day, it was seen that laying hens were dying after showing only a short period of illness. There had been a slight fall in egg production in the three days preceding their deaths. The remaining birds on the farm, Groups B to E, were all reported to be unaffected with no sign of disease. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	09/12/2021 to 11/12/2021
Likely:	28/11/2021 to 08/12/2021
Precautionary:	23/11/2021 to 27/11/2021

Spread tracings window:

High-risk:	10/12/2021 to 14/12/2021
Likely:	29/11/2021 to 09/12/2021
Precautionary:	24/11/2021 to 28/12/2021

Most likely date of infection: 09/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 197: Source and spread timeline for AIV 2021/60

Source Tracing Window	Spread Tracing Window	Date	
Day 21		21/11/21	
Day 20		22/11/21	
Day 19		23/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		24/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		25/11/21	
Day 16		26/11/21	
Day 15		27/11/21	
Day 14		28/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	29/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	30/11/21	
Day 11	Day 3	01/12/21	
Day 10	Day 4	02/12/21	
Day 9	Day 5	03/12/21	
Day 8	Day 6	04/12/21	
Day 7	Day 7	05/12/21	
Day 6	Day 8	06/12/21	
Day 5	Day 9	07/12/21	
Day 4	Day 10	08/12/21	
Day 3	Day 11	09/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	10/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	11/12/21	
	Day 14	12/12/21	Precautionary onset of clinical signs.
	Day 15	13/12/21	
	Day 16	14/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/124). Restrictions served.
Day 17	Day 17	15/12/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-60.
Day 18	Day 18	16/12/21	Culling completed. Further information gathered for PER by case vet.
Day 19	Day 19	17/12/21	Preliminary C & D completed.
Day 20	Day 20	18/12/21	Preliminary C & D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

50 premises with poultry holding between 1-294,000 birds (4 premises with 50 or more birds)

SZ (3-10 km)

61 premises with poultry holding between 1-1,200,000 birds (19 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing enquiries were initiated for feed and straw deliveries and the movement of eggs during the high-risk tracing window. All tracings were assessed as being low risk and closed without further action.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Biosecurity measures were basic. The feed and water were provided in the uncovered enclosures attracting wild birds.

Wild birds were reported to roost on trees close to the affected enclosure and a wild goose carcass had tested positive for HPAI H5N1.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being very low or negligible risk.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/61, Near Gretna, Dumfrieshire, Dumfries and Galloway, Scotland

Description of the premises

Overview of the premises and the wider business

This was a smallholding with 60 sheep and small flock of birds.

Species and number of each present

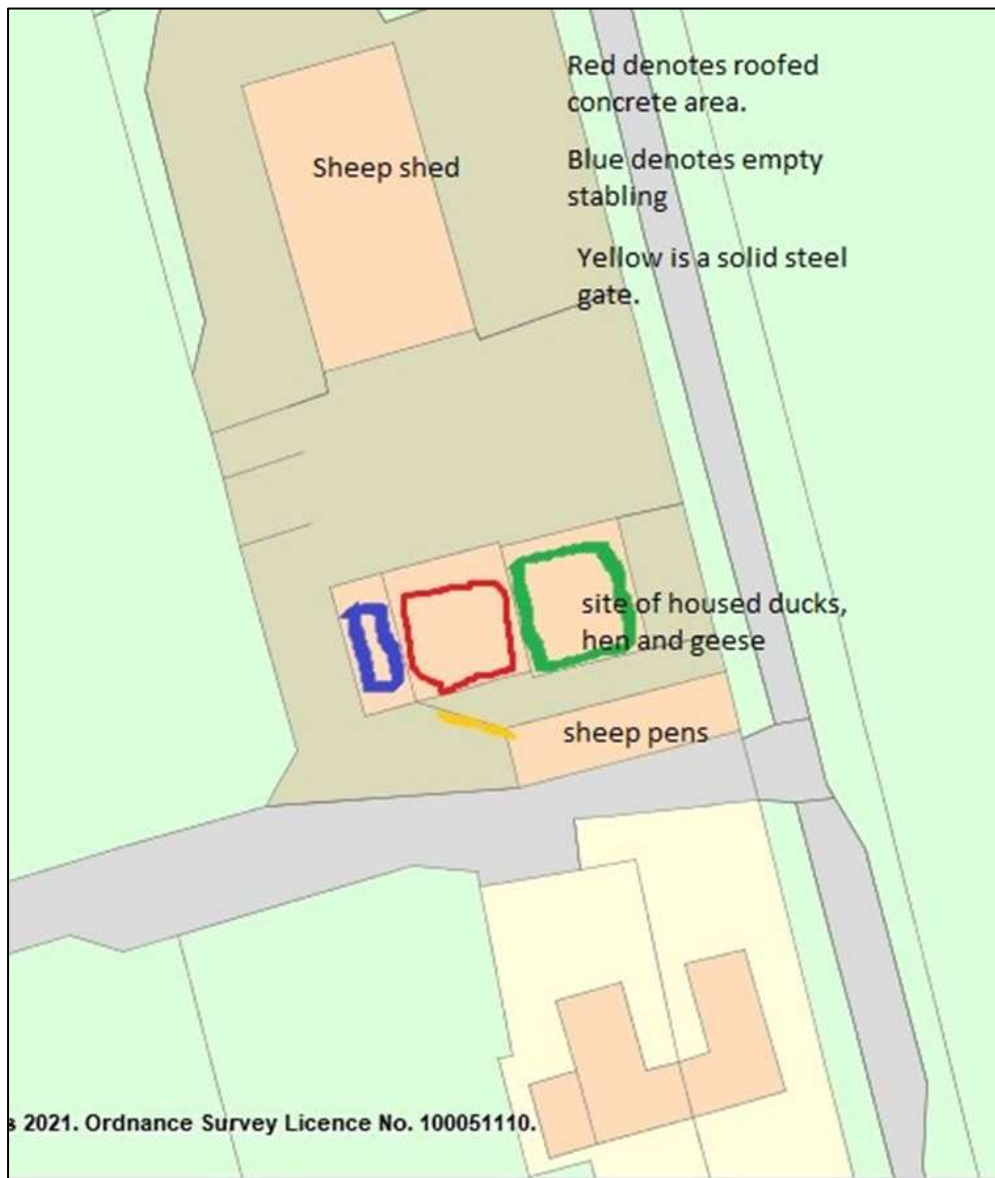
Two cockerels, two chickens, two ducks and four geese plus 60 sheep.

Description of the housing

The birds were usually free-range but were housed on 04/12/21 in horse stabling with the hens and ducks in one stable and the geese in an adjacent stable.

Plan of the infected premises

Figure 198: Plan of AIV 2021/61

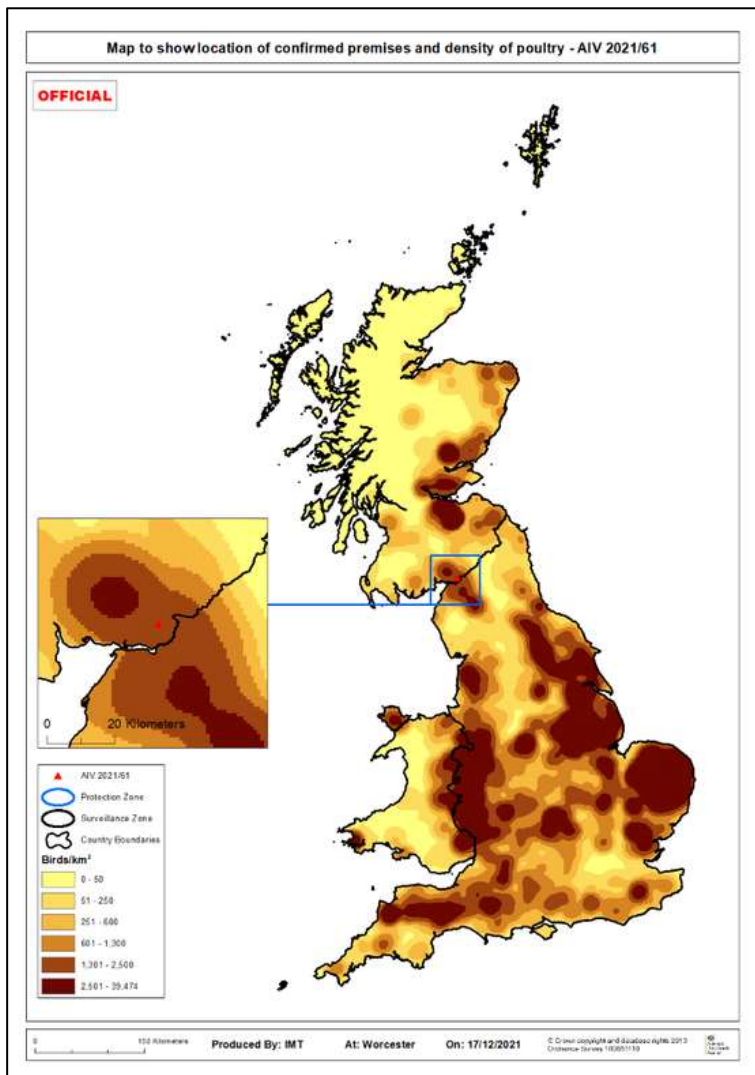


Overview of biosecurity

The birds had been free ranging until they were housed on 04/12/2021. The housing was not birdproof and small birds were seen inside at the feeders. There were foot dips with non-approved disinfectant on entry to the shed. Designated footwear plus gloves was used when working with the birds. There were no movements of birds on or off during the tracing windows.

Map with location in Great Britain and poultry density

Figure 199: Location of IP and poultry density



Overview of the surrounding area

This rural and lowland IP is set in a mixed agricultural landscape relatively close to estuarine habitats.

Ornithological assessment:

Desktop assessment: Wildfowl were abundant in the wider landscape and produced a known substantial source of infection at a moderate distance from the IP though it is less clear if any nearby source of infection occurred there. Wildfowl may have contaminated surfaces at the IP with these infection pathways producing some infection pressure.

Clinical picture

14/12/2021 – One goose, two cockerels and one chicken were found dead overnight with no previous clinical signs. Suspicion of avian notifiable disease was reported, and a report case investigation was carried out. There were no other clinical signs apart from the geese being subdued. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	10/12/2021 to 12/12/2021
Likely:	29/11/2021 to 09/12/2021
Precautionary:	23/11/2021 to 28/11/2021

Spread tracings window:

High-risk:	11/12/2021 to 14/12/2021
Likely:	30/11/2021 to 10/12/2021
Precautionary:	24/11/2021 to 29/11/2021

Most likely date of infection: 10/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 200: Source and spread timeline for AIV 2021/61

o	Spread Tracing Window	Date	
Day 20		23/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		24/11/21	Start of precautionary spread tracing window (source + 24h).
Day 18		25/11/21	
Day 17		26/11/21	
Day 16		27/11/21	
Day 15		28/11/21	
Day 14		29/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	30/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	01/12/21	
Day 11	Day 3	02/12/21	
Day 10	Day 4	03/12/21	
Day 9	Day 5	04/12/21	
Day 8	Day 6	05/12/21	
Day 7	Day 7	06/12/21	
Day 6	Day 8	07/12/21	
Day 5	Day 9	08/12/21	
Day 4	Day 10	09/12/21	
Day 3	Day 11	10/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	11/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	12/12/21	
	Day 14	13/12/21	Goose lethargic. Precautionary initial clinical signs.
	Day 15	14/12/21	Sudden death of 1 goose, 2 cockerels and 1 hen. Initial clinical signs. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/125). Restrictions served.
	Day 16	15/12/21	HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-61
	Day 17	16/12/21	
	Day 18	17/12/21	Cull Started and finished. Preliminary C and D completed
	Day 19	18/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

20 premises with poultry holding between 1-31,797 birds (four premises with 50 or more birds)

SZ (3-10 km)

54 premises with poultry holding between 1-230,000 birds (14 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The biosecurity was poor and the bird accommodation was not wild bird or vermin proofed.

The culling dates of AIV 2021/35 preceded the likely infection date but the prevailing wind direction at the time did not support the hypothesis of spread from AIV 2021/35.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty

AIV 2021/62, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

This was a large commercial chicken layer (caged and free-range) farm, part of a wider poultry company with several other IPs identified, including AIV 2021/51, AIV 2021/54, AIV 2021/57, AIV 2021/64, and AIV 2021/65.

It included an egg packing centre that received the eggs from the houses with caged birds (houses 1 to 3). The free-range houses (houses 4 to 9) supplied eggs to the main egg packing station owned by the company. Exceptionally, packaged eggs might have been delivered from this premises packing station to the company's main egg packing station.

Species and number of each present

616,512 layer chickens aged 24-72 weeks

Description of the housing

Poultry was kept in 9 houses:

Houses 1 to 3, with 183,000, 136,512 and 185,000 respectively (caged). Metal sheet covered buildings with fan driven ventilation. Dedicated staff (separate from houses 4 to 8). Generally, staff were appointed to either care for the birds or to the packing centre, although two members of staff were sometimes involved in both.

Houses 4 to 6, with 16,000 birds each (usually free-range). Flat deck systems.

House 7 to 9, with 32,000 birds each (usually free-range). Multitier system. Concrete buildings with pop holes on each side and natural ventilation. House 7 (the first affected by HPAI) was subdivided in two sides, each split into 4 sections with 4000 birds in each section.

Birds were placed in February 2021 from other premises owned by the same company.

Houses 7, 8 and 9 had a system where manure collection was required. The belt was activated from inside the egg room. Although this was done whenever possible by the staff on site, staff may not always have been available to ensure this.

All birds had been permanently housed on 29/11/2021 (at the beginning of the likely source and spread window for this IP) due to the AI risk

Plan of the infected premises

Figure 201: Plan of AIV 2021/62 houses 4 – 8

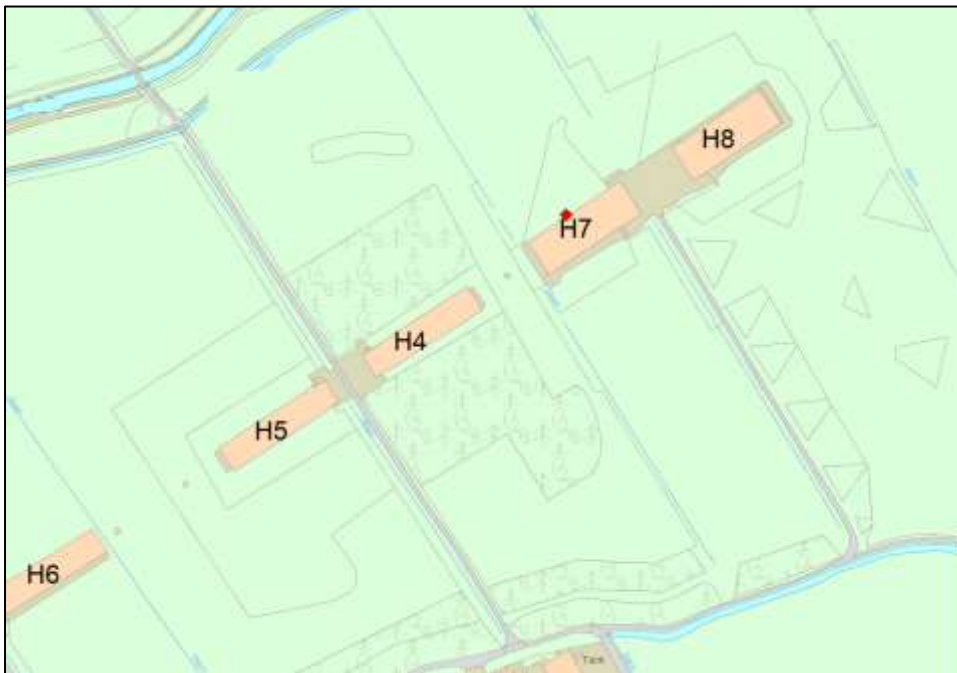
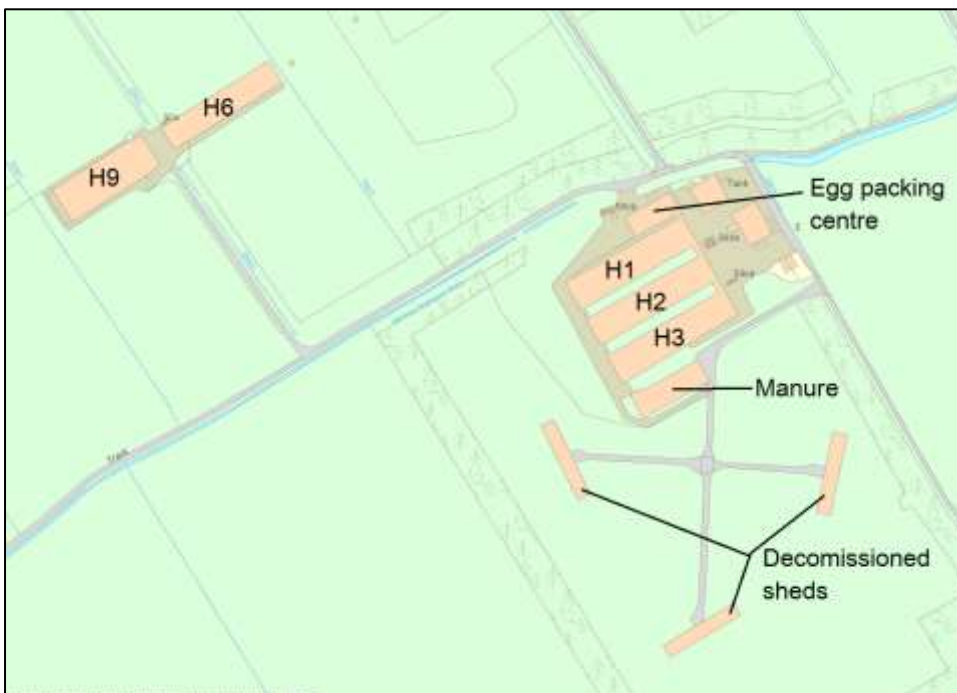


Figure 202: Plan of AIV 2021/62 houses 1 – 3, 6 and 9



Overview of biosecurity

There was a secure entry barrier, with vehicle disinfection prior to entering and manned checks as well as the provision of PPE and C&D facilities between clean and dirty areas and between bird areas.

The packing centre did not collect eggs from other premises and the staff working on houses 1,2,3 were dedicated to those houses. However, staff in the free-range houses did occasionally work on other company sites.

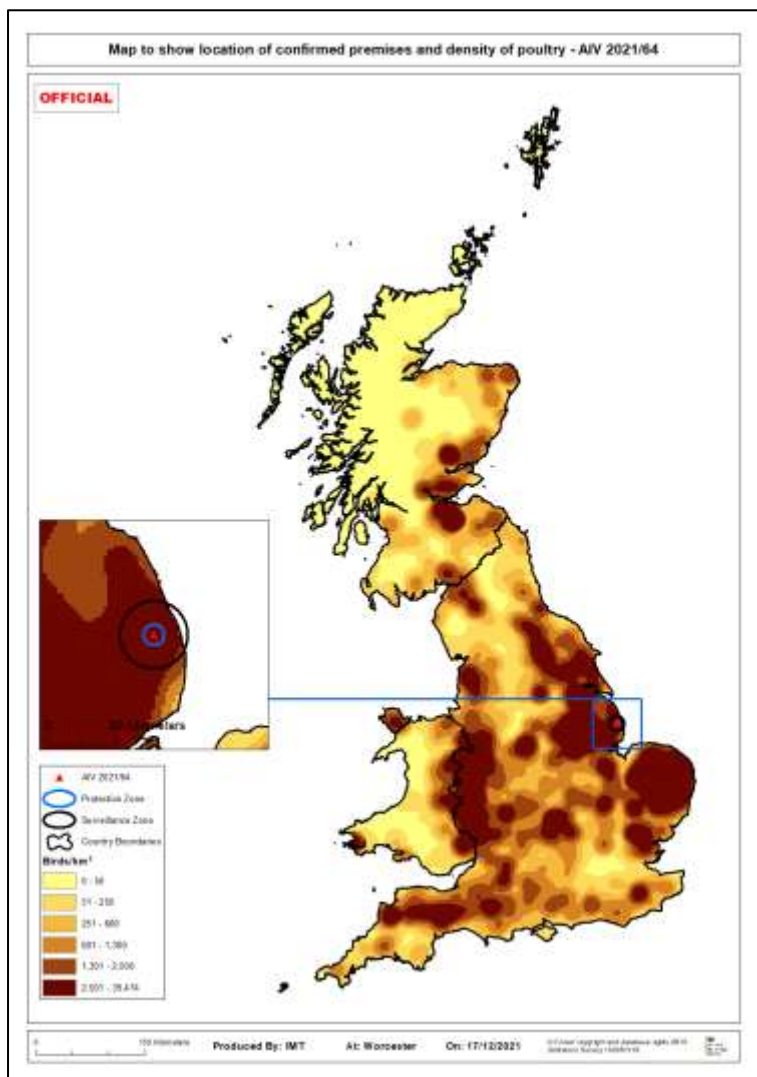
There was a boot disinfection point at the entry to the houses and another disinfection point immediately after entry, with a clean and dirty designated area made from wooden boards with approximately 30 cm height. Houses had a concrete apron.

Between houses 1-3 and houses 7-8 there was a second wheel disinfection point.

There were, however, reports of potential ways for wild birds to access poultry houses through range gates not closing properly.

Map with location in Great Britain and poultry density

Figure 203: Location of IP and poultry density



Overview of the surrounding area

The premises was in a high poultry density area, approximately 7 km from the coast, and in an area where multiple IPs had been also identified, although it was over 6 km from the nearest IP.

Ornithological assessment:

Desktop assessment: This concluded that wild birds were a likely source of infection pressure. This was a combined assessment covering seven IPs – five in relative geographical proximity (AIV 2021/51, AIV 2021/53, AIV 2021/57, AIV 2021/58, AIV 2021/64) and two more distant (AIV 2021/54, AIV 2021/62).

Local intelligence: There were many wild birds on site or flying over, including geese, due to the proximity of waterways. There was a river close by and several drainage ditches ran next to the housing as the farm itself was below sea level.

Clinical picture

13/12/2021 – high mortality was seen in house 2 but it was attributed to a fault in water supply. This was supported by the fact that no further deaths were recorded following the repair of the faulty line.

14/12/2021 – a sudden increase in mortality was seen in section 3 of house 7 (housed free-range) and suspicion of notifiable avian disease was reported.

15/12/2021 – the APHA investigation noted increasing mortality in house 7. A third of the birds remaining alive were showing some clinical signs including recumbency and lethargy and most affected birds had crops full of water with no food in it. Many birds showed conjunctivitis, head oedema and congested combs and wattles. Water consumption appeared to have decreased from 14/12/2021. Samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk:	09/12/2021 to 12/12/2021
Likely:	28/11/2021 to 08/12/2021
Precautionary:	23/11/2021 to 27/11/2021

Spread tracings window:

High-risk:	10/12/2021 to 14/12/2021
Likely:	29/11/2021 to 09/12/2021
Precautionary:	24/11/2021 to 28/11/2021

Most likely date of infection: 09/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 204: Source and spread timeline for AIV 2021/62

Source Tracing Window	Spread Tracing Window	Date	
Day 19		23/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		24/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		25/11/21	
Day 16		26/11/21	
Day 15		27/11/21	
Day 14		28/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	29/11/21	Start of likely spread tracing window (source tracing window +24h). Birds housed.
Day 12	Day 2	30/11/21	
Day 11	Day 3	01/12/21	
Day 10	Day 4	02/12/21	
Day 9	Day 5	03/12/21	
Day 8	Day 6	04/12/21	
Day 7	Day 7	05/12/21	
Day 6	Day 8	06/12/21	
Day 5	Day 9	07/12/21	
Day 4	Day 10	08/12/21	
Day 3	Day 11	09/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	10/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	11/12/21	
	Day 14	12/12/21	Precautionary onset of clinical signs - based on production records.
	Day 15	13/12/21	Initial notification to APHA - deaths in House 2. Water stoppage noted. Mortalities ceased once repaired. NFA required
	Day 16	14/12/21	Notification of suspicion of disease to APHA. Increasing mortality in House 7 (House 2 clinically recovered). Verbal restrictions served (DPR 2021/126).
	Day 17	15/12/21	APHA investigation and sampling. Restrictions served.
	Day 18	16/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/62.
	Day 19	17/12/21	
	Day 20	18/12/21	
	Day 21	19/12/21	
	Day 22	20/12/21	Culling commenced.
	Day 23	21/12/21	
	Day 31	29/12/21	
	Day 32	30/12/21	
	Day 33	31/12/21	Culling completed
	Day 34	01/01/22	
	Day 43	10/01/22	
	Day 44	11/01/22	Preliminary C&D completed.
	Day 45	12/01/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

19 premises with poultry holding between 2-69 birds (2 premises with 50 or more birds)

SZ (3-10 km)

166 premises with poultry holding between 1-106,000 birds (24 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were instructed for movements of eggs, personnel and feed during the high-risk tracing window. The enquiries identified 6 traced premises of which 5 were already under restrictions due to commercial links or, in 1 case, concurrent infection. Where a premises became an IP, tracing activities were superseded. The other premises remained under restrictions until, following a veterinary inspection, the risk was assessed as low.

Egg samples were also traced to a private vet where the risk was assessed as very low, allowing the tracing to be closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds, assessed as high likelihood with medium uncertainty.

Assessment and evidence base for the likely source

Ornithological assessment identified wild birds as a likely source of infection pressure, with local knowledge of wild birds on site or flying over, with a river close by and several drainage ditches running next to the housing.

Poor biosecurity had been identified in the wider company, possibly leading to likely breaches of biosecurity.

There had been wild bird incursions into sheds in the past and although improvements had been made, deficiencies in the structural integrity of the buildings were still clearly visible with some disruption to air vent coverings.

There were reports from the first affected house (7) of gaps around blocked up pop holes which could potentially have allowed ingress of rodents/wild birds. For this reason, direct contact with infected wild birds was assessed as medium likelihood and medium uncertainty.

Indirect introduction from domestic flock infection was assessed as medium likelihood with medium uncertainty, as there were links (egg collections, staff, feed deliveries) identified between the different IPs from the same company and biosecurity was poor.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

Indirect spread from domestic flock infection was assessed as medium likelihood with medium uncertainty, as there were links (egg collections, staff, feed deliveries) identified between the different IPs from the same company and biosecurity was poor.

Remaining uncertainty

As noted in source and spread assessments.

AIV 2021/63, Near Thirsk, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial unit containing broiler chickens. The unit was one of five located on a disused airfield in North Yorkshire. The other units had been populated with turkeys and all had become IPs with the most recent one having been confirmed 19 days prior to confirmation of disease on this premises. These five units were owned by a large, fully integrated poultry company which had many turkey and broiler rearing and breeding sites across the UK.

The site also included a green waste composting plant, a biomass enterprise and land for storing logs. Each unit had two biomass boilers associated with it.

Species and number of each present

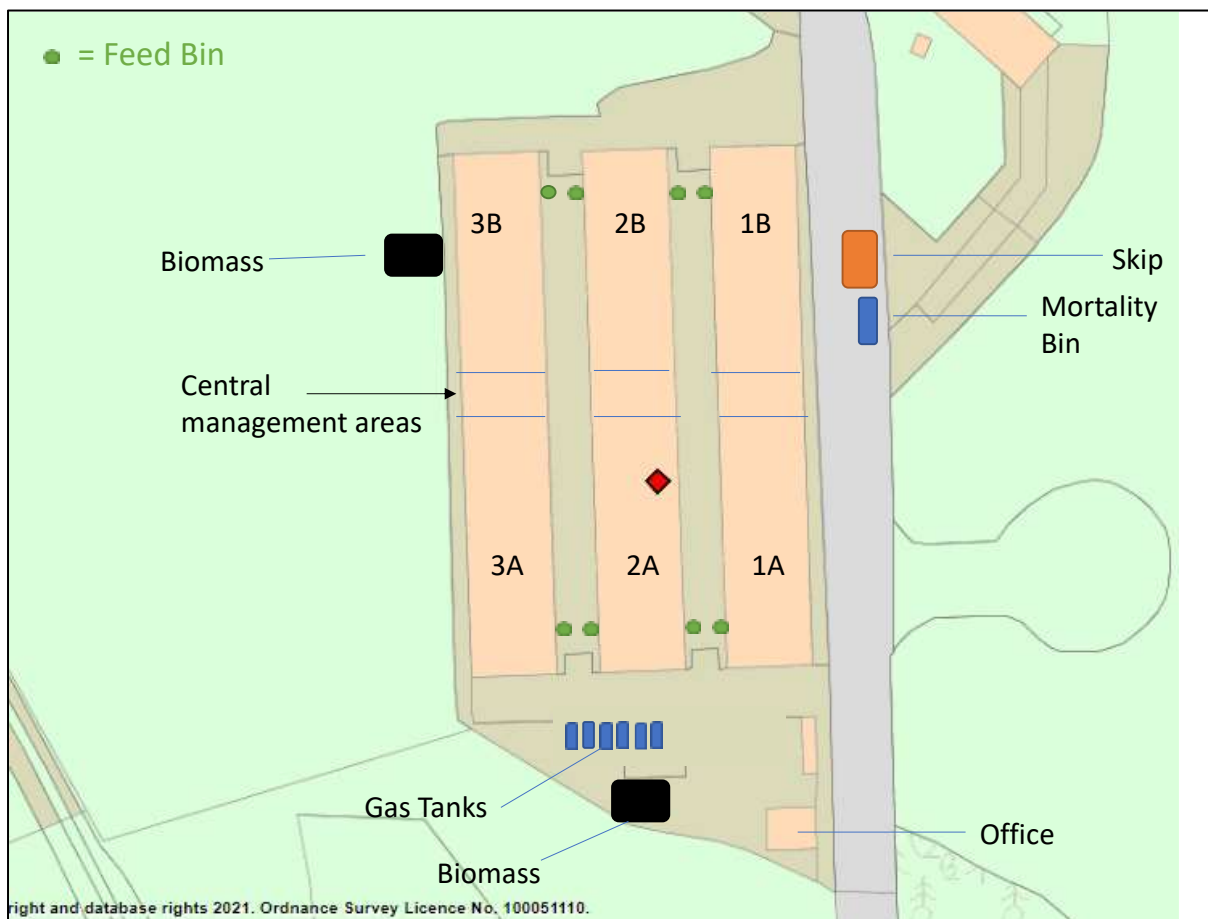
At the time of the report case, there were approximately 109,000 broiler chickens aged 31-32 days old. These were divided across three houses, each of which had two sections with separate airspaces. Each airspace section held approximately 17,500 birds.

Description of the housing

The unit comprised three wooden houses, each with two separate airspaces. There was one management area in the centre of each house. The houses were generally well maintained and the outside areas were clean and tidy.

Plan of the infected premises

Figure 205: Plan of AIV 2021/63



Overview of biosecurity

On the whole, the unit was considered to have good biosecurity and this was reflected across all the units on this site. A series of standard operating procedures were in place and there was a system of continual staff training. There were two members of staff dedicated to the unit and company protocol prohibited them from keeping poultry at home. A visitors' book was maintained in the office, although routine staff were not required to sign in.

PERSONNEL: There was a boot dip prior to entry to the office. Once in the office, staff changed into unit dedicated wellingtons and sometimes also unit dedicated overalls. There was a further foot dip for entry to the bird houses. Once inside the houses, there was a barrier system for entering each separate section. At this point, wellingtons were swapped for a different pair which are only used inside the bird areas. Plastic boot covers were used for visitors if there were not enough wellingtons. Provision of a further foot dip prior to entry to the bird areas was variable. Apart from wellingtons and boot covers, other clothing was not changed when moving between bird areas.

HOUSING: The housing was generally well maintained and wild birds would not have been able to enter.

DELIVERY VEHICLES: Vehicles such as feed wagons had to enter through a barrier. There were facilities for wheel cleansing and disinfection. Drivers were required to wear boot covers.

FEED: Feed was supplied by the company's own mill. It was blown into bins which were located on concrete alleyways between houses.

BEDDING: Wood shavings for the next flock were brought in after cleansing and disinfection was complete following depopulation. Top up bedding had not been required for this flock.

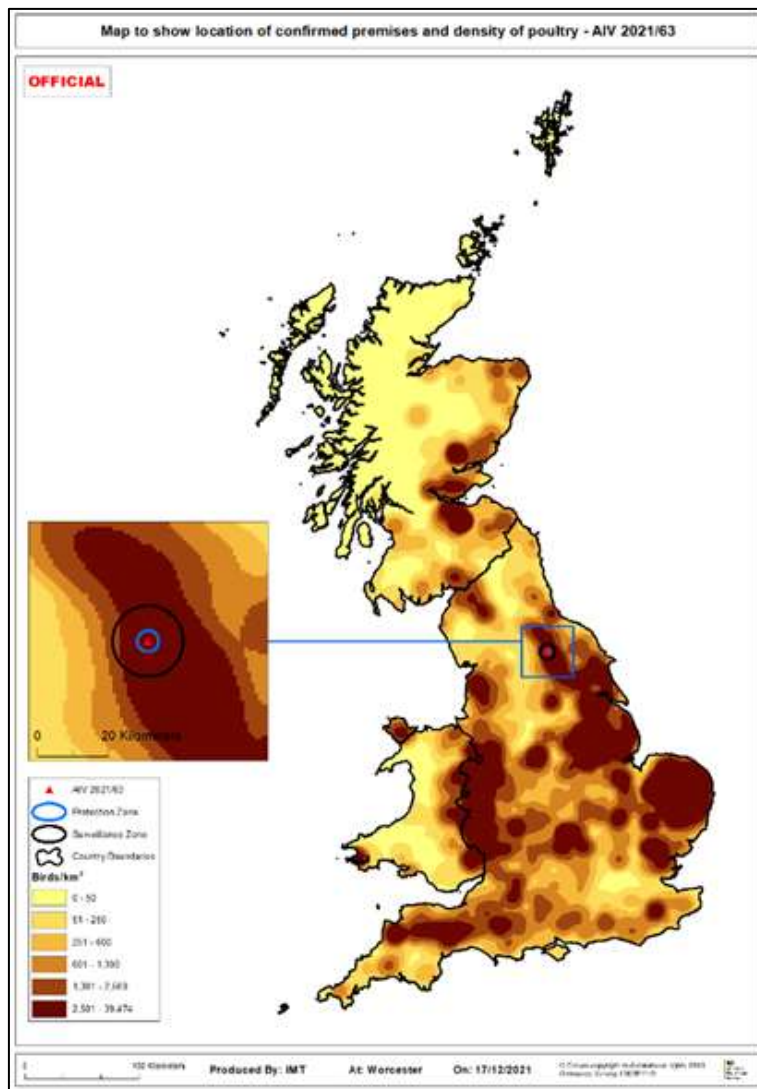
WATER: Mains supply with storage in covered header tanks.

ABP: Dead birds were stored in a freezer and once this was full, frozen carcasses were transferred in a loader bucket into a bin which was outside the boundary of the unit. Collection was carried out monthly.

VERMIN: Pest control was carried out routinely and records were available. Rodent activity had been observed around the unit and this had been documented.

Map with location in Great Britain and poultry density

Figure 206: Location of IP and poultry density



Overview of the surrounding area

There were two buildings adjacent to this unit. One was destined to become a steel fabrication company and the other was a utilities depot. The unit was one of five poultry units on the airfield site. All units were within 1 km of each other. There was a pig unit and pet crematorium adjacent to the airfield site and an unrelated laying unit approximately 1 km away which subsequently became an IP. The area had high poultry density and a significant amount of pig production. More widely, there was arable ground and a river to the west. There were various gamebird shoots nearby.

Ornithological assessment:

Desktop assessment: Bridge species were considered likely to be common and appeared to present the most likely potential wild bird infection pathway onto the site.

Both gulls and corvids were likely to visit the wider airfield site and approach buildings to contaminate surfaces. Although wildfowl, waders and other water birds are likely to be generally common in the landscape, it was not thought that they would pose significant infection pressure on this IP. Passerines were not thought to be significant here.

Local intelligence: Pheasants were seen around the unit at the time of the investigation. Large numbers of geese had been seen flying over in recent weeks.

Clinical picture

11/12/2021 -10 birds were found dead in section 3A.

12/12/2021 – 12 birds were found dead.

13/12/2021 – a further 29 birds were found dead in the same section. The private vet investigated suspicion of notifiable avian disease was reported.

14/12/2021 – at the APHA investigation, a further 50 birds had died. Clinical signs at this stage included lethargy, recumbency, gasping, discolouration of the throat and seizures which were quickly followed by death. Mortality rate in section 3A increased over the next few days and section 2A and 2B also became affected.

Although the most notable increase in deaths above normal fluctuations for the flock was seen on 13/12/2021, the number of deaths on 12/12/2021 and 11/12/2021 was above recent normal fluctuations (although such numbers had been recorded earlier in the flock). On this basis, a precautionary approach was taken and the onset of clinical signs was considered to be 11/12/2021.

Timeline

Tracings windows

Source tracings window:

High-risk:	08/12/2021 to 10/12/2021
Likely:	27/11/2021 to 07/12/2021
Precautionary:	23/11/2021 to 26/11/2021

Spread tracings window:

High-risk:	09/12/2021 to 14/12/2021
Likely:	28/11/2021 to 08/12/2021
Precautionary:	24/11/2021 to 27/11/2021

Most likely date of infection: 08/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 207: Source and spread timeline for AIV 2021/63

Source Tracing Window	Spread Tracing Window	Date	
		18/11/21	
		19/11/21	
		20/11/21	
		21/11/21	
		22/11/21	
Day 18		23/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		24/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		25/11/21	
Day 15		26/11/21	
Day 14		27/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	28/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	29/11/21	
Day 11	Day 3	30/11/21	
Day 10	Day 4	01/12/21	
Day 9	Day 5	02/12/21	
Day 8	Day 6	03/12/21	
Day 7	Day 7	04/12/21	
Day 6	Day 8	05/12/21	
Day 5	Day 9	06/12/21	
Day 4	Day 10	07/12/21	
Day 3	Day 11	08/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	09/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	10/12/21	
	Day 14	11/12/21	Precautionary onset of clinical signs. 10 birds found dead in section 3A. Although this is just above recent normal fluctuations, mortalities continued to rise from here.
	Day 15	12/12/21	12 birds found dead in section 3A
	Day 16	13/12/21	29 birds found dead in 3A, 22 birds found dead in 1A (both significant increase above recent normal levels)
	Day 17	14/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/127). Restrictions served.
		15/12/21	
		16/12/21	HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-63.
		17/12/21	HPAI H5N1 confirmed.
		18/12/21	VFEI Investigation. Culling commenced
		19/12/21	
		20/12/21	
		21/12/21	
		22/12/21	Culling completed
		23/12/21	
		24/12/21	
		25/12/21	
		26/12/21	
		27/12/21	
		28/12/21	
		29/12/21	
		30/12/21	
		31/12/21	
		01/01/22	
		02/01/22	
		03/01/22	
		04/01/22	
		05/01/22	
		06/01/22	
		07/01/22	Preliminary C&D completed
		08/01/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

46 premises with poultry holding between 1-128,400 birds (11z premises with 50 or more birds)

SZ (3-10 km)

187 premises with poultry holding between 1-240,000 birds (29 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for a private vet, a maintenance engineer who visited to service the boiler, and another maintenance engineer who attended the feeders.

All tracings were assessed as being very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds. This was attributed a high likelihood assessment with low uncertainty.

Assessment and evidence base for the likely source

Tracing investigations have not identified any likely transmission pathways onto this unit. All pathways assessed were found to be low, very low or negligible likelihood. Biosecurity protocols for visiting personnel and vehicles were generally considered to be good.

Although biosecurity for regular personnel and routine management was generally also good, rodent activity had been observed and recorded around the unit. It was acknowledged that vermin control is a constant challenge across the whole airfield site. Rodents can mediate fomite transmission of the virus if they become contaminated with it.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

Tracing investigations have shown that all other potential spread pathways were very low likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/64, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

The IP was a commercial organic free-range layer and rearing unit. Birds presumably fully housed since 29/11/21 (date of the housing order, at the beginning of the likely source and spread windows), although there was some uncertainty on the exact housing date.

The IP was part of a wider poultry company within which several other IPs were identified.

Species and number of each present

Approximately 34,000 chickens

Description of the housing

The birds were distributed in 7 houses (6 layer units and 1 rearing unit).

House 1: Multitier, 3,000 birds at 72 weeks

House 2: Multitier, 3,000 birds at 72 weeks

House 3: Multitier, 3,000 birds at 71-72 weeks

House 4: Multitier, 3,000 birds at 71 weeks

House 5: Flat-deck, 3,000 birds at 79 weeks

House 6: Flat-deck, 3,000 birds at 79 weeks

Rearing unit: Flat-deck, 16,000 birds at 2 weeks

Layer units were distributed in pairs (1-2, 3-4, and 5-6). There was a concrete apron at the front and rear of all layers sheds. Each house had an egg store at the end of the building with a wall separating the store from the birds.

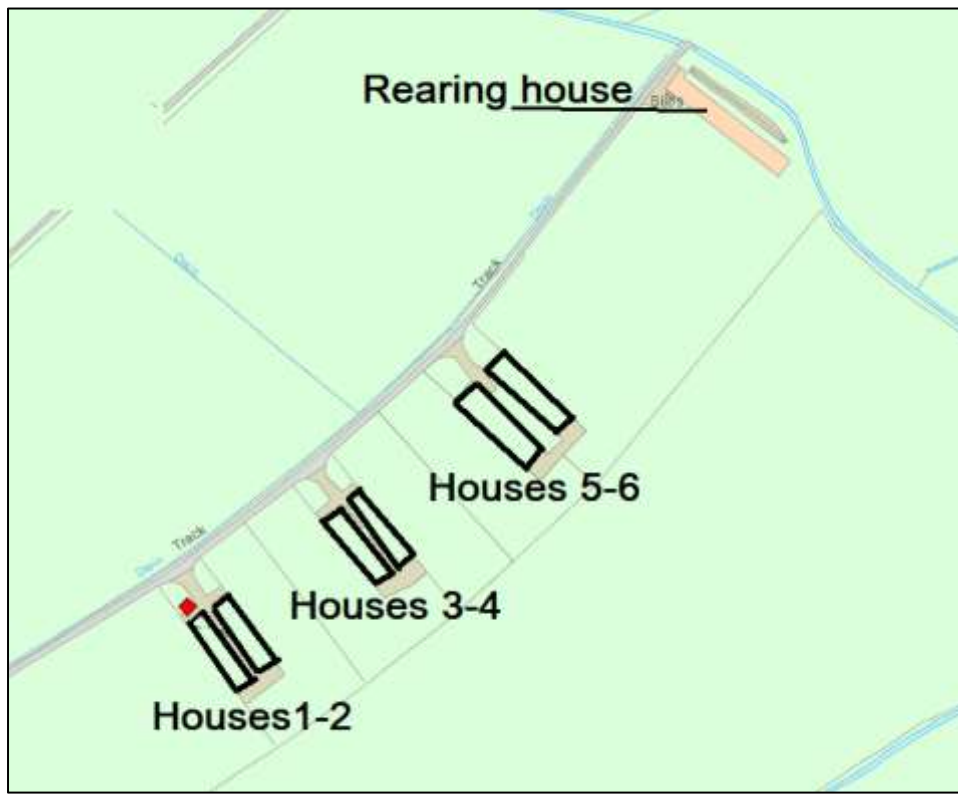
Houses 1 (affected), 2, 3 and 4 had steel sheet lateral walls and exit flaps, nylon sheet roofs, ventilation on the lateral walls of the houses mechanised or natural.

Houses 5 & 6 had side walls constructed of mesh with rolled nylon adjustable sheeting for environmental control, with natural ventilation only.

There were some areas where wild birds could have had contact with birds in the sheds either due to damage to the fabric of the building or due to the design.

Plan of the infected premises

Figure 208: Plan of AIV 2021/64



Overview of biosecurity

The six layer units were staffed by just one egg picker and overseen by a Farm Manager who also managed some of the units in the wider company. The IP staff would go to another company farm (later confirmed as AIV 2021/51) to clock in and out at the machine in the canteen there. IP equipment including disinfectant and PPE was also stored at that farm and provision of it on site was organised by the farm manager. Biosecurity of movements of staff and equipment between sites was poor. Once the first report case was present in the company group, the pattern of staffing changed trying to improve biosecurity.

The rearing unit was staffed by a worker who would only attend the rearing unit and not the layers. He also worked at another company farm (later confirmed as AIV 2021/57) as well as vaccinating birds at other company sites.

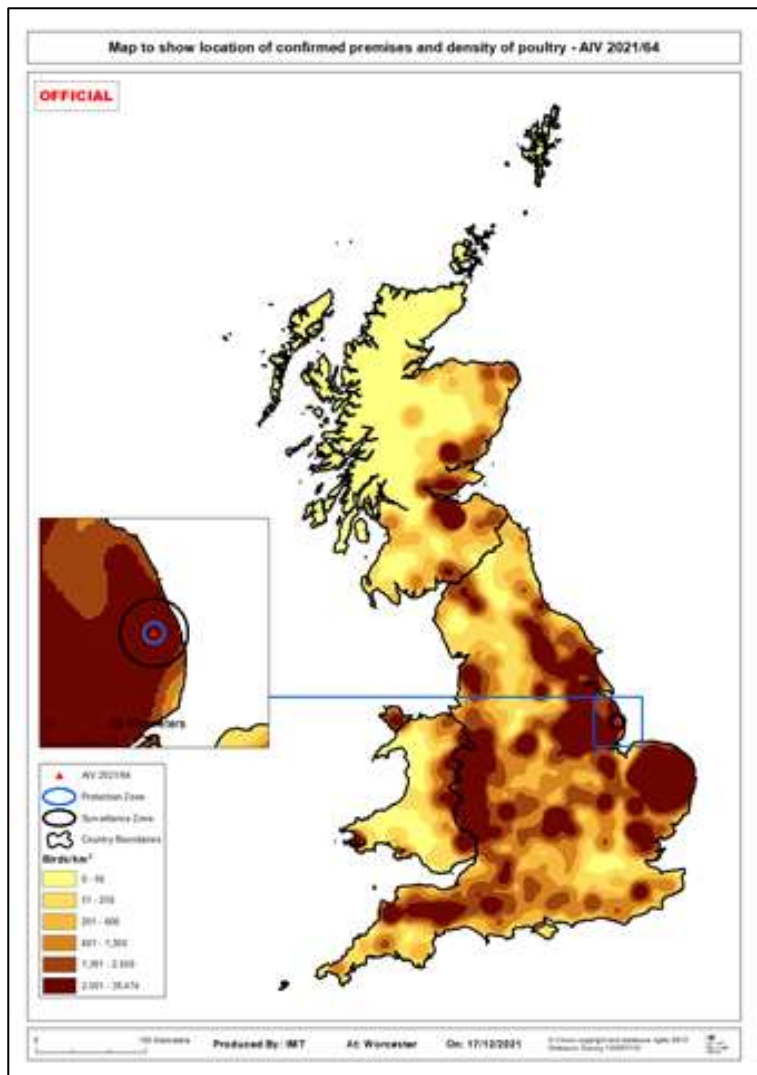
Boot dips for disinfection of footwear were present but the investigation noted important uncertainty regarding consistency and effectiveness of their use at this IP.

Pest control was undertaken in-house, with rats and droppings seen on site.

There was a large wheelie bin adjacent to House 4 for storage of carcasses, with Animal By-Products regularly collected by contractor.

Map with location in Great Britain and poultry density

Figure 209: Location of IP and poultry density



Overview of the surrounding area

The premises was in an area of high poultry density and in close geographical proximity with other IPs, some of them from the same company.

Ornithological assessment:

Desktop assessment: A combined assessment covering this and six other IPs – four in relative geographical proximity (AIV 2021/51, AIV 2021/53, AIV 2021/57, AIV 2021/58) and two more distant (AIV 2021/54, AIV 2021/62) was conducted and concluded that wild birds were a likely source of infection pressure.

Local intelligence: Features likely to attract wild birds included a water filled ditch on the opposite side of the track to the poultry houses, and a flooded clay pit, around

200 m from House 1. Geese were roosting near IP and were seen flying low over the sheds at dusk.

Clinical picture

14/12/2021 – 12 hens were found dead in House,

15/12/2021 – 32 more hens found dead in the same house and suspicion of notifiable avian disease was reported. The other birds in House 1 were reported to be quiet and huddled.

At the APHA investigation the same day, over 50% of the hens in House 1 were dull and lethargic, with yellowish diarrhoea, swollen eyes with watery discharge, swollen heads and combs. On inspection of the records, egg production and water consumption were found to have decreased since 12/12/2021.

In houses 2, 3, 4, 5, and 6 there were no signs of HPAI infection. The rearing unit had been populated 2 weeks ago and the chicks presented no clinical signs.

Timeline

Tracings windows

Source tracings window:

High-risk:	09/12/2021 to 11/12/2021
Likely:	28/11/2021 to 08/12/2021
Precautionary:	24/11/2021 to 27/11/2021

Spread tracings window:

High:	10/12/2021 to 15/12/2021
Likely:	29/11/2021 to 09/12/2021
Precautionary:	25/11/2021 to 28/11/2021

Most likely date of infection: 09/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 210: Source and spread timeline for AIV 2021/64

Source Tracing Window	Spread Tracing Window	Date	
Day 18		24/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		25/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		26/11/21	
Day 15		27/11/21	
Day 14		28/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	29/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	30/11/21	
Day 11	Day 3	01/12/21	
Day 10	Day 4	02/12/21	
Day 9	Day 5	03/12/21	
Day 8	Day 6	04/12/21	
Day 7	Day 7	05/12/21	
Day 6	Day 8	06/12/21	
Day 5	Day 9	07/12/21	
Day 4	Day 10	08/12/21	
Day 3	Day 11	09/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	10/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	11/12/21	
	Day 14	12/12/21	Precautionary onset of clinical signs - based on production records.
	Day 15	13/12/21	
	Day 16	14/12/21	
	Day 17	15/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/128). Restrictions served.
	Day 18	16/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/64.
	Day 19	17/12/21	
	Day 20	18/12/21	
	Day 21	19/12/21	Culling commenced.
	Day 22	20/12/21	
	Day 23	21/12/21	Culling completed.
	Day 24	22/12/21	
	Day 25	23/12/21	
	Day 26	24/12/21	
	Day 27	25/12/21	
	Day 28	26/12/21	
	Day 29	27/12/21	
	Day 30	28/12/21	
	Day 31	29/12/21	
	Day 32	30/12/21	
	Day 33	31/12/21	
	Day 34	01/01/22	
	Day 35	02/01/22	
	Day 36	03/01/22	
	Day 37	04/01/22	Preliminary C&D completed.
	Day 38	05/01/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

27 premises with poultry holding between 1-393,000 birds (8 premises with 50 or more birds)

SZ (3-10 km)

129 premises with poultry holding between 1-225,500 birds (21 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

There was one egg collection during the high-risk tracing window which was assessed as being very low risk and the enquiry was closed. Tracing enquiries into the movements of farm workers and maintenance personnel identified 6 traced premises which were all already restricted due to established commercial links or in 1 case, concurrent infection. The other premises had a veterinary visit at least 21 days after contact with the IP and were assessed as being low risk.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds, with high likelihood and medium uncertainty

Assessment and evidence base for the likely source

An ornithological assessment identified wild birds as a likely source of infection pressure. Features likely to attract wild birds were present near the IP. Geese were roosting near the IP and were seen flying low over the sheds at dusk. Poor biosecurity on the farm was confirmed. Vermin issues were identified.

Direct contact with infected wild birds was assessed as medium likelihood with medium uncertainty as some opportunities were identified due to poor maintenance or design.

Indirect introduction from domestic flock infection was assessed as medium likelihood with medium uncertainty, as there were links (egg collections, staff, feed deliveries) identified between the different IPs from the same company and biosecurity was poor.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

Indirect spread from domestic flock infection was assessed as medium likelihood with medium uncertainty, as there were links (egg collections, staff, feed deliveries) identified between the different IPs from the same company and biosecurity was poor.

Remaining uncertainty

As noted in source and spread assessments.

AIV 2021/65, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a commercial free-range and organic laying premises, part of a large local integrated laying enterprise. Birds originated from another premises under the same ownership.

It was located within the surveillance zone (SZ) of two other infected premises AIV 2021/51 and AIV 2021/54 belonging to the same company.

Species and number of each present

24,000 chickens.

House 15 held 5,882 hens 73 week old,

House 4 held 6,000 hens 63 weeks old,

House 20 held 12,000 hens 56 weeks old.

Description of the housing

Although the IP normally operated as a free-range site, all birds had been housed since 27/11/2021. The holding comprised three houses, two (house 15 and house 20) very close to each other and one (house 4) further away. All three were serviced by the same (two) staff. There were a mixture of building types:

House 15 (initially affected) was of new construction, a single flat-deck with nesting boxes in the middle. It was well maintained.

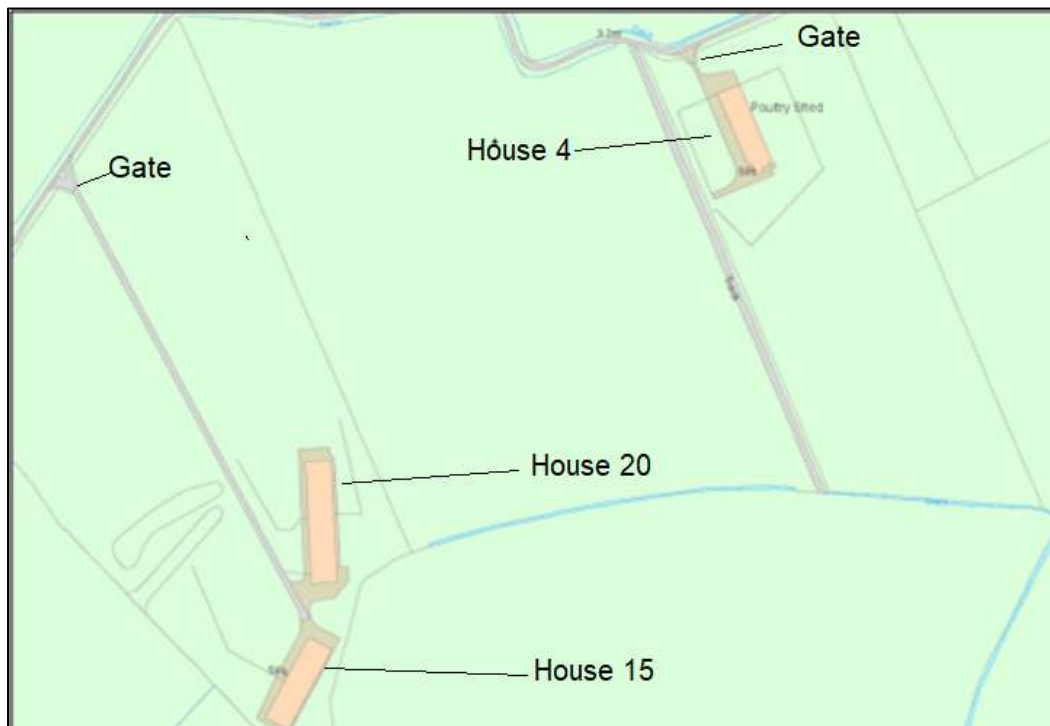
House 4 was a single, flat-deck of old construction, with nesting boxes in the middle. It was in reasonably good condition. and had access that was separate to the other 2 houses. The egg service/storage area was by the entrance of the house.

House 20 was a multi-tier shed, of new construction and well maintained. It had a manure belt (and was the only house in which manure was regularly removed during production). The egg service/storage area was by the entrance of the house.

All of the houses had natural ventilation.

Plan of the infected premises

Figure 211: Plan of AIV 2021/65



Overview of biosecurity

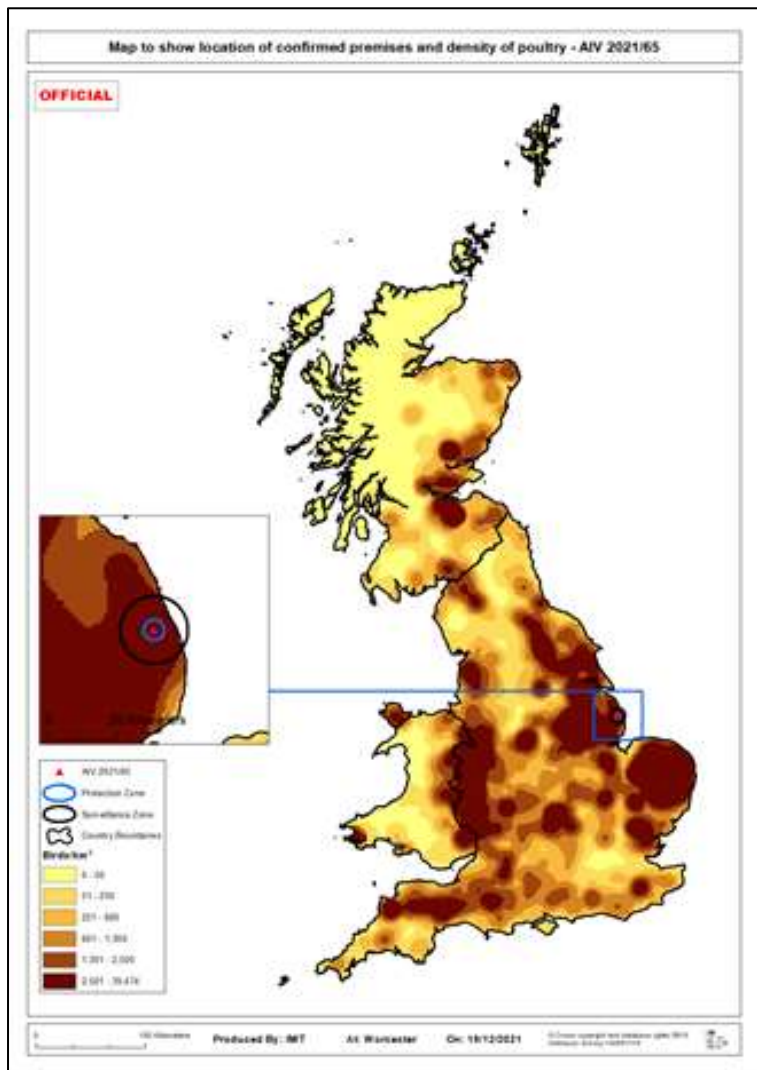
Biosecurity (the setting and routine procedures) was considered to be of an average to poor standard when compared to permanently housed poultry premises. This was an unsupervised site and adherence to biosecurity policies was not monitored or recorded. There was uncertainty on whether egg and feed trucks followed disinfection protocols on entry and movement around the site. There was no evidence that overalls were changed between houses, or that dip points were used for footwear.

Staff did not register in the visitor's log. The employment records indicated that until 20/12/2021 staff clocked in at the canteen at Ivy House, which became an infected premises (AIV 2021/51).

Bedding was stored outside on pallets in plastic wrapped bale that had evidence of bird faeces on them, and the plastic wrapping appeared to be torn in some places.

Map with location in Great Britain and poultry density

Figure 212: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density and it was located within the surveillance zone (SZ) of two other affected premises (AIV 2021/51 and AIV 2021/54) belonging to the same company as this IP.

Ornithological assessment

Desktop assessment: A combined assessment for the geographical cluster of IPs was carried out as they shared many features relevant to this assessment, and due to the coincidence in time of these cases (temporal cluster). The assessment identified wild birds, as the likely source of infection pressure.

Local intelligence: The ranges were in good condition, with several wild bird species noted, including corvids and geese.

Clinical picture

16/12/2021 – Suspicion of notifiable avian disease was reported to APHA by the PVS following increased mortality in House 15, with no other remarkable clinical signs

16/12/2021 – at the APHA inspection, around 300 dead birds were reported dead and another 15-20% on the same section of the house presented with profound dullness and malaise, clear nasal exudate, pyrexia, diarrhoea, swollen eyelids and were unable to stand. Records of feed intake and egg production for the affected house showed a marked decline. Samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk:	10/12/2021 to 12/12/2021
Likely:	29/11/2021 to 09/12/2021
Precautionary:	24/11/2021 to 28/11/2021

Spread tracings window:

High-risk:	11/12/2021 to 16/12/2021
Likely:	30/11/2021 to 10/12/2021
Precautionary:	25/11/2021 to 29/11/2021

Most likely date of infection: 10/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 213: Source and spread timeline for 2021/65

Source Tracing Window	Spread Tracing Window	Date	
Day 19		24/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		25/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		26/11/21	
Day 16		27/11/21	Birds housed.
Day 15		28/11/21	
Day 14		29/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	30/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	01/12/21	
Day 11	Day 3	02/12/21	
Day 10	Day 4	03/12/21	
Day 9	Day 5	04/12/21	
Day 8	Day 6	05/12/21	
Day 7	Day 7	06/12/21	
Day 6	Day 8	07/12/21	
Day 5	Day 9	08/12/21	
Day 4	Day 10	09/12/21	
Day 3	Day 11	10/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	11/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	12/12/21	
	Day 14	13/12/21	Precautionary onset of clinical signs - based on production records.
	Day 15	14/12/21	
	Day 16	15/12/21	Notification of suspicion of disease to APHA. Verbal restrictions served (DPR 2021/129).
	Day 17	16/12/21	APHA investigation and sampling. Restrictions served.
	Day 18	17/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/65.
	Day 19	18/12/21	
	Day 20	19/12/21	
	Day 21	20/12/21	Culling commenced.
	Day 22	21/12/21	
	Day 23	22/12/21	
	Day 24	23/12/21	Culling completed.
	Day 25	24/12/21	
	Day 26	25/12/21	
	Day 27	26/12/21	
	Day 28	27/12/21	
	Day 29	28/12/21	
	Day 30	29/12/21	
	Day 31	30/12/21	
	Day 32	31/12/21	
	Day 33	01/01/22	
	Day 34	02/01/22	
	Day 35	03/01/22	
	Day 36	04/01/22	Preliminary C&D completed.
	Day 37	05/01/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

29 premises with poultry holding between 2-22,700 birds (5 premises with 50 or more birds)

SZ (3-10 km)

156 premises with poultry holding between 1-393,000 birds (25 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing enquiries were instructed for a collection of eggs, a delivery of feed and movements of farm workers and maintenance personnel. Traced premises were already restricted due to established commercial links or concurrent infection. Those that were not IPs had a veterinary inspection at least 21 days after contact with this IP, and were assessed as being low risk.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Indirect contact with infected wild birds was assessed as highly likely with medium uncertainty. Ornithological assessment identified wild birds as likely source of infection pressure. Biosecurity was poor including bedding stored outdoors showing evidence of contamination with bird droppings.

However, indirect introduction from other domestic flocks could not be ruled out and was assessed as medium likelihood with medium uncertainty. The IP was geographically close to AIV 2021/51 and AIV 2021/54 and linked by commercial operations (egg collection, feed delivery, ABP collections, staff sharing) with evidence of poor biosecurity.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being very low likelihood as traced premises were already restricted due to established commercial links or concurrent infection. Those that were not IPs had a veterinary inspection at least 21 days after contact with this IP and were assessed as being low risk.

Remaining uncertainty

As stated above, some uncertainty remains on likely source pathway, which is explored in the cluster report.

AIV 2021/66, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial, free-range chicken laying premises, and all poultry had been housed since 29/11/2021.

The IP was a sister farm under the same ownership as another commercial free-range laying premises about 3 miles away which had been confirmed as IP AIV 2021/53 on 12/12/2021.

While not considered part of AIV 2021/53, it was restricted as a contact premises on 14/12/2021, and later confirmed as AIV 2021/66.

Eggs for both premises were collected by a local multisite commercial laying company, within which several other concurrent clustered AI outbreaks were identified.

The business operated an all-in all-out system. Point of lay pullets were placed after being reared in the rearing house on the sister farm.

Species and number of each present

Chicken (laying hens): 14000

Description of the housing

There were three poultry houses:

House 1 contained 3000 hens, 76 weeks of age.

House 2 contained 4000 hens, also 76 weeks of age.

House 3 contained 7000 hens, 56 weeks of age.

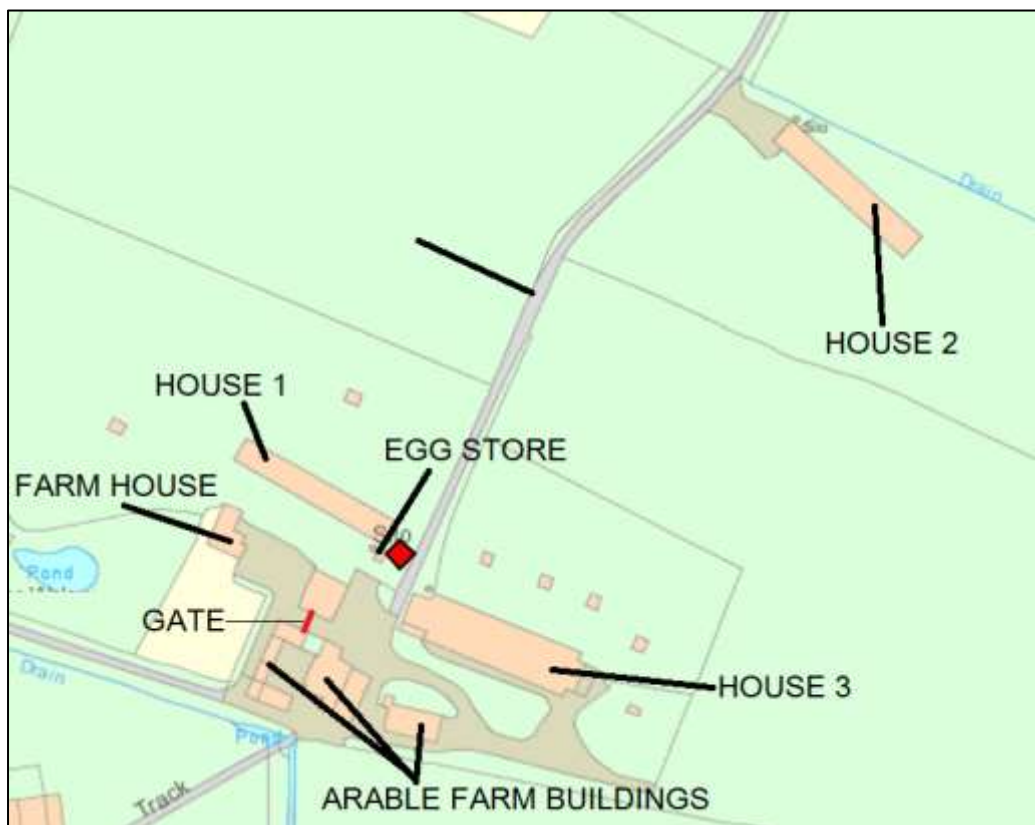
The sheds were single, flat-deck hen sheds, with natural ventilation and nesting boxes in the middle of the shed. All were designed for free-range operations, although permitted permanent housing of the birds as required.

Houses 1 and 2 were mobile sheds (although they always sat at the same location) with plastic roofs. The area around the houses was not concreted, and there was evidence of flooding around both houses when inspected.

House 3 was a timber and concrete shed with tin roof. The area around the house was not concreted

Plan of the infected premises

Figure 214: Plan of AIV 2021/66



Overview of biosecurity

In addition to the three houses, there were several buildings on both sides of the main road including:

The main farmyard, accessed via a lockable gate and with perimeter fence including a number of outbuildings (both for poultry and arable activities) and bird houses 1 and 3. Each house had an egg store. The egg store for House 1 was detached and near the entrance. The egg store was within House 3.

House 2 was located approximately 500 m away from the rest of the buildings and its egg store was within the house.

Staffing: Four people worked on the IP and on the sister farm (AIV 2021/53) and had access to the birds. None of them kept any other poultry/birds themselves. Up to 10/12/2021, there were movements of staff between the two farms to tend the birds (high-risk spread from AIV 2021/53 and high-risk source for this IP). From 11/12/2021, staff were dedicated to one of the two farms.

The farm usually operated as a free-range farm, and routine procedures were average to poor when compared to permanently housed poultry premises. There was a brief generic biosecurity procedure described, but it lacked detail to ensure effective risk mitigation. There was no clear written procedure or restrictions on the movement of personnel within the IP (or between IP and sister farm), and staff were

not generally dedicated to specific farm activities. Biosecurity measures aimed at mitigating the risk of disease spread within the farm (or between IP and sister farm) appeared to be insufficient.

There was a visitor book, which appeared to be up to date, but it did not record staff movements between the sister premises. Staff wore clean clothing/overalls and boots (or boot covers) on the farm.

External vehicles (egg collection, feed, ABP) needed to enter the perimeter of the farm and drove to the relevant areas near the poultry accommodation. There was no shower in/out system in place. There was a gate at the entrance of the farm, situated at the end of a country lane, with biosecurity signage and a sprayer with disinfectant (FAM 30-1%) available for vehicle wheels, wheel arches and mudflaps. However, this gated entrance was not the only access to the poultry housing area, with at least one other access identified, which was temporarily blocked during a retrospective inspection on 05/01/2022. The biosecurity procedure was not specific as to when and how to C&D vehicles, and compliance with any C&D of external vehicles was not monitored.

The area around the houses was not concreted and there was evidence of flooding around both houses when inspected on 5/01/2022. The farmer reported absence of flooding during the risk windows.

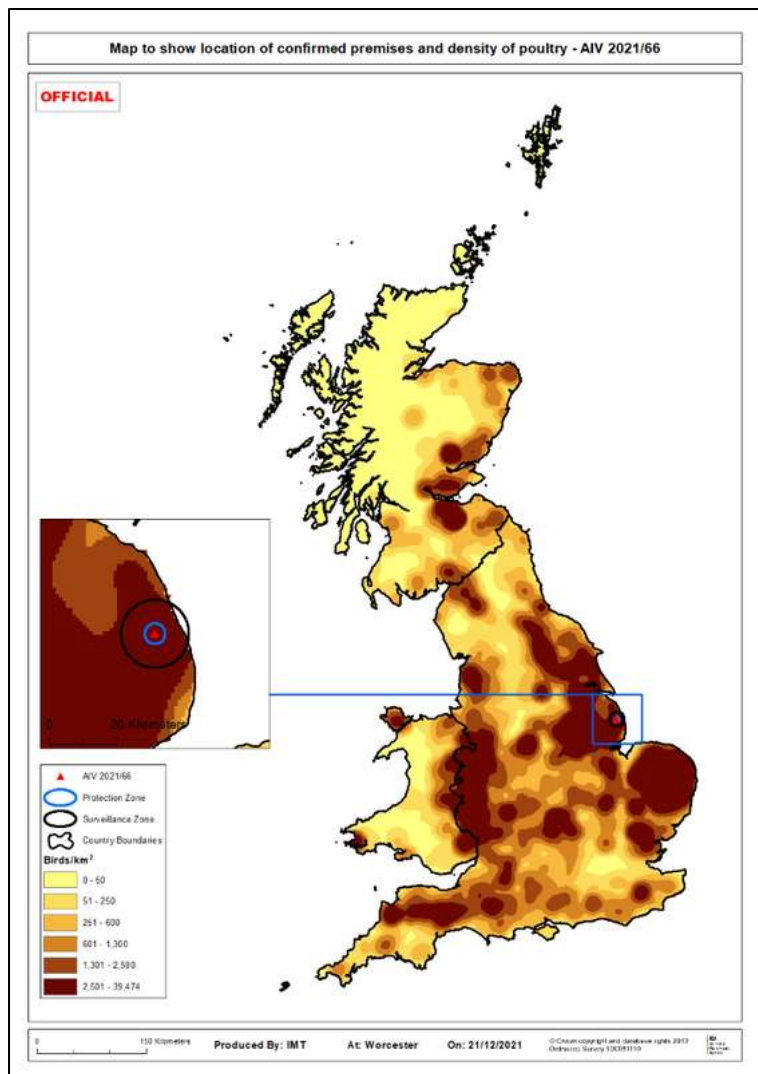
House 1 (the affected house) presented meshed side air vents with string mesh, which appeared damaged in several places, and would have allowed entry of wild birds. Gaps were also observed in the doors of house 1, which could have allowed rodent entry

Bedding (wood shavings) was stored indoors in plastic wrapping.

There as a double biosecurity barrier system in poultry houses, with foot dips present at entrances to each of the houses (outside the buildings) and again inside the reception areas after the barrier beside doors to the poultry area, with demarcation of dirty and clean areas where boots could be changed before entering sheds.

Map with location in Great Britain and poultry density

Figure 215: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density and was geographically close (within approximately 5 km) to AIVs 2021/51, 53, 54, 57, 58, 64 and 65

Ornithological assessment:

A combined assessment for the geographical cluster of IPs was carried out as they shared many features relevant to this assessment and due to the coincidence of these cases (temporal cluster). The assessment identified wild birds as a likely source of infection pressure.

Clinical picture

16/12/2021 – the owner reported suspicion of notifiable disease, starting in house 1 with increased mortality overnight and the birds being lethargic. Dead birds showing

swollen heads, congested combs and wattles and nasal secretion. The litter was wet indicating possible diarrhoea but there were no changes in egg production

17/12/2021 – at the APHA investigation, lethargy was reported in 20% of birds with hypothermic moribund birds in House 1, some displaying nervous tremors, diarrhoea (watery white/creamy faeces). Many had swollen eyelids with bright red wattle/combs and cyanotic skin above the hocks. A mortality of around 25% was reported overall in the affected house.

There were small numbers of lethargic birds in house 2 (four birds) and house 3 (six birds) with no other clinical findings initially reported. Samples were submitted.

Based on production records/clinical signs, the most likely date of infection was 10/12/2021

Timeline

Tracings windows

Source tracings window:

High-risk:	10/12/2021 to 12/12/2021
Likely:	29/11/2021 to 09/12/2021
Precautionary:	25/11/2021 to 28/11/2021

Spread tracings window:

High-risk:	11/12/2021 to 17/12/2021
Likely:	30/11/2021 to 10/12/2021
Precautionary:	26/11/2021 to 29/11/2021

Most likely date of infection: 10/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 216: Source and spread timeline for AIV 2021/66

Source Tracing Window	Spread Tracing Window	Date	
Day 21		22/11/21	Birds housed
Day 20		23/11/21	
Day 19		24/11/21	
Day 18		25/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		26/11/21	Start of precautionary spread tracing window (source + 24h).
Day 16		27/11/21	
Day 15		28/11/21	
Day 14		29/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	30/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	01/12/21	
Day 11	Day 3	02/12/21	
Day 10	Day 4	03/12/21	
Day 9	Day 5	04/12/21	
Day 8	Day 6	05/12/21	
Day 7	Day 7	06/12/21	
Day 6	Day 8	07/12/21	
Day 5	Day 9	08/12/21	
Day 4	Day 10	09/12/21	
Day 3	Day 11	10/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	11/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	12/12/21	
	Day 14	13/12/21	Precautionary onset of clinical signs - based on production records.
	Day 15	14/12/21	
	Day 16	15/12/21	
	Day 17	16/12/21	Notification of suspicion of disease to APHA. Verbal restrictions served (DPR 2021/130).
	Day 18	17/12/21	APHA investigation and sampling. Restrictions served.
	Day 19	18/12/21	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2021/66.
	Day 20	19/12/21	
	Day 21	20/12/21	
	Day 22	21/12/21	
	Day 23	22/12/21	Culling commenced and completed.
	Day 24	23/12/21	Preliminary C&D completed.
	Day 25	24/12/21	Preliminary C&D considered effective.
	Day 26	25/12/21	
	Day 27	26/12/21	
	Day 28	27/12/21	
	Day 29	28/12/21	
	Day 30	29/12/21	
	Day 31	30/12/21	
	Day 32	31/12/21	
	Day 33	01/01/22	
	Day 34	02/01/22	
	Day 35	03/01/22	
	Day 36	04/01/22	
	Day 37	05/01/22	
	Day 38	06/01/22	
	Day 39	07/01/22	
	Day 40	08/01/22	Preliminary C&D - partial reapplication.
	Day 41	09/01/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

33 premises with poultry holding between 1-100,000 birds (6 premises with 50 or more birds)

SZ (3-10 km)

152 premises with poultry holding between 1-393,000 birds (23 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for one feed delivery and the movement of farm workers. The feed delivery was assessed as being a very low risk, and the line of enquiry was closed. The farm workers were shared with another premises, which was already confirmed as an IP, so no further tracing activities were required. There were no egg collections during the high-risk tracing window.

Source investigations: Hypothesis for the source

The most likely source identified was indirect introduction from domestic infected poultry by fomite spread by staff working on AIV 2021/53, assessed as highly likely with medium uncertainty

However, indirect contact with wild birds was also assessed as highly likely with medium uncertainty. Direct contact with wild birds was assessed as medium likelihood with medium uncertainty

Assessment and evidence base for the likely source

There was shared staff accessing bird housing between this IP and sister site (later confirmed as AIV 2021/53) during the respective high-risk source and spread windows.

Biosecurity was described as average with potential biosecurity breaches allowing staff to walk infection into the housing.

Ornithological assessment identified wild birds as a likely source of infection pressure.

The areas outside the sheds were not concreted, with puddles of rainwater present and gaps in doors could allow ingress of rain/surface water and/or vermin.

There was evidence of damage to mesh on ventilation on infected house which could have allowed wild birds entering the shed.

Other source investigations were completed and closed, having been assessed as being low (or lower) likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was assessed as low with low uncertainty, not higher than the background risk.

Other spread investigations were completed and closed indicating low (or lower) likelihood of spread.

Remaining uncertainty

No remaining uncertainty other than indicated in hypothesis for source which is explored in the cluster report.

AIV 2021/67, Near Helsby, Cheshire West & Chester, Cheshire, England

Description of the premises

Overview of the premises and the wider business

This was a mixed-species commercial premises, near Manchester in north-west England. It comprised two agricultural buildings and a domestic dwelling. Eggs were sold through an honesty-box system at the farm gate.

Species and number of each present

There were 50 laying hens, 30 Aylesbury ducks, 20 ornamental ducks of various species and seven geese. There were also 30 cattle, 30 sheep and seven goats.

Description of the housing

The chickens and Aylesbury ducks were housed in a makeshift pen within the large livestock shed. The shed itself had solid walls to 2.5 metres and then space boarding to the roof. The pen was made from slatted gates and wire. It was not biosecure from wild bird access. The ornamental ducks lived on the pond and often entered the building with the other poultry.

Plan of the infected premises

Figure 217: Plan of AIV 2021/67

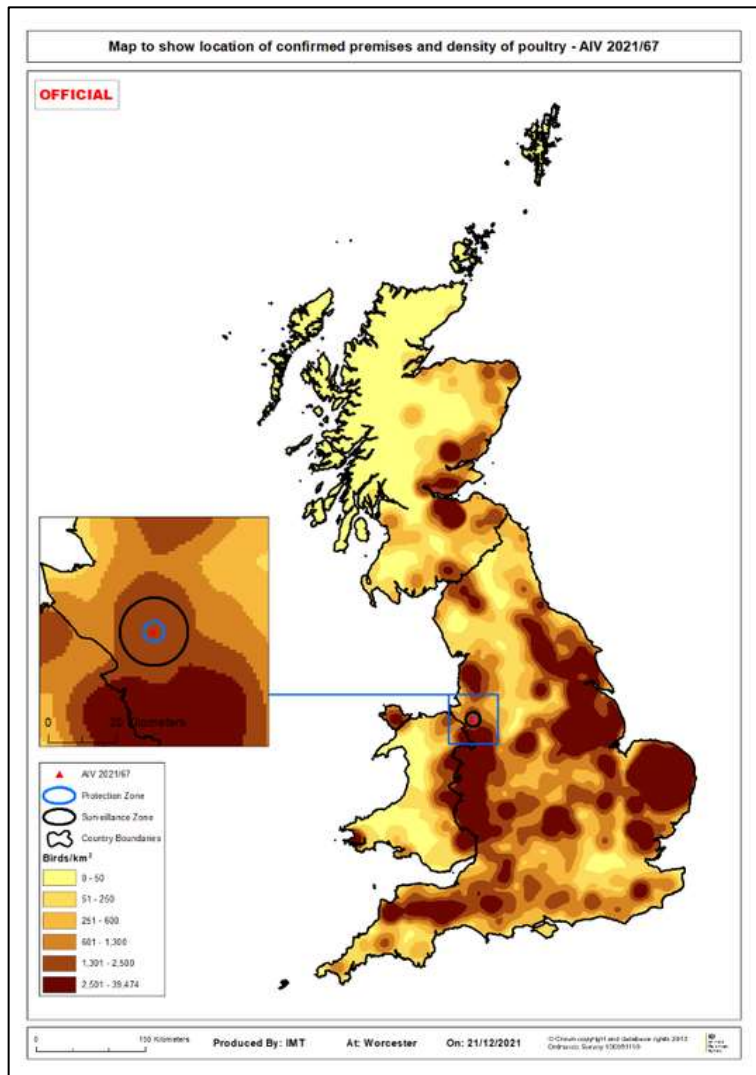


Overview of biosecurity

Biosecurity was very poor. There was no effective separation between the kept and wild birds. There were no foot dips, specific clothing or footwear or records. There were no measures in place to deter wild birds from the pond that the ornamental ducks and geese used.

Map with location in Great Britain and poultry density

Figure 218: Location of IP and poultry density



Overview of the surrounding area

The fields around the IP belonged to the keeper and there were no contiguous poultry premises. There was a large wooded area to the south of the property that held a large number of wild birds of various species.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The IP was approximately 3 km from the delta of the Mersey River, which attracted a large number of waders.

Clinical picture

16/12/2021 – Birds were found to be lethargic and egg production had dropped.

17/12/2021 – Seven dead chickens were found and only 6 were eggs laid, one of which had a very thin shell. A number of birds were observed to be lethargic, not moving, hunched up and off their food. At the APHA investigation one bird was found dead and two were culled. No respiratory signs were observed but cyanotic combs and green diarrhoea were seen. There were no clinical signs in the outdoor ducks or geese.

Timeline

Tracings windows

Source tracings window:

High-risk:	12/12/2021 to 14/12/2021
Likely:	01/12/2021 to 11/12/2021
Precautionary:	26/11/2021 to 30/11/2021

Spread tracings window:

High-risk:	13/12/2021 to 17/12/2021
Likely:	02/12/2021 to 12/12/2021
Precautionary:	27/11/2021 to 01/12/2021

Most likely date of infection: 12/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 219: Source and spread timeline for AIV 2021/67

Source Tracing Window	Spread Tracing Window	Date	
Day 19		26/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		27/11/21	Start of precautionary spread tracing window (source + 24h).
Day 17		28/11/21	
Day 16		29/11/21	
Day 15		30/11/21	
Day 14		01/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	02/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	03/12/21	
Day 11	Day 3	04/12/21	
Day 10	Day 4	05/12/21	
Day 9	Day 5	06/12/21	
Day 8	Day 6	07/12/21	
Day 7	Day 7	08/12/21	
Day 6	Day 8	09/12/21	
Day 5	Day 9	10/12/21	
Day 4	Day 10	11/12/21	
Day 3	Day 11	12/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	13/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	14/12/21	
	Day 14	15/12/21	Precautionary onset of clinical signs.
	Day 15	16/12/21	
	Day 16	17/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/132). Restrictions served.
	Day 17	18/12/21	Avian Influenza H5N1 confirmed by CVO with case reference AIV2021-67.
	Day 18	19/12/21	
	Day 19	20/12/21	Cull started and completed. Preliminary C & D applied
	Day 20	21/12/21	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

40 premises with poultry holding between 1-289,000 birds (3 premises with 50 or more birds)

SZ (3-10 km)

196 premises with poultry holding between 1-22,742 birds (17 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for a private vet visit and a feed delivery within the high-risk tracing windows. No other poultry contacts were identified for the private vet and the tracing was assessed as being very low risk and closed. On enquiries, it was confirmed the feed delivery had not occurred in the high-risk tracing windows, no further action was required, and the tracing was closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Infected wild birds were the most likely source. The ornamental ducks and geese mingled with wild birds on the pond and also frequented the shed where the hens, which showed clinical signs, were kept. Further, the hen pen in the shed was not wild bird proof and no biosecurity was present.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as being low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/68, Near Helsby, Cheshire West & Chester, Cheshire, England

Description of the premises

Overview of the premises and the wider business

This was a small hobby flock of ducks that were out of lay.

Species and number of each present

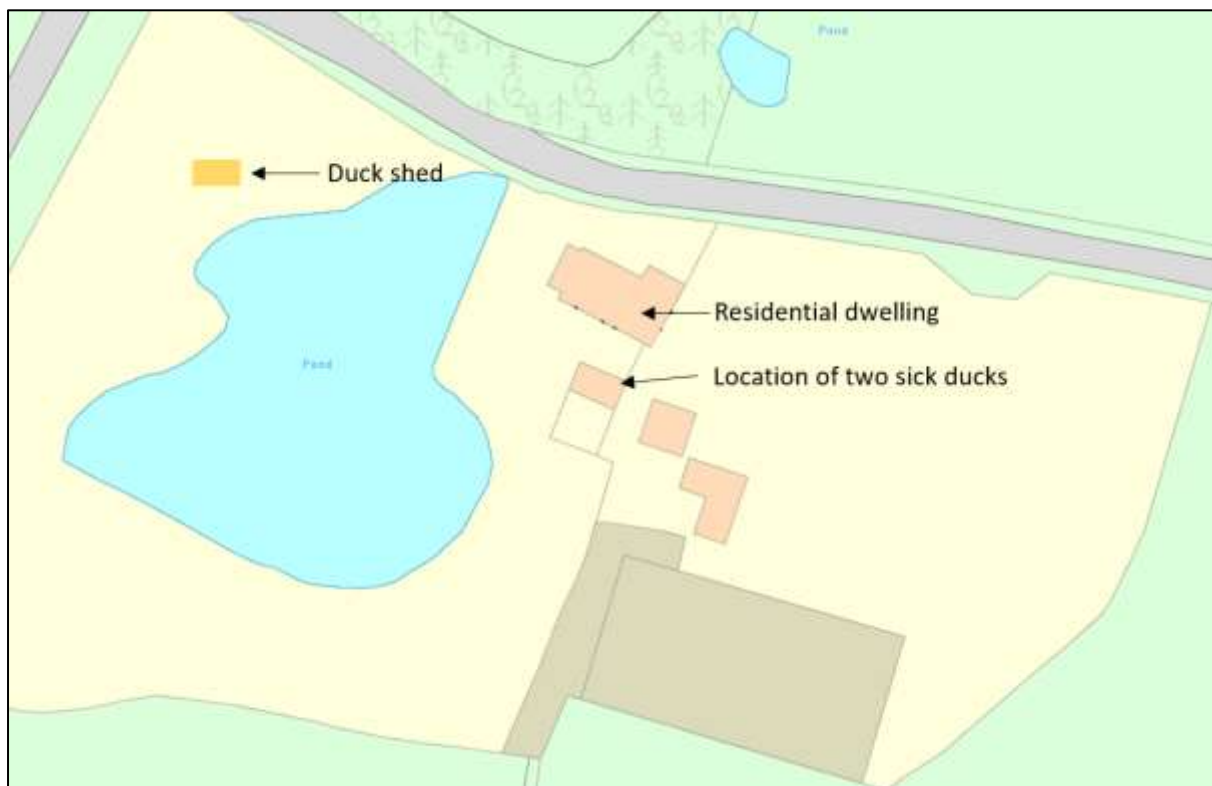
16 ducks.

Description of the housing

The flock was housed at night in two plastic sheds and released into the backyard during the day. The yard contained a large pond that was accessible to wild birds. The flock was kept inside after 2 ducks were found to be ill on 18/12/2021.

Plan of the infected premises

Figure 220: Plan of AIV 2021/68

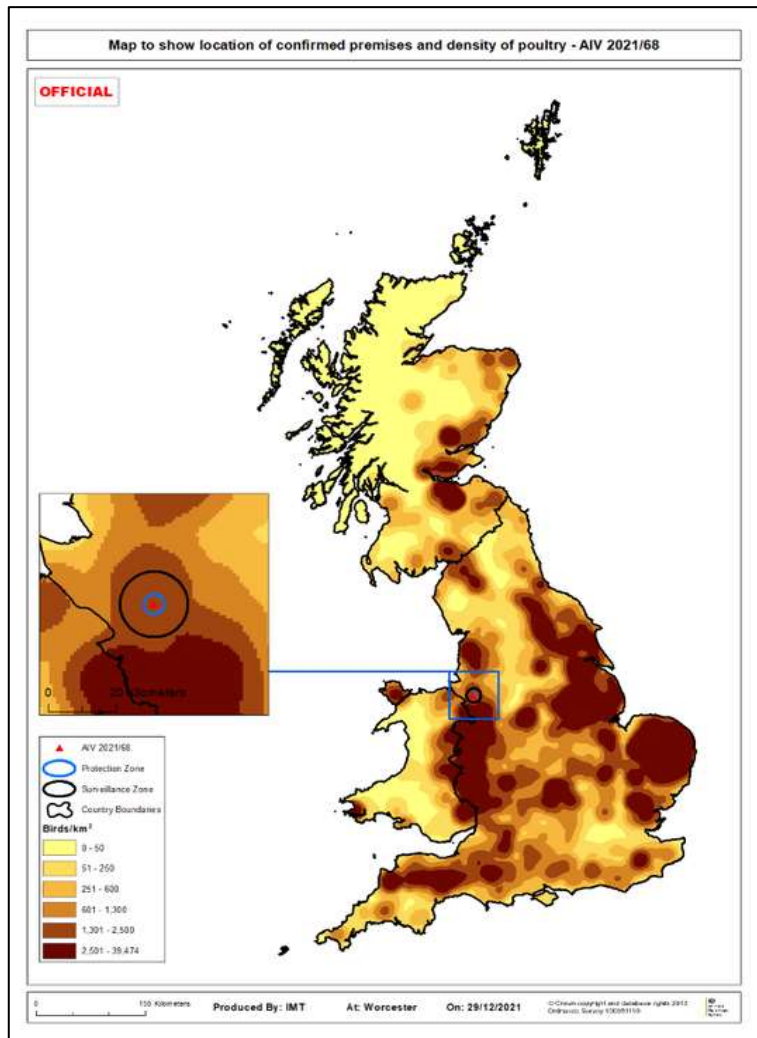


Overview of biosecurity

There were no biosecurity measures in place and no movements of birds or products on or off during the tracing windows.

Map with location in Great Britain and poultry density

Figure 221: Location of IP and poultry density



Overview of the surrounding area

This was a rural and lowland site, close to the coast and nearby estuary hosting substantial populations of waterbirds.

Ornithological assessment:

Desktop assessment: Waterfowl on estuary provide a substantial source of infection in the wider landscape and the pond is likely to attract wildfowl.

Local intelligence: The premises was located 2 km from AIV 2021/18 and was within the PZ of AIV 2021/67. There was a large pond on site.

Clinical picture

18/12/2021 – One Indian runner duck was found recumbent and another displayed neurological signs including torticollis, head tremor and ataxia.

20/12/2021 – The remainder of the flock were slightly depressed.

21/12/2021 – Suspicion of disease was reported and a report visit conducted. Of the two ill ducks, one had diarrhoea and reduced appetite and the other had recovered from the neurological signs and was eating and drinking. Samples were collected from all 16 ducks.

Timeline

Tracings windows

Source tracings window:

High-risk: 11/12/2021 to 16/12/2021

Likely: 03/12/2021 to 10/12/2021

Precautionary: 30/11/2021 to 02/12/2021

Spread tracings window:

High-risk: 12/12/2021 to 21/12/2021

Likely: 04/12/2021 to 11/12/2021

Precautionary: 01/12/2021 to 03/12/2021

Most likely date of infection: 11/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 222: Source and spread timeline for AIV 2021/68

Source Tracing Window	Spread Tracing Window	Date	
Day 17		30/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		01/12/21	Start of precautionary spread tracing window (source + 24h).
Day 15		02/12/21	
Day 14		03/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	04/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	05/12/21	
Day 11	Day 3	06/12/21	
Day 10	Day 4	07/12/21	
Day 9	Day 5	08/12/21	
Day 8	Day 6	09/12/21	
Day 7	Day 7	10/12/21	
Day 6	Day 8	11/12/21	Start of high risk source tracing window. Most likely infection date for this outbreak based on seroconversion of samples taken at initial report visit following advice from APHA Disease Consultants.
Day 5	Day 9	12/12/21	Start of high risk spread tracing window (source +24h).
Day 4	Day 10	13/12/21	
Day 3	Day 11	14/12/21	
Day 2	Day 12	15/12/21	
Day 1	Day 13	16/12/21	
	Day 14	17/12/21	Precautionary onset of clinical signs.
	Day 15	18/12/21	
	Day 16	19/12/21	
	Day 17	20/12/21	
	Day 18	21/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/136). Restrictions served.
	Day 19	22/12/21	Avian Influenza H5N1 confirmed by CVO with case reference AIV2021-68.
	Day 20	23/12/21	Culling completed.
	Day 21	24/12/21	Prelim C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

46 premises with poultry holding between 1-88 birds (one premises with 50 or more birds)

SZ (3-10 km)

194 premises with poultry holding between 1-289,000 birds (17 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Wild and kept birds shared access to the pond. No housing or biosecurity measures were taken until birds were seen to be ill.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2021/69, Near Buckfastleigh, Teignbridge, Devon, England

Description of the premises

Overview of the premises and the wider business

The Infected Premises was a domestic dwelling in the town of Buckfastleigh, Devon. The birds were kept in the domestic dwelling itself, back yard and an allotment site, which was accessed by a private footbridge across the river Mardle. No eggs had been sold and there had been no visitors.

Species and number of each present

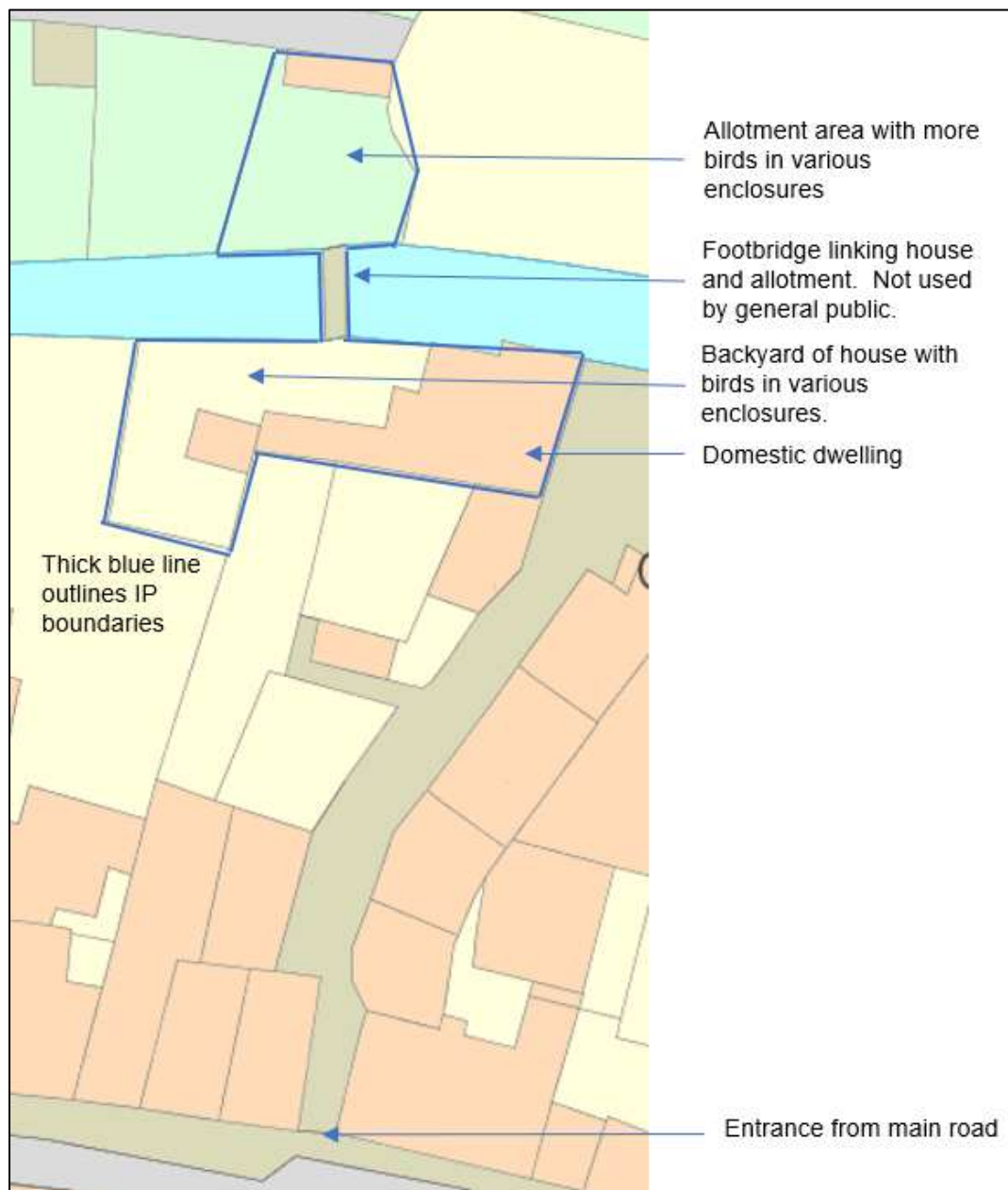
There were approximately 125 ducks of various breeds including call ducks, mallards and Muscovys. There were six caged aviary birds within the house.

Description of the housing

The birds were housed in a mixture of small hutches and houses made of wood and wire. Birds were allowed out periodically to exercise on the river.

Plan of the infected premises

Figure 223: Plan of AIV 2021/69

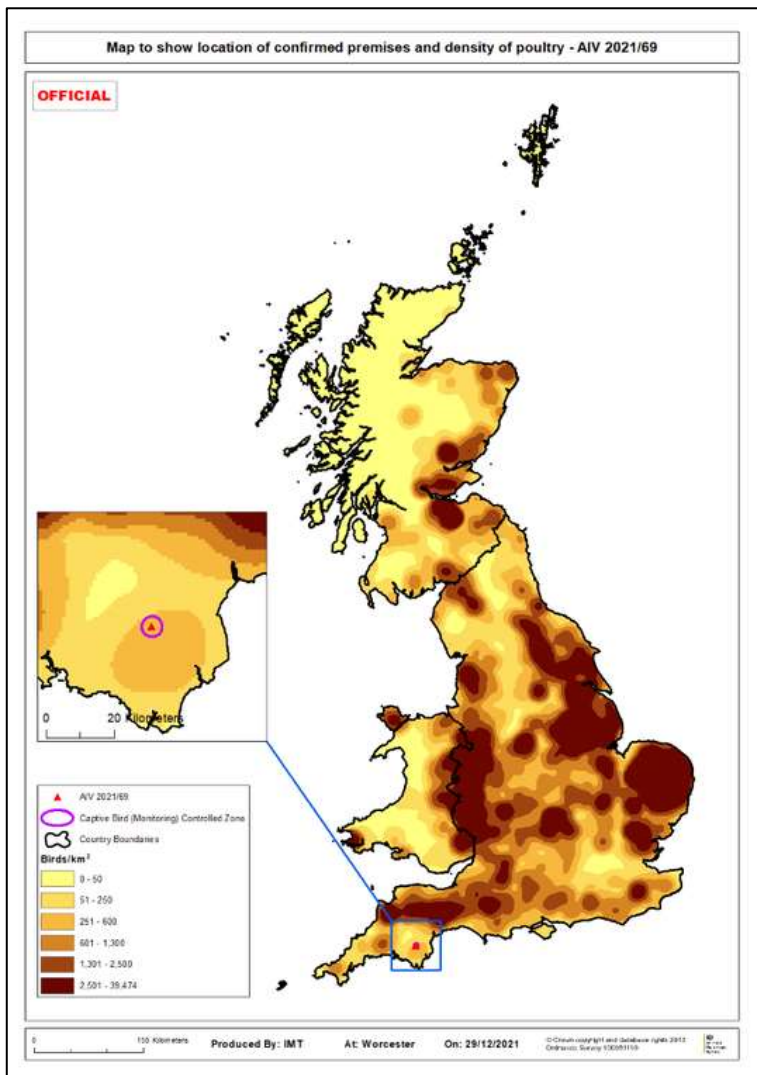


Overview of biosecurity

Biosecurity was poor. The keeper disinfected some areas with an approved DEFRA disinfectant, but the concentration it was used at was unknown. No vermin control was observed although it was likely that a large number of vermin were present due to poor biosecurity and proximity to the river. No records were kept and no PPE was used. The owner kept some ducks within the domestic dwelling.

Map with location in Great Britain and poultry density

Figure 224: Location of IP and poultry density



Overview of the surrounding area

The IP was located in a highly-dense residential area in a small town. Access was through narrow streets and alleys. There were no contiguous premises with poultry and the area was of low poultry density.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Wild ducks frequented the river running through the IP and were fed by the keeper. The river Dart was approximately 1 km away, which would have attracted a range of wild birds. Human feeding of passerines was likely within the built-up area.

Clinical picture

20/12/2021 – suspicion of disease was first reported and initially negated on investigation.

22/12/2021 – mortalities continued to increase and a second investigation was carried out and samples were taken. The birds were inappetent, had diarrhoea and five had died.

Timeline

Tracings windows

Source tracings window:

High-risk:	14/12/2021 to 16/12/2021
Likely:	03/12/2021 to 13/12/2021
Precautionary:	30/11/2021 to 02/12/2021

Spread tracings window:

High-risk:	15/12/2021 to 22/12/2021
Likely:	04/12/2021 to 14/12/2021
Precautionary:	30/11/2021 to 03/12/2021

Most likely date of infection: 14/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 225: Source and spread timeline for AIV 2021/69

Source Tracing Window	Spread Tracing Window	Date	
Day 17		30/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		01/12/21	Start of precautionary spread tracing window (source + 24h).
Day 15		02/12/21	
Day 14		03/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	04/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	05/12/21	
Day 11	Day 3	06/12/21	
Day 10	Day 4	07/12/21	
Day 9	Day 5	08/12/21	
Day 8	Day 6	09/12/21	
Day 7	Day 7	10/12/21	
Day 6	Day 8	11/12/21	
Day 5	Day 9	12/12/21	
Day 4	Day 10	13/12/21	
Day 3	Day 11	14/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	15/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	16/12/21	
	Day 14	17/12/21	Precautionary onset of clinical signs.
	Day 15	18/12/21	
	Day 16	19/12/21	
	Day 17	20/12/21	Notification of suspicion of disease to APHA (DPR2021/134:negated on clinical inspection)
	Day 18	21/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/137). Restrictions served.
	Day 19	22/12/21	H5N1 confirmed by CVO with case reference AIV2021-69
	Day 20	23/12/21	
	Day 21	24/12/21	
	Day 22	25/12/21	
	Day 23	26/12/21	
	Day 24	27/12/21	
	Day 25	28/12/21	
	Day 26	29/12/21	
	Day 27	30/12/21	Culling started
	Day 28	31/12/21	
	Day 29	01/01/22	
	Day 30	02/01/22	
	Day 31	03/01/22	Culling complete
	Day 32	04/01/22	Preliminary C & D applied
	Day 33	05/01/22	Preliminary C & D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

CBMCZ (0-3 km)

61 premises with poultry holding between 1-335 birds (1 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Infected wild birds were the most likely source. The keeper had allowed the affected group to exercise in the river on 13/12/2021 and 14/12/2021. This is the same date as most likely infection, so is the most likely pathway. There was no link to any other IPs and so lateral spread was ruled out.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as being low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/70, Near Watlington, King's Lynn and West Norfolk, Norfolk, England

Description of the premises

Overview of the premises and the wider business

This was a commercial turkey fattening unit that was part of a large integrated poultry company. It was operated on an all-in, all-out basis for each house, rearing stag turkeys from 9 weeks old to slaughter.

Species and number of each present

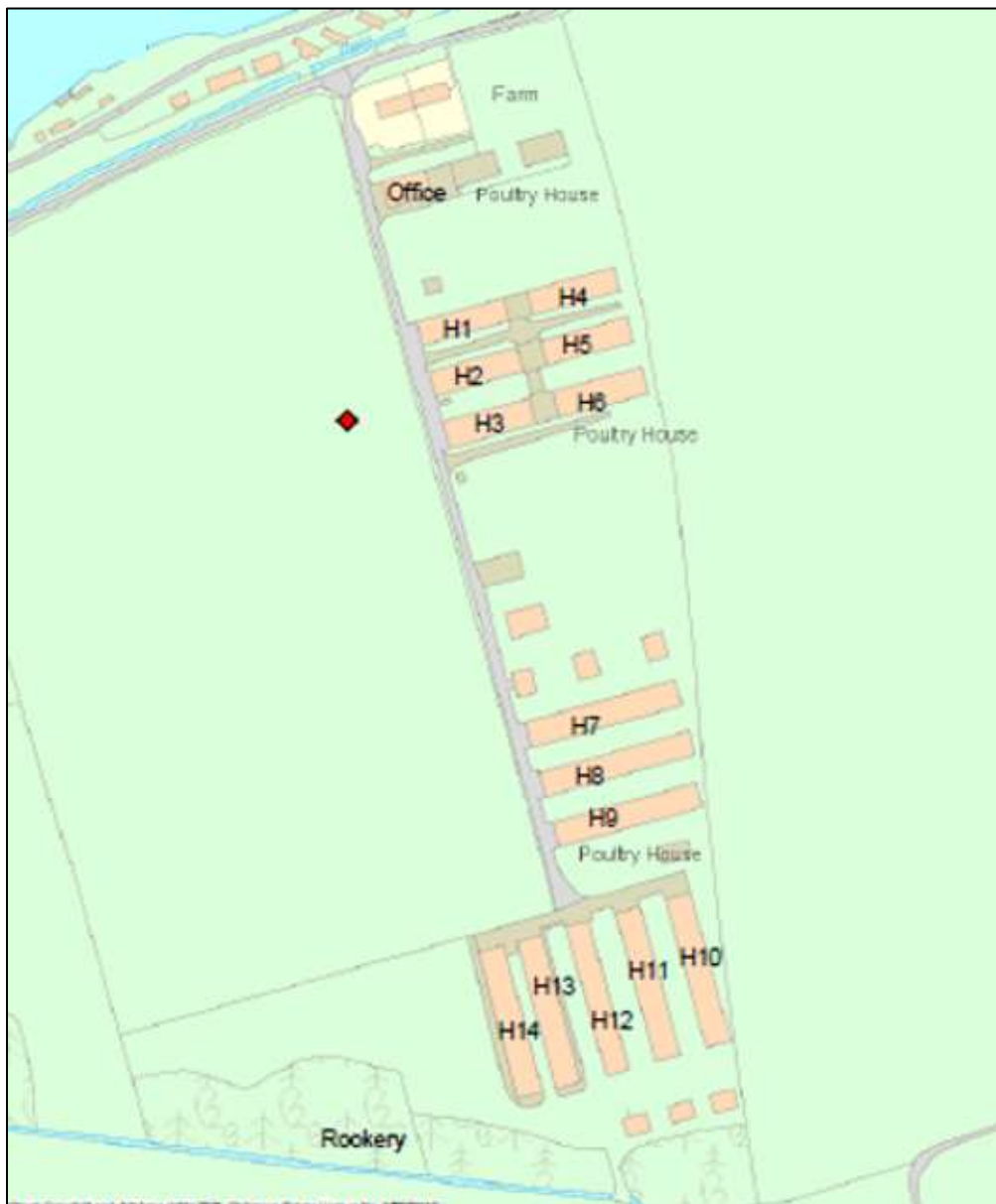
33,000 turkeys (18 weeks old)

Description of the housing

There were 14 poultry houses, which were built in 1970s. They were open span wooden barns with frames made of steel and with side windows. Window openings were covered with metal mesh. The ventilation system consisted of fans and inlets in the side walls and outlets in the roof.

Plan of the infected premises

Figure 226: Plan of AIV 2021/70



Overview of biosecurity

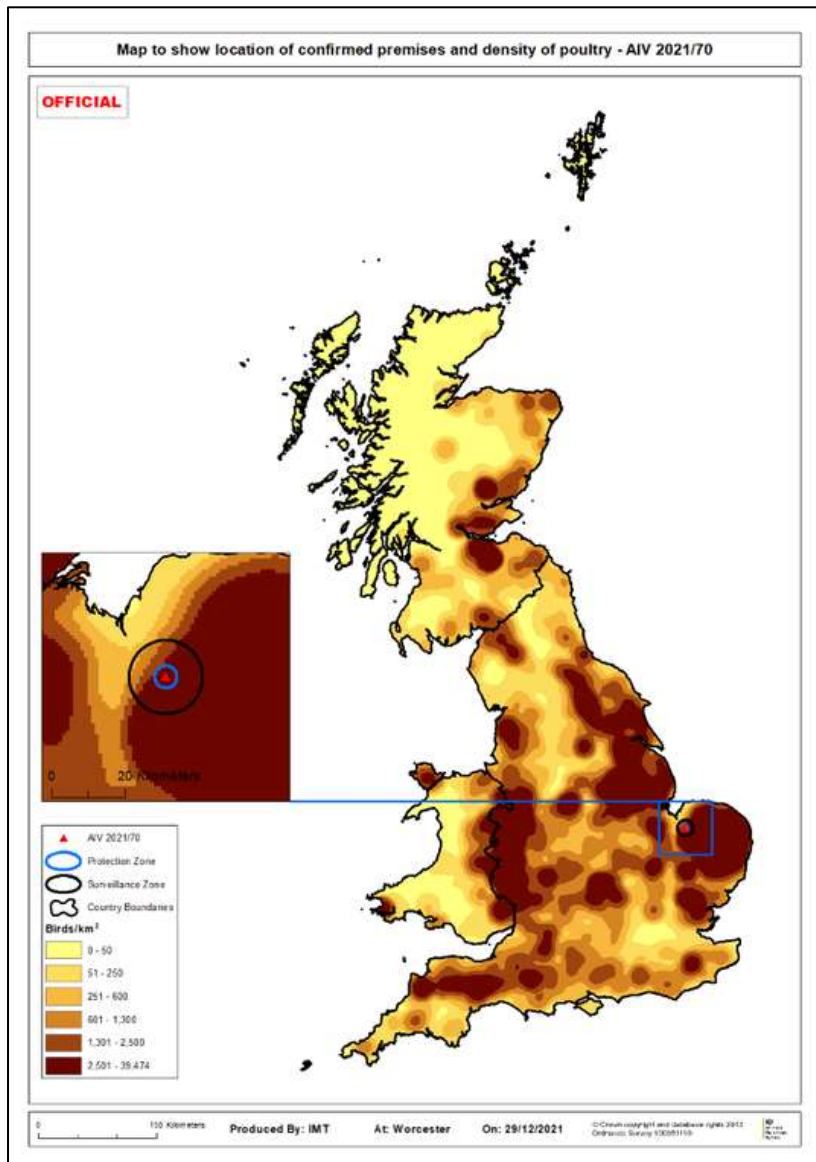
Biosecurity was potentially good, with site specific clothing and boots. There was a double barrier system used in each house, with the requirement to change into dedicated house boots in a lobby area, with disinfectant foot dips and use of disinfectant hand gel. There was locked, controlled access to the farm with a vehicle disinfection point. Bedding was stored triple wrapped outside in an open sided barn, and there were regular pest control visits by a contractor.

However, the double barrier system that separated clean and dirty areas in the lobbies was not fully effective because the wooden barriers were not fixed to the floor, some were broken and in three houses consisted of wrapped straw bales. The houses themselves were poorly maintained, with holes in the wire mesh that was

used to cover window openings and roof ventilation outlets. There were signs of water ingress and damage to roofs.

Map with location in Great Britain and poultry density

Figure 227: Location of IP and poultry density



Overview of the surrounding area

This premises was in a very high poultry density area of Norfolk.

Ornithological assessment:

Desktop assessment: This concluded that wild birds were a likely source of infection pressure for this IP based on the proximity to the river Nar and a significant cluster of lakes where wildfowl were likely to be abundant especially around the river. Bridge

species were considered the most likely source of infection pressure, as they were more likely to be present on the IP. These included gulls, corvids, wild passerines, wood pigeon and starling.

Local intelligence: At the back of sheds 11-14 there was a line of trees with wild rooks nesting.

Clinical picture

26/12/2021 – three dead birds were found in house 11.

27/12/2021 – 124 deaths.

28/12/2021 – 589 deaths. Affected turkeys were reported to be quiet, hot to touch, some had neurological signs and many gathered close to the walls of the building where it was cooler. Splenomegaly was noted by the PVS on post-mortem examination.

Timeline

Tracings windows

Source tracings window:

High-risk:	23/12/2021 to 26/12/2021
Likely:	12/12/2021 to 22/12/2021
Precautionary:	06/12/2021 to 11/12/2021

Spread tracings window:

High-risk:	24/12/2021 to 27/12/2021
Likely:	13/12/2021 to 23/12/2021
Precautionary:	07/12/2021 to 12/12/2021

Most likely date of infection: 23/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 228: Source and spread timeline for AIV 2021/70

Source Tracing Window	Spread Tracing Window	Date	
Day 16		06/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 15		07/12/21	Start of precautionary spread tracing window (source + 24h).
Day 14		08/12/21	
Day 13	Day 1	09/12/21	
Day 12	Day 2	10/12/21	
Day 11	Day 3	11/12/21	
Day 10	Day 4	12/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 9	Day 5	13/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 8	Day 6	14/12/21	
Day 7	Day 7	15/12/21	
Day 6	Day 8	16/12/21	
Day 5	Day 9	17/12/21	
Day 4	Day 10	18/12/21	
Day 3	Day 11	19/12/21	
Day 2	Day 12	20/12/21	
Day 1	Day 13	21/12/21	
	Day 14	22/12/21	
	Day 15	23/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
	Day 16	24/12/21	Start of high risk spread tracing window (source +24h).
	Day 17	25/12/21	
	Day 18	26/12/21	Precautionary onset of clinical signs.
	Day 19	27/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/140). Restrictions served.
	Day 20	28/12/21	HPAI H5N1 confirmed by CVO and given case reference AIV2021-70.
	Day 21	29/12/21	
	Day 22	30/12/21	Culling commenced
	Day 23	31/12/21	
	Day 24	01/01/22	
	Day 25	02/01/22	
	Day 26	03/01/22	Culling completed
	Day 27	04/01/22	
	Day 28	05/01/22	
	Day 29	06/01/22	
	Day 30	07/01/22	Preliminary C&D started
	Day 31	08/01/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

35 premises with poultry holding between 1-28,056 birds (3 premises with 50 or more birds)

SZ (3-10 km)

86 premises with poultry holding between 1-408,800 birds (18 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the private vet, feed and bedding deliveries, a catching team in association with birds having moved to a slaughterhouse (the relevant

authorities were notified of the movement) and an area manager within the high-risk tracing windows.

This resulted in a tracing visit being completed in relation to another premises that the area manager was associated with. The outcome was of negligible risk of disease transmission and the tracing was closed. All other tracings were assessed as being very low risk, and all were closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds although direct contact could not be completely ruled out.

Assessment and evidence base for the likely source

Problems were identified with biosecurity especially the integrity of the inner shells of the poultry accommodation where water ingress and holes were noted.

Ornithological assessment indicated high potential local wild bird pressure from an abundance of waterfowl and the presence of bridge species on the premises.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as being very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/71, Near North Somercotes, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

The IP was a turkey fattener. Day-old poults were placed and grown until time for slaughter. This premises was part of a company that had eight other turkey premises in the area. Two of these subsequently became IPs (2021/74 and 2022/04). All premises were rented.

Species and number of each present

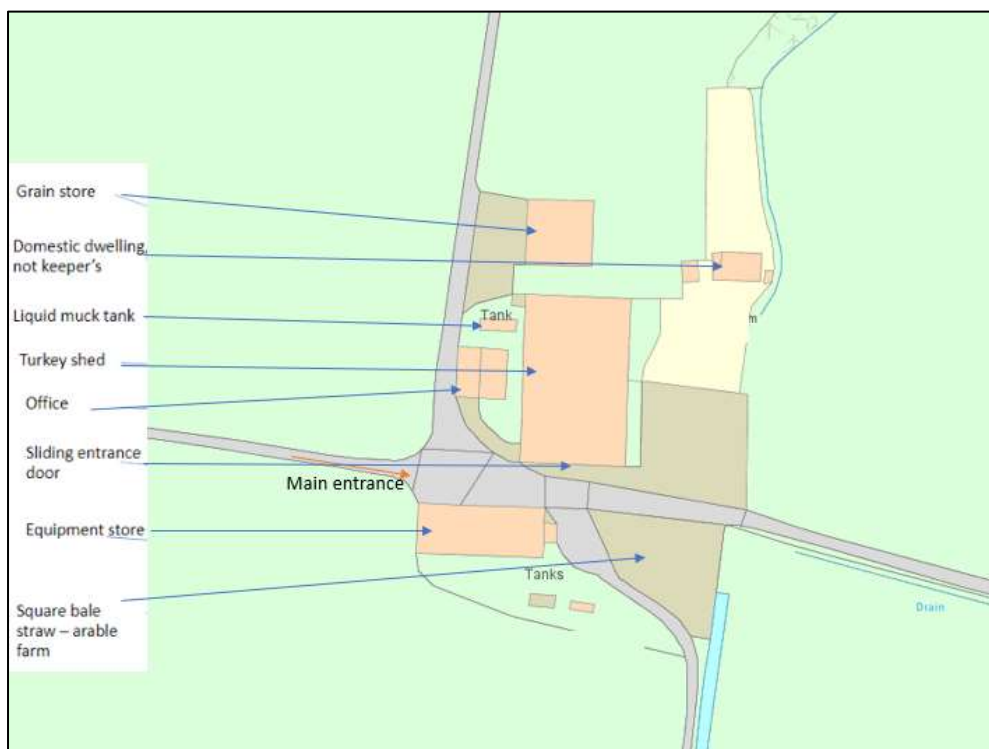
There were approximately 3800 19-week-old turkeys.

Description of the housing

There was one traditional turkey pole-barn. There was a breeze block wall about 2 metres high with about 45 cm of Yorkshire boarding up to the roof. There was a large sliding door at the front that could be opened for extra ventilation. There was an office next to the shed which linked to the turkey shed via an open lean-to. Also on the site was a grain store and equipment shed used by the arable farm and a private dwelling house.

Plan of the infected premises

Figure 229: Plan of AIV 2021/71



Overview of biosecurity

Biosecurity was very poor. There were multiple areas for wild birds to access the shed and pigeons were observed nesting in the lean-to. Whilst foot dips were in place, they were grossly contaminated. Basic PPE was used, but the boots worn in the sheds were kept in the office so could have been contaminated when walking across the yard to the bird area via the lean-to.

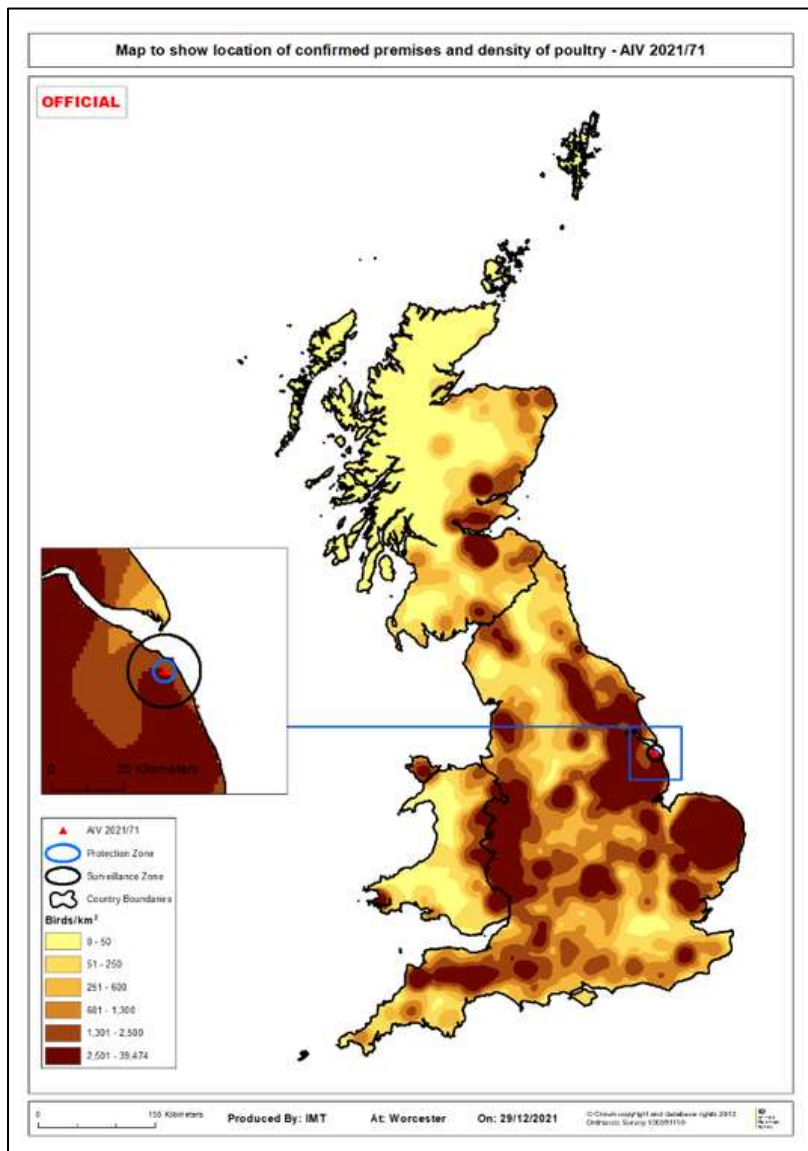
Straw bedding was stored 3 km away in an open-sided barn. It was unwrapped and delivered directly to the houses when required with no C and D. This bedding store was shared with AIV 2022/04.

Visitor records were poor and the site shared staff with other sites within the company.

Before disease confirmation, ABP was taken to a shared and unregistered store, which was shared with another poultry company.

Map with location in Great Britain and poultry density

Figure 230: Location of IP and poultry density



Overview of the surrounding area

The local geography was flat and had few features. Land use was predominantly arable. The IP was approximately 1.25 km from the coast inhabited by bridge species and waterfowl. It was situated between the Humber and the Wash, so was in the direct flightline for flying waterfowl.

Ornithological assessment:

Desktop assessment: The area was rated at the highest score for wild bird infection pressure. The location of this landscape, between two major regional bird sites was significant. Wildfowl were likely to be abundant, especially close to the IP where they exploited coastal habitats. It was likely they produced a local source of infection and

they may also have sustained significant infection pathways. Waders and other waterbirds were likely to have been abundant close to the IP and so contribute to producing a nearby source of infection.

Bridge species may have represented one of the strongest sources of infection pressure. Principally by gulls, but corvids may have played a part. Wild passerines, wood pigeon and starlings were considered less likely to contribute to infection pressure.

Local intelligence: During the APHA investigation, wood pigeons were observed in abundance.

Clinical picture

27/12/2021 – 85 birds were found dead in the morning and suspicion of notifiable avian disease was reported. By the afternoon, 70% of the birds were showing clinical signs of depression, nervous signs including incoordination, drooping wings and twisted necks, respiratory signs, ocular and oral discharge, cyanosis of the comb and pyrexia. Mortality continued rapidly.

Timeline

Tracings windows

Source tracings window:

High-risk:	21/12/2021 to 23/12/2021
Likely:	10/12/2021 to 20/12/2021
Precautionary:	06/12/2021 to 09/12/2021

Spread tracings window:

High-risk:	22/12/2021 to 27/12/2021
Likely:	11/12/2021 to 21/12/2021
Precautionary:	07/12/2021 to 10/12/2021

Most likely date of infection: 21/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 231: Source and spread timeline for AIV 2021/71

Source Tracing Window	Spread Tracing Window	Date	
Day 18		06/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		07/12/21	Start of precautionary spread tracing window (source + 24h).
Day 16		08/12/21	
Day 15		09/12/21	
Day 14		10/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	11/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	12/12/21	
Day 11	Day 3	13/12/21	
Day 10	Day 4	14/12/21	
Day 9	Day 5	15/12/21	
Day 8	Day 6	16/12/21	
Day 7	Day 7	17/12/21	
Day 6	Day 8	18/12/21	
Day 5	Day 9	19/12/21	
Day 4	Day 10	20/12/21	
Day 3	Day 11	21/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	22/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	23/12/21	
	Day 14	24/12/21	Precautionary onset of clinical signs based on increase in deaths when production data assessed.
	Day 15	25/12/21	
	Day 16	26/12/21	
	Day 17	27/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/141). Restrictions served.
	Day 18	28/12/21	Avian Influenza H5N1 confirmed by CVO with case reference AIV2021-71.
	Day 19	29/12/21	
	Day 20	30/12/21	Culling started and completed
	Day 21	31/12/21	Preliminary C & D applied
	Day 22	01/01/22	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the

Surveillance activity

PZ (0-3 km)

31 premises with poultry holding between 2-237,000 birds (7 premises with 50 or more birds)

SZ (3-10 km)

112 premises with poultry holding between 1-106,000 birds (19 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for feed deliveries, several staff movements to other company linked premises and movements of ABP to a shared company ABP

site that was also used by a separate poultry company in the high-risk tracing windows.

One tracing visit was completed in relation to another poultry premises visited after the feed delivery to the IP. This was assessed as being very low risk and closed. Three tracing visits were completed to another company's poultry premises that used the same ABP collection site as this IP. All these visits were assessed as being very low risk as no credible risk pathway was found to exist and they were all closed. The shared ABP site was also placed under restrictions, the remaining ABP was disposed of, and C and D was completed.

Tracing visits were initiated to the other linked company premises due to potential staff movements and other epidemiological links. For five premises where an epidemiological link was identified, 21-day post contact tracing visits were instructed. All were completed and assessed as being very low risk and the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect wild bird contact.

Assessment and evidence base for the likely source

Infected wild birds were the most likely source. This was based primarily on poor biosecurity allowing wild bird access.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

An area of initial concern was the shared ABP point, shared with another poultry company. Restrictions were immediately placed on the collection point and the other company. ABP was removed under licence and the area C and D. The other company's sites were investigated and no disease spread observed.

All other spread pathways were assessed as being low or negligible likelihood although spread to the company's other two IPs could not be ruled out.

Remaining uncertainty

Spread to the company's other two IPs could not be ruled out.

AIV 2021/72, Near Romsey, Test Valley, Hampshire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial beef and sheep farm with a non-commercial poultry flock. Eggs were consumed by the owners or given to neighbours.

Species and number of each present

28 chickens, 26 ducks, two semi-feral geese

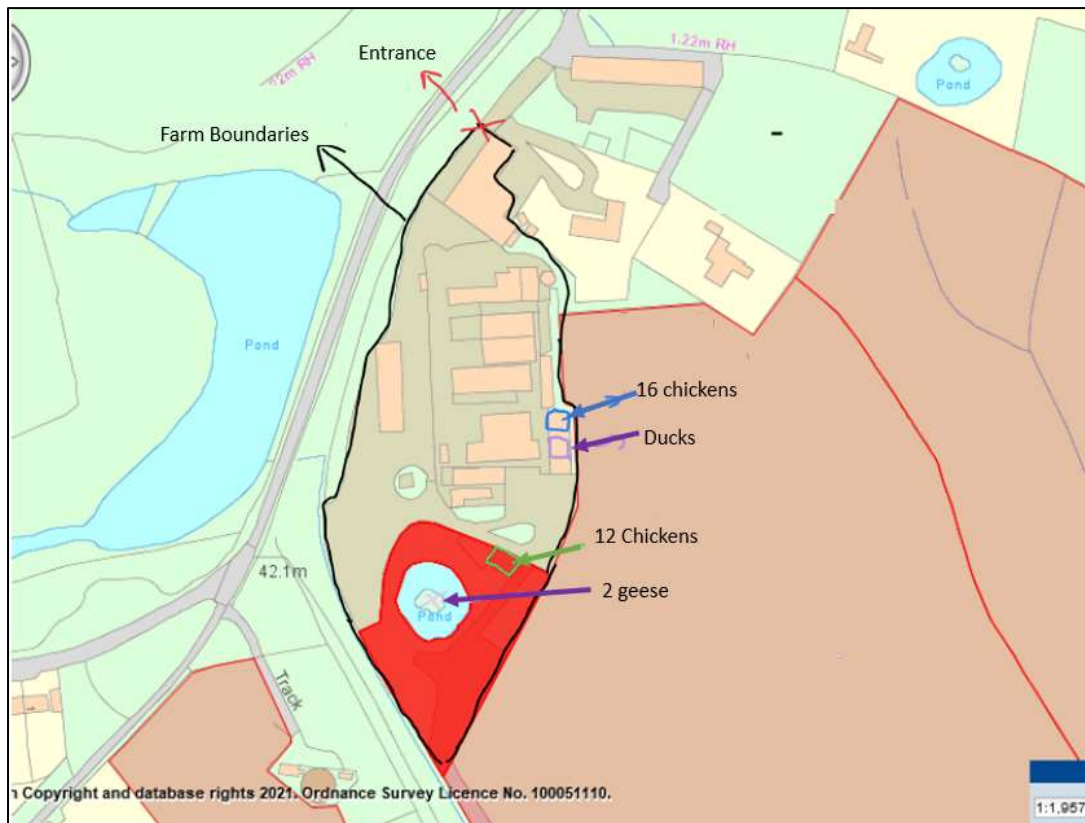
160 cattle, 70 sheep, two goats and one alpaca

Description of the housing

The chickens were kept as two flocks -16 in a horse stable with half door open and wired and 12 in a separate coop. The 26 ducks were kept in a horse stable with a half door open and wired and the two geese lived on the pond.

Plan of the infected premises

Figure 232: Plan of AIV 2021/72

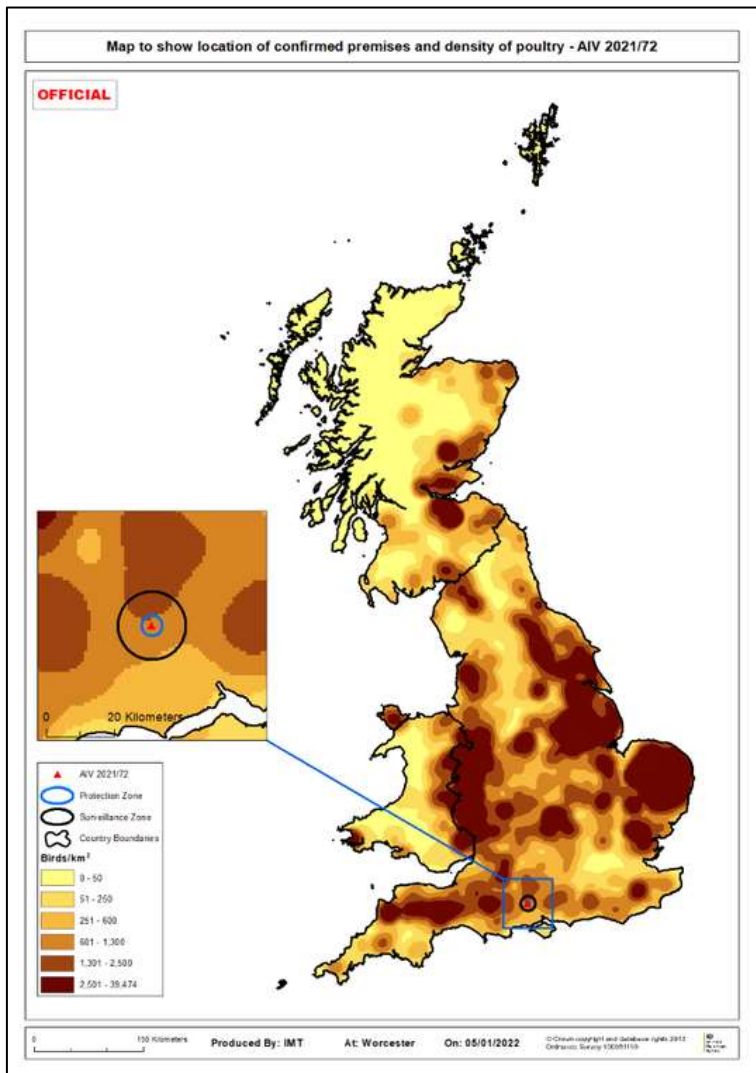


Overview of biosecurity

The birds were kept indoors using wire mesh over open stable doors but these were not completely birdproof. There were no foot dips or change of clothing when managing the birds.

Map with location in Great Britain and poultry density

Figure 233: Location of IP and poultry density



Overview of the surrounding area

Cattle and sheep were housed in adjacent open fronted barns. The two goats were free roaming. There were no contiguous premises with susceptible animals and there was a large pond across the road and bounding the farm.

Ornithological assessment:

Desktop assessment: Not conducted

Local intelligence: There was a large pond across the road bounding the farm in addition to one on the farm.

Clinical picture

28/12/2021 – One of the group of 16 chickens was off colour.

29/12/2021 – Nine chickens died overnight and seven were moribund. The ducks were lethargic and one had torticollis. Suspicion of avian notifiable disease was reported.

29/12/2021 – By the time of the APHA investigation 12 of the 16 chickens had died and 45% of ducks were lethargic, some with yellow diarrhoea and torticollis. The geese and separate group of 12 chickens were healthy. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	25/12/2021 to 27/12/2021
Likely:	14/12/2021 to 24/12/2021
Precautionary:	08/12/2021 to 13/12/2021

Spread tracings window:

High-risk:	26/12/2021 to 02/01/2022
Likely:	15/12/2021 to 25/12/2021
Precautionary:	19/12/2021 to 14/12/2021

Most likely date of infection: 25/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 234: Source and spread timeline for AIV 2021/72

Source Tracing Window	Spread Tracing Window	Date	
Day 21		07/12/21	
Day 20		08/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		09/12/21	Start of precautionary spread tracing window (source + 24h).
Day 18		10/12/21	
Day 17		11/12/21	
Day 16		12/12/21	
Day 15		13/12/21	
Day 14		14/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	15/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	16/12/21	
Day 11	Day 3	17/12/21	
Day 10	Day 4	18/12/21	
Day 9	Day 5	19/12/21	
Day 8	Day 6	20/12/21	
Day 7	Day 7	21/12/21	
Day 6	Day 8	22/12/21	
Day 5	Day 9	23/12/21	
Day 4	Day 10	24/12/21	
Day 3	Day 11	25/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	26/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	27/12/21	
	Day 14	28/12/21	Precautionary onset of clinical signs. One chicken off colour.
	Day 15	29/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/149). Restrictions served.
	Day 16	30/12/21	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-72.
	Day 17	31/12/21	Culling commenced. Preliminary C&D completed.
	Day 18	01/01/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

76 premises with poultry holding between 1-40,000 birds (9 premises with 50 or more birds)

SZ (3-10 km)

90 premises with poultry holding between 2-27,700 birds (30 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There were no movements of birds or products on or off during the tracing windows. There were two large ponds nearby attracting wildfowl and there was also poor biosecurity.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2021/73, Near Mablethorpe, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

This was a livery yard with a non-commercial flock of ducks and chickens. Eggs were used for personal consumption.

Species and number of each present

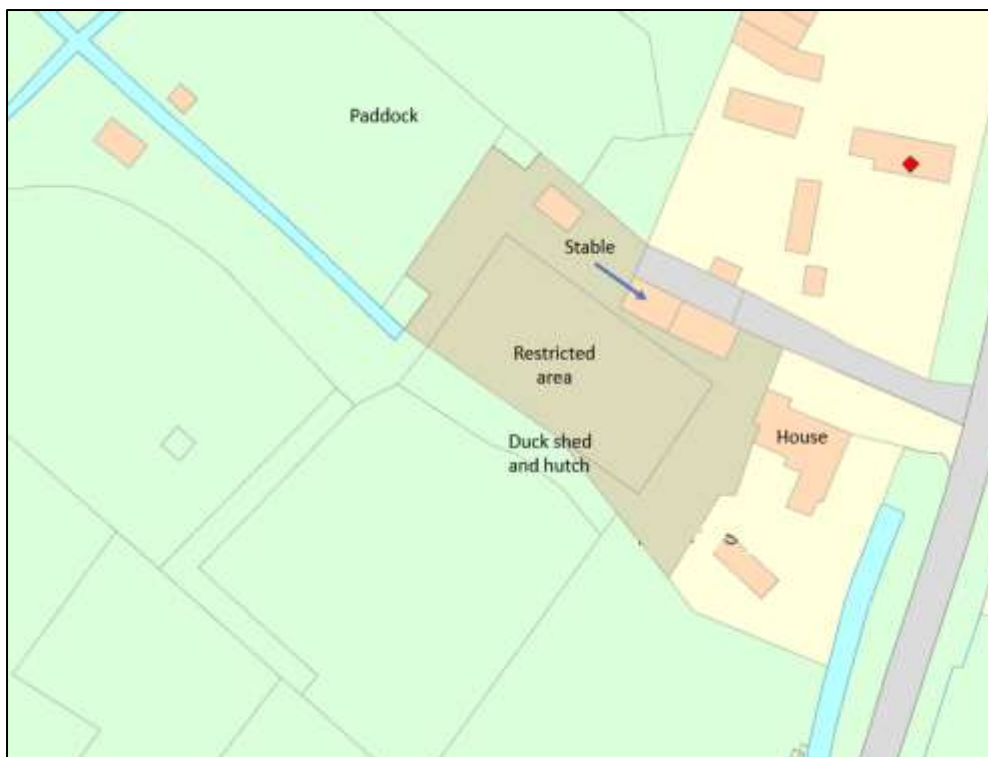
Nine ducks, six chickens and 10 horses.

Description of the housing

The ducks and chickens were kept in separate areas, 10 m apart. The ducks were in a netted run which was bird proof but could be contaminated from above. The chicken area was uncovered and accessible to wildlife.

Plan of the infected premises

Figure 235: Plan of AIV 2021/73

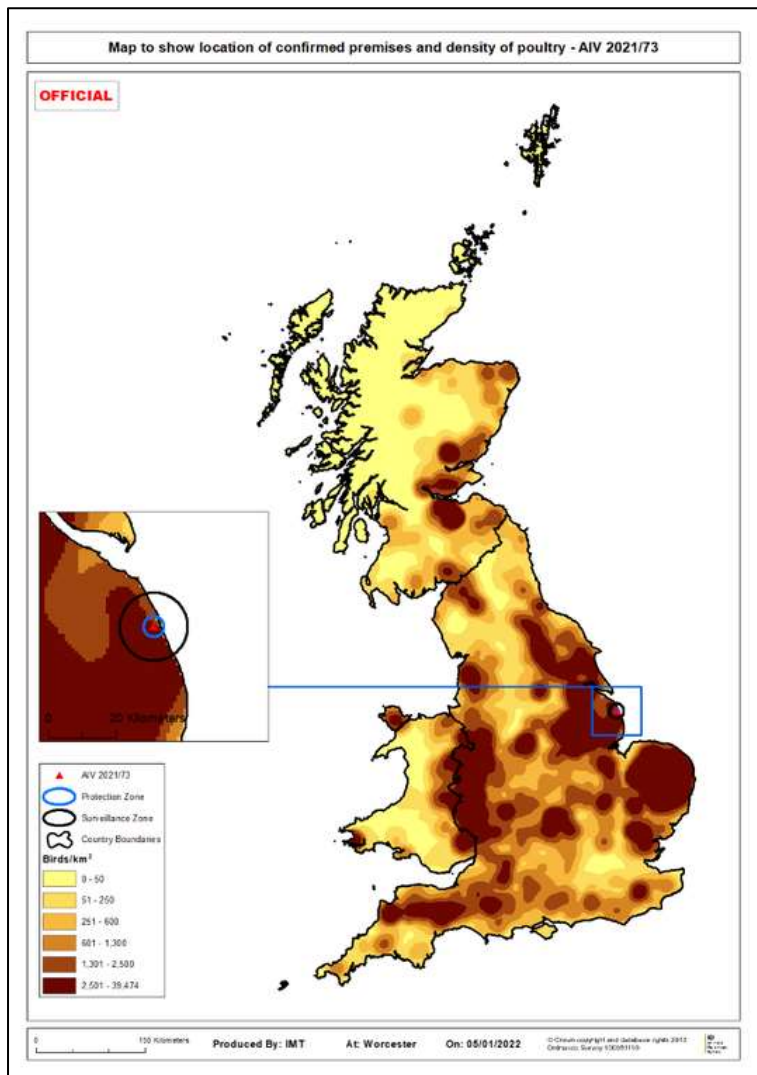


Overview of biosecurity

The accommodation was not completely birdproof. Dedicated footwear was used for each group of birds but no other biosecurity measures were taken.

Map with location in Great Britain and poultry density

Figure 236: Location of IP and poultry density



Overview of the surrounding area

The area was surrounded by trees. There were two dikes on the property that wild birds could access.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Previous PZ and SZs intersected around the area indicating a likely infection pressure.

Clinical picture

29/12/2021 – Suspicion of disease was reported following three to five days of lethargy and ataxia in one duck. Some other ducks had diarrhoea and reduced egg laying. The chickens showed no clinical signs. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk: 21/12/2021 to 23/12/2021
 Likely: 10/12/2021 to 20/12/2021
 Precautionary: 08/12/2021 to 09/12/2021

Spread tracings window:

High-risk: 22/12/2021 to 29/12/2021
 Likely: 11/12/2021 to 21/12/2021
 Precautionary: 09/12/2021 to 10/12/2021

Most likely date of infection: 21/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 237: Source and spread timeline for AIV 2021/73

Source Tracing Window	Spread Tracing Window	Date	
Day 21		03/12/21	
Day 20		04/12/21	
Day 19		05/12/21	
Day 18		06/12/21	
Day 17		07/12/21	
Day 16		08/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 15		09/12/21	Start of precautionary spread tracing window (source + 24h).
Day 14		10/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	11/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	12/12/21	
Day 11	Day 3	13/12/21	
Day 10	Day 4	14/12/21	
Day 9	Day 5	15/12/21	
Day 8	Day 6	16/12/21	
Day 7	Day 7	17/12/21	
Day 6	Day 8	18/12/21	
Day 5	Day 9	19/12/21	
Day 4	Day 10	20/12/21	
Day 3	Day 11	21/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	22/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	23/12/21	
	Day 14	24/12/21	Precautionary onset of clinical signs - ducks off food and stopped laying (3-5 days prior to notification)
	Day 15	25/12/21	
	Day 16	26/12/21	
	Day 17	27/12/21	
	Day 18	28/12/21	
	Day 19	29/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/148). Restrictions served.
	Day 20	30/12/21	
	Day 21	31/12/21	HP Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2021-73..
	Day 22	01/01/22	Culling commenced and Preliminary C&D completed
	Day 23	02/01/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

33 premises with poultry holding between 1-129 birds (6 premises with 50 or more birds)

SZ (3-10 km)

104 premises with poultry holding between 1-106,000 birds (10 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There were no movements of poultry or products on or off during the tracing windows.

There was poor biosecurity and the accommodation was not completely bird proof. The dikes on the property held water and were attractive to wild birds. Other HPAI outbreaks had occurred in the area indicating substantial infection pressure.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2021/74, Near Louth, East Lindsey, Lincolnshire England

Description of the premises

Overview of the premises and the wide business

The IP was a turkey fattener. Day-old poults were placed and grown until time for slaughter. This premises was part of a company that had eight other turkey premises in the area. Two of these became IPs. There were two houses on the site which were rented and not owned by the company.

Species and number of each present

House 1 – 2,249 birds at 17 weeks.

House 2 – 1,200 birds at 19 weeks.

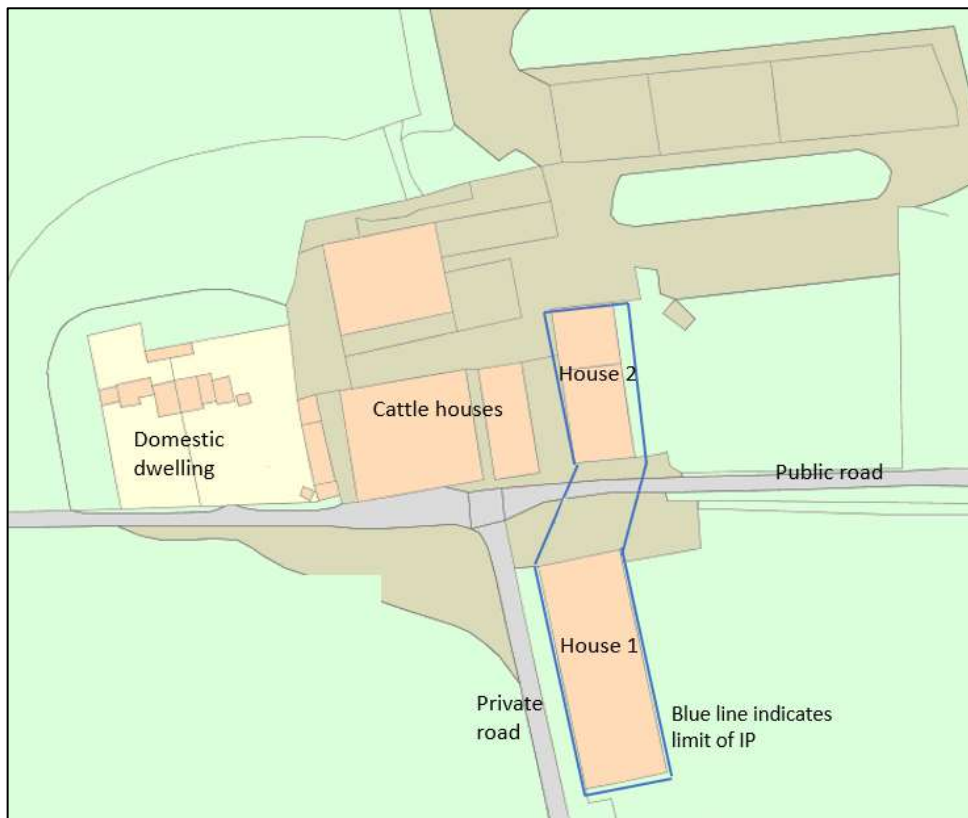
There were also cattle on the premises but under different ownership and management.

Description of the housing

The IP was split by a minor public road. The houses were of a traditional pole-barn style with breeze block to around 2 metres and Yorkshire boarding to the roof. The roof was of corrugated metal sheeting with ridge ventilation outlets that were not protected by wire mesh. There were large doors at the north end of each shed used for vehicle access, these were often opened to allow extra ventilation.

Plan of the infected premises

Figure 238: Plan of AIV 2021/74



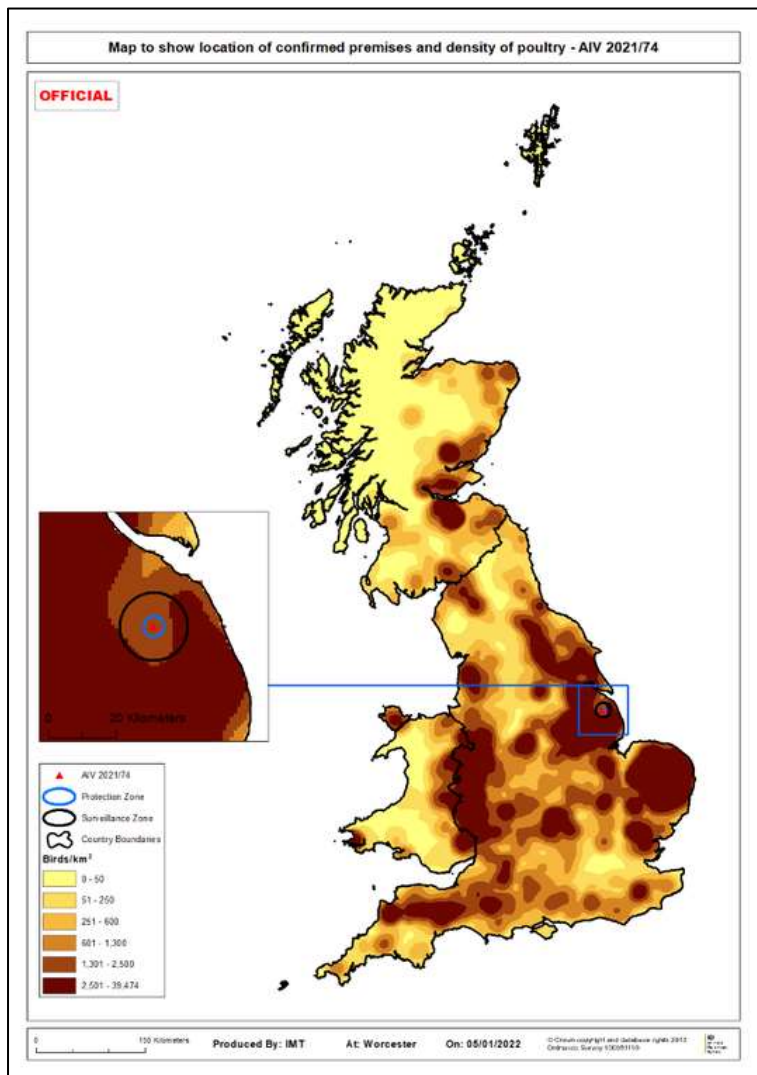
Overview of biosecurity

Biosecurity was very poor. There was no outer-shell to the premises and it was split in half by a public road. Wild birds could access the houses through the space boarding and when the gable-end doors were left open. There were no C and D facilities for vehicles delivering feed or bedding. Cleaning boots was difficult as the lobby to each house was small and it was likely that staff moved between the houses using the same boots.

There was no staff training or written biosecurity procedures in place. Straw bedding was unwrapped and stored in an open-sided barn. It was delivered directly to the houses when required with no C and D. Visitor records were poor, and the site did share staff with other sites, including other IPs. Before disease confirmation, ABP was taken to a shared and unregistered store, which was shared with another poultry company.

Map with location in Great Britain and poultry density

Figure 239: Location of IP and poultry density



Overview of the surrounding area

The premises was situated on a beef and arable farm. The cattle were directly adjacent to House 2 and the access for cattle feeding was beside that house. The surrounding fields were largely arable with some cattle grazing. It was situated between the Humber and the Wash and so was in the direct flightline for flying waterfowl.

Ornithological assessment:

Desktop assessment: Most waterbodies close to the IP were small ponds and the largest with a known aggregation of waterbirds was too distant to be significant. The IP was probably too distant from coastal habitats for this to be considered a source. Wildfowl were not thought to produce much infection pressure here. Bridge species were considered likely to be common and appeared to be the most likely infection

pathway, with both gulls and corvids likely to exploit the farm and contaminate operational surfaces. However, even for these wide-ranging species, the distance to any likely source of infection moderated the assessment of infection pressure. Wild passerines, woodpigeon and starling may have contributed several alternative infection pathways to add to the infection pressure.

Local intelligence: Nothing further.

Clinical picture

30/12/2021 – increased mortality was observed in House 1 and suspicion of notifiable avian disease was reported. At the investigation, 40 birds had died. Birds in House 1 were very lethargic, several were recumbent and others suffered fits before suddenly dying. The birds felt hot to-the-touch and there was a notable increase in shed temperature compared to the outside temperature. The birds in House 2 were unaffected.

Analysis of mortality records showed that the actual increase in mortality was likely to have happened from 28/12/2021. Thus, the most likely date of infection was 25/12/2021.

Timeline

Tracings windows

Source tracings window:

High-risk:	25/12/2021 to 27/12/2021
Likely:	14/12/2021 to 24/12/2021
Precautionary:	09/12/2021 to 13/12/2021

Spread tracings window:

High-risk:	26/12/2021 to 30/12/2021
Likely:	15/12/2021 to 25/12/2021
Precautionary:	10/12/2021 to 14/12/2021

Most likely date of infection: 25/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 240: Source and spread timeline for AIV 2021/74

Source Tracing Window	Spread Tracing Window	Date	
Day 19		09/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		10/12/21	Start of precautionary spread tracing window (source + 24h).
Day 17		11/12/21	
Day 16		12/12/21	
Day 15		13/12/21	
Day 14		14/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	15/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	16/12/21	
Day 11	Day 3	17/12/21	
Day 10	Day 4	18/12/21	
Day 9	Day 5	19/12/21	
Day 8	Day 6	20/12/21	
Day 7	Day 7	21/12/21	
Day 6	Day 8	22/12/21	
Day 5	Day 9	23/12/21	
Day 4	Day 10	24/12/21	
Day 3	Day 11	25/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	26/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	27/12/21	
	Day 14	28/12/21	Precautionary onset of clinical signs.
	Day 15	29/12/21	
	Day 16	30/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/153). Restrictions served.
	Day 17	31/12/21	H5N1 confirmed by CVO with case reference AIV 2021-74.
	Day 18	01/01/22	
	Day 19	02/01/22	Culling started and completed
	Day 20	03/01/22	Preliminary C & D applied
	Day 21	04/01/22	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

11 premises with poultry holding between 0-32 birds (2 premises with 50 or more birds)

SZ (3-10 km)

113 premises with poultry holding between 1-60,000 birds (23 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were raised for carcasses moving to the private vet for post-mortem examination, a maintenance worker, two farm workers, two feed deliveries, a waste collection, three ABP collections and a used bedding collection. These in turn generated two further telephone tracings relating to premises visited after the ABP

collections on two occasions. As both these contact premises had no poultry present, all the tracing enquiries were deemed as being low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect wild bird contact.

Assessment and evidence base for the likely source

Infected wild birds were the most likely source. This was based primarily on poor biosecurity allowing wild bird access.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

An area of initial concern was the shared ABP point, shared with another poultry company. Restrictions were immediately placed on the collection point and the other company. ABP was removed under licence and the area C and D. The other company's sites were investigated and no disease spread observed.

All other spread pathways were assessed as being low or negligible likelihood although spread to the company's other two IPs could not be ruled out.

Remaining uncertainty

Spread to the company's other two IPs could not be ruled out.

Annex 3: Reports of findings from the individual infected premises confirmed in 2022

AIV 2022/01, Near Eton, Windsor & Maidenhead, Berkshire, England

Description of the premises

Overview of the premises and the wider business

This was a swan rehabilitation centre located on an island in the river Thames in Berkshire, consisting of seven enclosures with no housing.

Species and number of each present

31 Mute swans

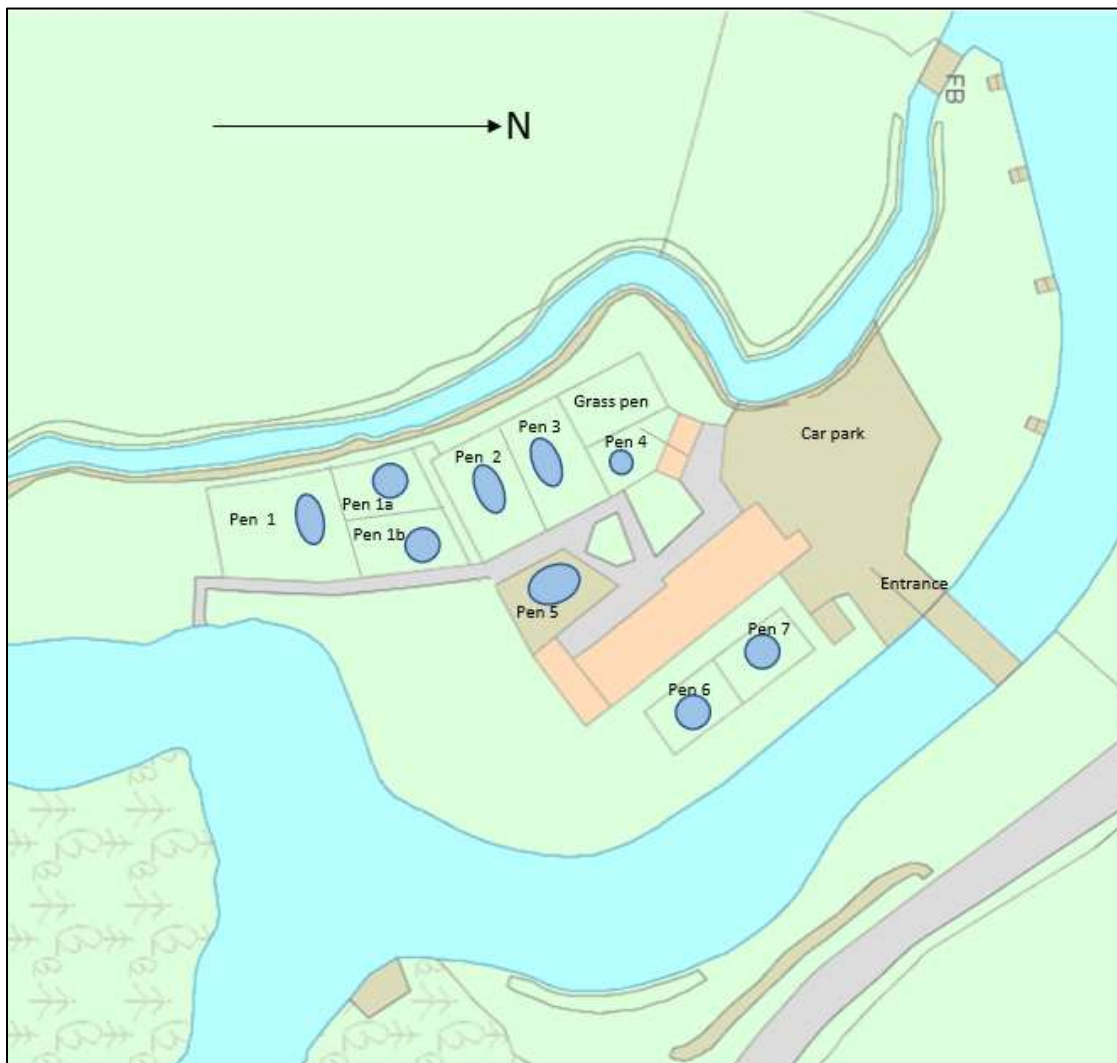
Description of the housing

There were 10 pens present, of which some were interconnected. All had concrete bases, weldmesh sides (half inch by 3 inch) and netting over enclosures of approximately half inch mesh. Ponds were made of concrete and water pumped into them from the adjacent river. Ponds overflowed via underground pipes mostly into the stream running west of the premises, although overflows from pens 6 and 7 drained into the river running along the eastern aspect of the premises

A mobile pump was used to remove pond water every three days and moved with its piping from pen to pen. The water was replaced with a mixture of tap water and river water. No water was discharged after signs of disease were first noticed.

Plan of the infected premises

Figure 241: Plan of AIV 2022/01



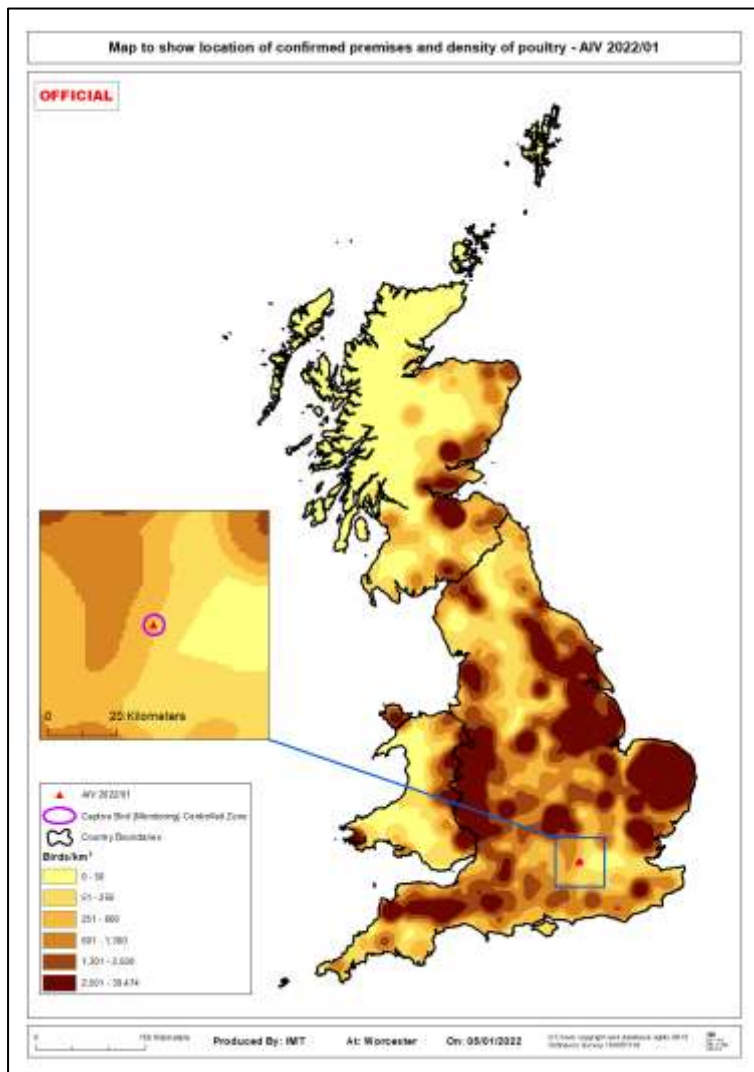
Ponds within pens are represented by blue circles/ellipses and buildings in orange.

Overview of biosecurity

Some biosecurity measures were in place such as disinfectant foot baths which had been used for at least the previous 30 days at the entrance to every pen and on the concrete pathways. Mesh covering over pens was present but reports of wild magpies and squirrels in the pens indicated that they were not a complete barrier to wild bird entry. A decision to avoid taking further swans after 15/12/2021 had been made to reduce risk of introduction of infection. However, regular use of river water to fill ponds continued.

Map with location in Great Britain and poultry density

Figure 242: Location of IP and poultry density



Overview of the surrounding area

The site was immediately surrounded by water from the river Thames with its tributaries, the Jubilee River 1.3 km to the north, other water bodies including a large rowing lake 2 km to the west and a nature reserve 1.5 km to the west. There were other substantial bodies of water within 4 to 5 km especially to the east where multiple reservoirs and gravel pits formed good habitats for waterfowl. The nearest agricultural land was 3 km to the south and west beyond the outskirts of the town of Windsor.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Diverse water habitats were present that were ideal for wild waterfowl both in the immediate vicinity and within 2 km of the premises.

Clinical picture

29/12/2021 – a swan (introduced on 13/11/2021) in Pen 1a which was combined with 1b, went off its food on and died the following day.

31/12/2021 another swan in the same pen (introduced on 15/12/2021) developed neurological signs. This swan and another in the same pen died on 01/01/22 and clinical signs of disease were also seen in pens 2, 3, 5 & 7.

02/01/2022 – two further swans died in pens 2 and 5.

Timeline

Tracings windows

Source tracings window:

High-risk:	26/12/2021 to 28/12/2021
Likely:	15/12/2021 to 25/12/2021
Precautionary:	09/12/2021 to 14/12/2021

Spread tracings window:

High-risk:	27/12/2021 to 31/12/2021
Likely:	16/12/2021 to 26/12/2021
Precautionary:	10/12/2021 to 15/12/2021

Most likely date of infection: 26/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 243: Source and spread timeline for AIV 2022/01

Source Tracing Window	Spread Tracing Window	Date	
Day 21		08/12/21	
Day 20		09/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		10/12/21	Start of precautionary spread tracing window (source + 24h).
Day 18		11/12/21	
Day 17		12/12/21	
Day 16		13/12/21	
Day 15		14/12/21	
Day 14		15/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs). Last swan addition - died 1/1/22
Day 13	Day 1	16/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	17/12/21	
Day 11	Day 3	18/12/21	
Day 10	Day 4	19/12/21	
Day 9	Day 5	20/12/21	
Day 8	Day 6	21/12/21	
Day 7	Day 7	22/12/21	
Day 6	Day 8	23/12/21	
Day 5	Day 9	24/12/21	
Day 4	Day 10	25/12/21	
Day 3	Day 11	26/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	27/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	28/12/21	
	Day 14	29/12/21	Precautionary onset of clinical signs. One swan off food.
	Day 15	30/12/21	Swan off food on 29/12/21 died over night.
	Day 16	31/12/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/155). Restrictions served. Swan with neurological signs in same pen as dead swan.
	Day 17	01/01/22	Two swans in same pen including the affected one on 31/12/21 died. Swans in five out of ten pens dull.
	Day 18	02/01/22	H5N1 confirmed by CVO and given case reference AIV2022-01
	Day 19	03/01/22	Culling completed. Preliminary C&D completed.
	Day 20	04/01/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates

Surveillance activity

CBMCZ (0-3 km)

69 premises with poultry holding between 1-125 birds (6 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

None of the two workers or nine volunteers kept or had contact with poultry. None of the volunteers had visited the premises for several days. The last swan introduction to the centre occurred 14 days prior to the onset of first clinical signs. There were no other identified tracings in the high-risk tracing windows for this premises.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds by faecal contamination of water pumped into ponds or from infected wild birds roosting on the mesh pen covering and defecating into the swan areas.

Assessment and evidence base for the likely source

The multiple opportunities for indirect contact of swans in the infected premises with faeces or secretions from wild birds particularly waterfowl led to an assessment of high likelihood of indirect contact with infected wild birds at low uncertainty. Although the level of wild bird surveillance was low and non-systematic, infection had been detected in a mute swan in Berkshire on 24/11/2021 about 17 km west of the premises and in West London on 20/01/2022 about 11 km to the east supporting local infection in wild waterfowl and particularly swans around the time of infection of the infected premises.

Spread investigations: Assessment of potential and likelihood of spread

Spread to poultry premises was assessed as very low likelihood with medium uncertainty with no clear risk pathways for transmission identified through tracing activities.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/02, Near Alford, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

The sole business activity was providing trained animals and birds for filming in advertisements and films. None had been used since November. There was a small flock of ex-battery hens providing eggs for personal consumption.

Species and number of each present

25 chickens, six ducks, 13 geese, one swan 13 doves, nine pigeons and one canary.

One horse, one pony, three donkeys, two sheep, one goat, one deer, two guinea pigs, two rabbits, cats and dogs and one parrot kept in the house

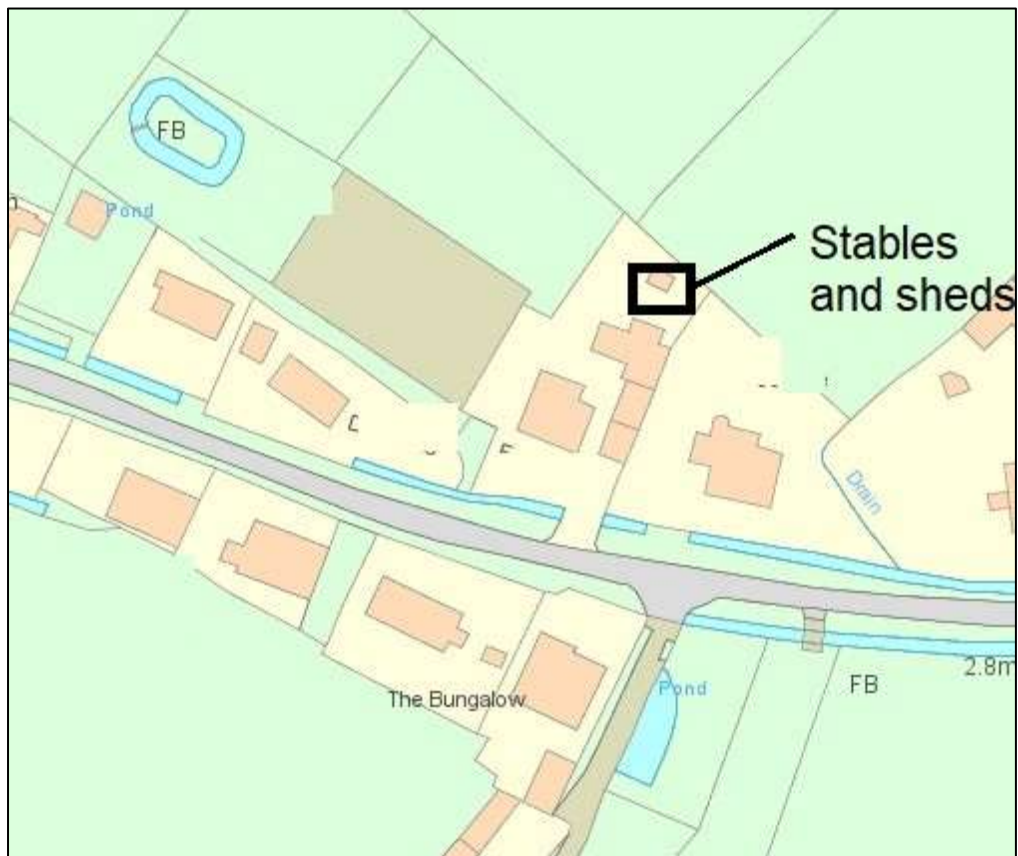
Description of the housing

The ducks and chickens were kept in separate wooden sheds with large mesh coverings and were next to each other in a larger meshed enclosure. There was the possibility of cross contamination at daily mucking out.

The other animals were kept in pens within the other sheds and stables.

Plan of the infected premises

Figure 244-Plan of AIV 2022/02

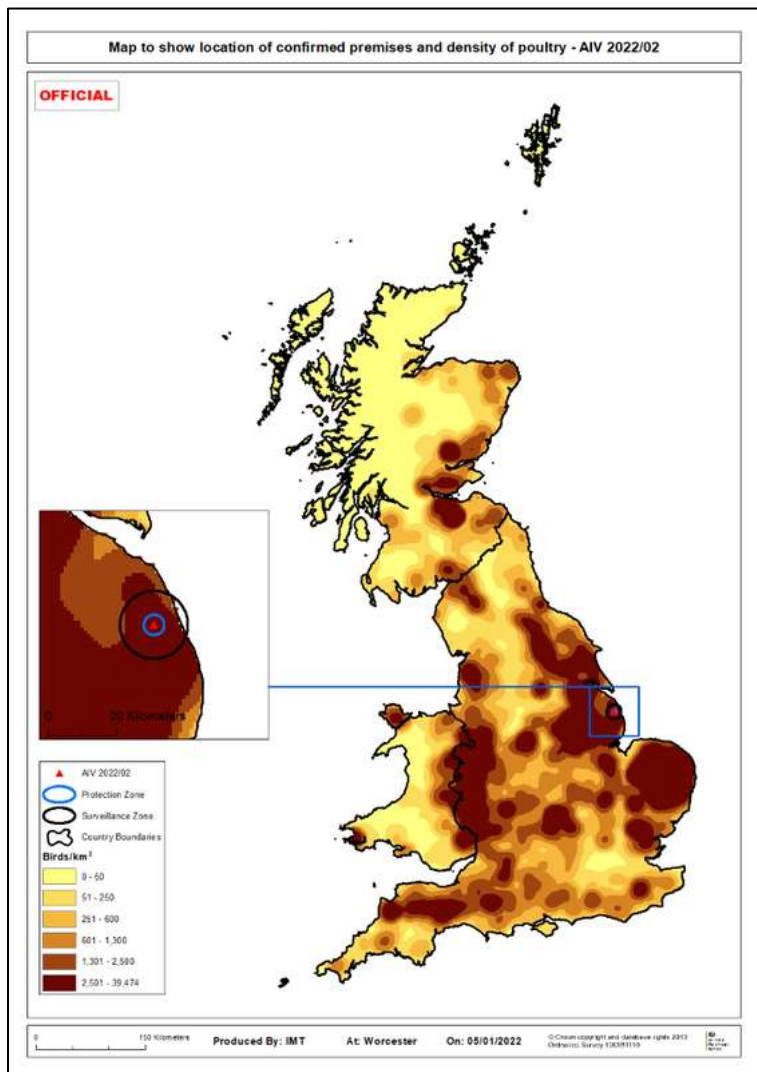


Overview of biosecurity

The level of biosecurity was assessed as low. All the birds were housed in November. Access to the yard and enclosures was via a solid wooden double gate with a disinfectant (Defra approved) foot dip. There were other foot dips at the entrance to the geese enclosure and at the rear entrance to the yard. The same footwear was used throughout the premises. Feed for all the birds was stored in the barn next to the geese enclosure. Straw, hay and feed were stored on and beside a trailer at the front of the house. Manure was removed to a communal muck heap by trailer and quad bike with no wheel disinfection.

Map with location in Great Britain and poultry density

Figure 245: Location of IP and poultry density



Overview of the surrounding area

AIV 2021/62, a commercial chicken laying premises, was 1.6 km to the southeast but had been culled and cleansed and disinfected before the start of the likely source tracing window for this IP. There were no known tracing contacts.

The premises was in a small village and consisted of a dwelling house with a garden and a garage, a yard with barn and stables, sheds and paddocks. There were some drains and ditches in the area and a pond in one of the paddocks, attracting wild ducks.

Ornithological assessment:

Desktop assessment: Not conducted

Local intelligence: There were some drains and ditches in the area and a pond in one of the paddocks, attracting wild ducks.

Clinical picture

31/12/2021 – The chickens were subdued and two died suddenly.

01/01/2022 – 20 chickens died overnight and three were unwell. The ducks and geese had no clinical signs. Suspicion of avian notifiable disease was reported.

02/01/2022 – During the APHA investigation, two chickens were found to be moribund and one was lethargic. One duck was unwilling to move and was separate from the others. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/12/2021 to 30/12/2021
Likely:	17/12/2021 to 27/12/2021
Precautionary:	11/12/2021 to 16/12/2021

Spread tracings window:

High-risk:	29/12/2021 to 01/01/2022
Likely:	18/12/2021 to 28/12/2021
Precautionary:	12/12/2021 to 17/12/2021

Most likely date of infection: 28/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 246: Source and spread tracing for AIV 2022/02

Source Tracing Window	Spread Tracing Window	Date	
Day 20		11/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		12/12/21	Start of precautionary spread tracing window (source + 24h).
Day 18		13/12/21	
Day 17		14/12/21	
Day 16		15/12/21	
Day 15		16/12/21	
Day 14		17/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	19/12/21	
Day 11	Day 3	20/12/21	
Day 10	Day 4	21/12/21	
Day 9	Day 5	22/12/21	
Day 8	Day 6	23/12/21	
Day 7	Day 7	24/12/21	
Day 6	Day 8	25/12/21	
Day 5	Day 9	26/12/21	
Day 4	Day 10	27/12/21	
Day 3	Day 11	28/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/12/21	
	Day 14	31/12/21	Owner noted birds were quiet and two dead. Precautionary onset of clinical signs.
	Day 15	01/01/22	Further 20 dead chickens and 3 showing nervous signs. Notification of suspicion of disease. APHA investigation and sampling (DPR 2022/01). Restrictions served.
	Day 16	02/01/22	
	Day 17	03/01/22	HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2022-02
	Day 18	04/01/22	Culling commenced
	Day 19	05/01/22	Culling completed. Preliminary C and D completed
	Day 20	06/01/22	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

26 premises with poultry holding between 1-69 birds (2 premises with 50 or more birds)

SZ (3-10 km)

166 premises with poultry holding between 1-106,000 birds (24 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Biosecurity was assessed as low with opportunities for direct contact with wild birds or indirect contact via the footwear or the bedding straw and hay which were stored outside under plastic.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2022/03, Near Lazonby, Eden, Cumbria, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a small scale unit holding 241 birds of various species. The owner had an interest in breeding for desired aesthetic characteristics and it was primarily considered a hobby. However, there was a very small scale commercial element as a small number of birds (usually less than 20 per year) were sold at specialist poultry sales. Eggs were not sold but kept for the owner's consumption. The premises also held 142 sheep, 41 cattle, 8 pigs with piglets and three pygmy goats. There was also an office on site which administered the British Blue Cattle Society.

Species and number of each present

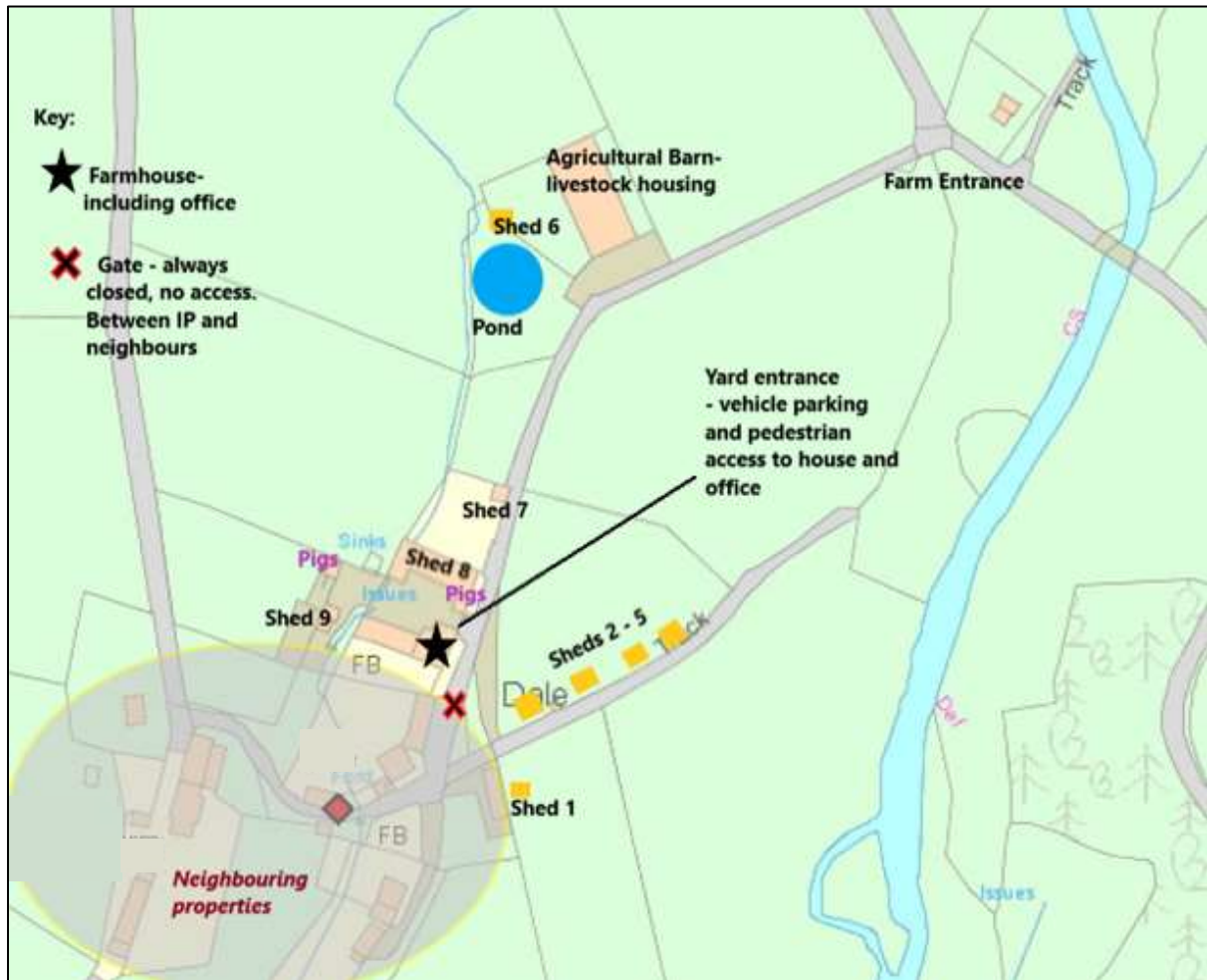
The poultry collection comprised 241 birds including chickens (Buff Orpington), turkeys (Crollwitzer), guinea fowl, ducks (Call, Silver Appleyard, Black East Indies, Runner and Bali), geese (Toulouse, Embden, Chinese).

Description of the housing

Birds were accommodated across nine houses of varying construction including stone barns and smaller wooden sheds. They would usually be free range but had been housed when the national housing order came into effect (29/11/2021).

Plan of the infected premises

Figure 247: Plan of AIV 2022/03

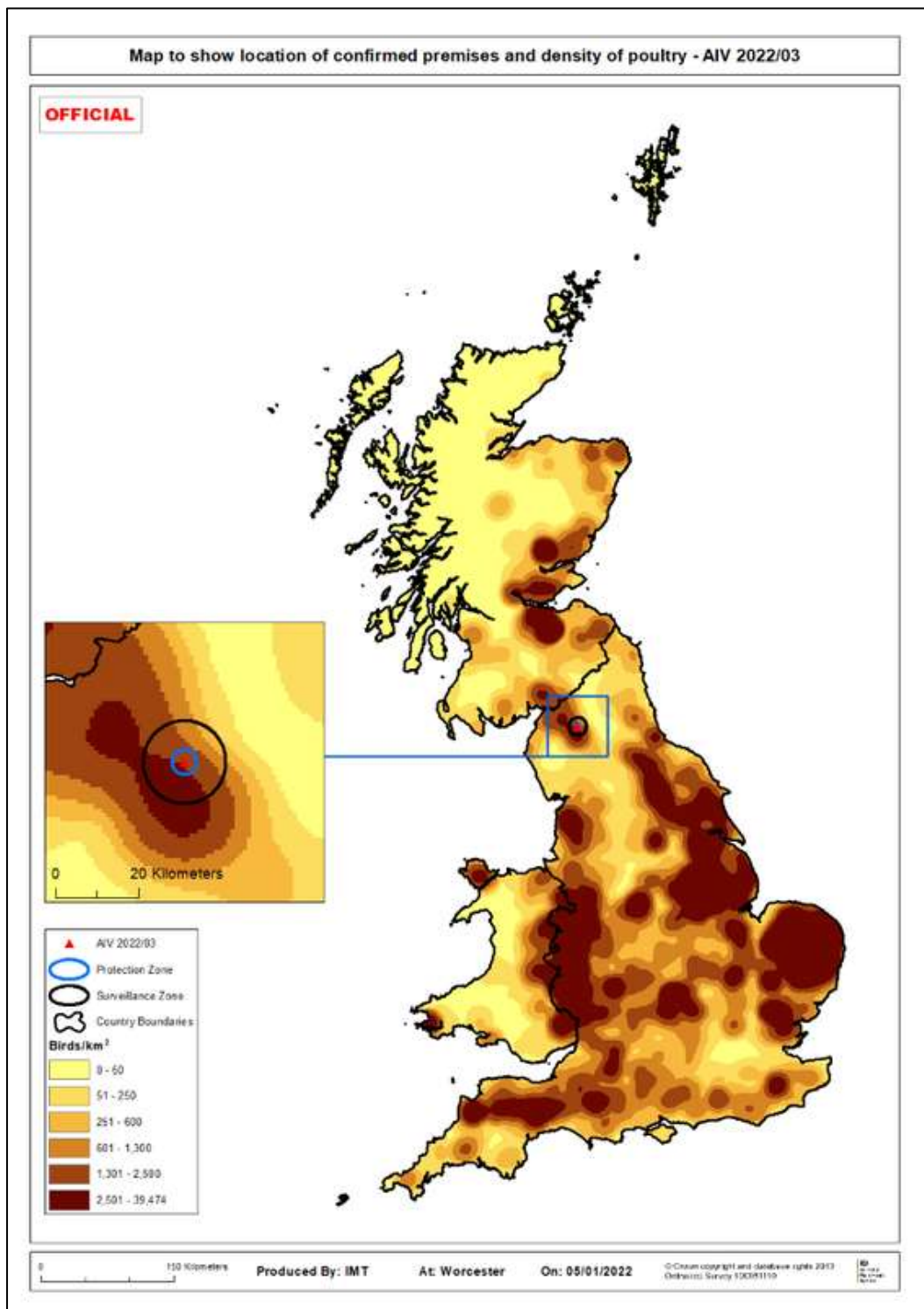


Overview of biosecurity

Routine biosecurity measures were not practised. Sheds 8 and 9 which were the two which became affected could be accessed by wild birds.

Map with location in Great Britain and poultry density

Figure 248: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of medium-high poultry density. There were no commercial poultry units adjacent to the IP but small holders were identified. There was a pond and a small stream running through the premises. There was a river approximately 250 m to the east. The wider area was dominated by agricultural land and there were a few small wooded areas.

Ornithological assessment:

Desktop assessment: Not conducted

Local intelligence: Garden birds and crows were seen regularly on the site and pheasants were seen occasionally. Waterbodies on site and nearby could attract waterfowl although these were not reported.

Clinical picture

On 31/12/2021, one duck was found dead in the morning in shed 8.

From 01/01/2022 to 02/02/2022, one turkey, one duck and one chicken were found dead in shed 8. Eight chickens were found dead in shed 9.

APHA investigated on 03/01/2022 and found one chicken and two ducks to be lethargic and dull in shed 8. Two ducks were found to be dull, pyrexia and displaying neurological signs in shed 9.

On 04/01/2022, one chicken was found dead in shed 9.

The other sheds remained unaffected.

With regard to the first death on 31/12/2021, this duck may have become affected overnight. Subsequently seen clinical signs in other ducks included dullness and lethargy which if present in the first duck to die, may not have been obvious prior to death. On this basis, a precautionary approach was taken and the onset of clinical signs was considered to be 29/12/2021.

Timeline

Tracings windows

Source tracings window:

High-risk:	26/12/2021 to 28/12/2021
Likely:	15/12/2021 to 25/12/2021
Precautionary:	13/12/2021 to 14/12/2021

Spread tracings window:

High-risk:	27/12/2021 to 03/01/2022
Likely:	16/12/2021 to 26/12/2021
Precautionary:	14/12/2021 to 15/12/2021

Most likely date of infection: 26/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 249: Source and spread timeline for AIV 2022/03

Source Tracing Window	Spread Tracing Window	Date	
		09/12/21	
		10/12/21	
		11/12/21	
		12/12/21	
Day 16		13/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 15		14/12/21	Start of precautionary spread tracing window (source + 24h).
Day 14		15/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	16/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	17/12/21	
Day 11	Day 3	18/12/21	
Day 10	Day 4	19/12/21	
Day 9	Day 5	20/12/21	
Day 8	Day 6	21/12/21	
Day 7	Day 7	22/12/21	
Day 6	Day 8	23/12/21	
Day 5	Day 9	24/12/21	
Day 4	Day 10	25/12/21	
Day 3	Day 11	26/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	27/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	28/12/21	
	Day 14	29/12/21	Precautionary onset of clinical signs.
	Day 15	30/12/21	
	Day 16	31/12/21	One duck found dead in shed 8 in the morning (may have died overnight).
	Day 17	01/01/22	
	Day 18	02/01/22	
	Day 19	03/01/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/05). Restrictions served.
		04/01/22	Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2022-03
		05/01/22	Culling completed, VFEI investigation
		06/01/22	Preliminary C&D completed
		07/01/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

10 premises with poultry holding between 2-47 birds (0 premises with 50 or more birds)

SZ (3-10 km)

32 premises with poultry holding between 1-100,000 birds (8 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Telephone tracing investigations were initiated for several people who worked in the on-site office. No other poultry contacts were identified, no further actions were required, and all the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds. Direct contact with wild birds was attributed medium likelihood with medium uncertainty. Indirect contact with wild birds was attributed high likelihood with low uncertainty.

Assessment and evidence base for the likely source

Tracings investigations did not identify any likely transmission pathways onto this unit. All pathways assessed were found to be very low or negligible likelihood. The two sheds which were affected could have been accessed by wild birds allowing either direct beak to beak contact or indirect contact via faeces. There were no routine biosecurity measures on the site so introduction of virus on fomites such as wellingtons boots, equipment and via rodents could occur readily.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/04, Near North Somercotes, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

This was a turkey fattener business. Day-old poults were placed and grown until time for slaughter. This premises was part of a company that had eight other turkey premises in the area. Two of these subsequently became IPs. The IP site was rented by the company.

Species and number of each present

There were approximately 4,200 20-week-old turkeys.

Description of the housing

The birds were kept in one pole-barn shed next to a public road. There was a grass verge separating the shed from the road. The shed was an approximately 2 metre high wall of breeze-blocks and Yorkshire boarding to the roof. The roof was made of corrugated metal. Ventilation was natural and the gable-end doors could be opened for more ventilation. The shed was not wild-bird proof.

Plan of the infected premises

Figure 250: Plan of AIV 2022/04



Overview of biosecurity

Biosecurity was very poor. There were multiple areas for small wild birds to access the shed, and whilst foot dips were in place, they were grossly contaminated.

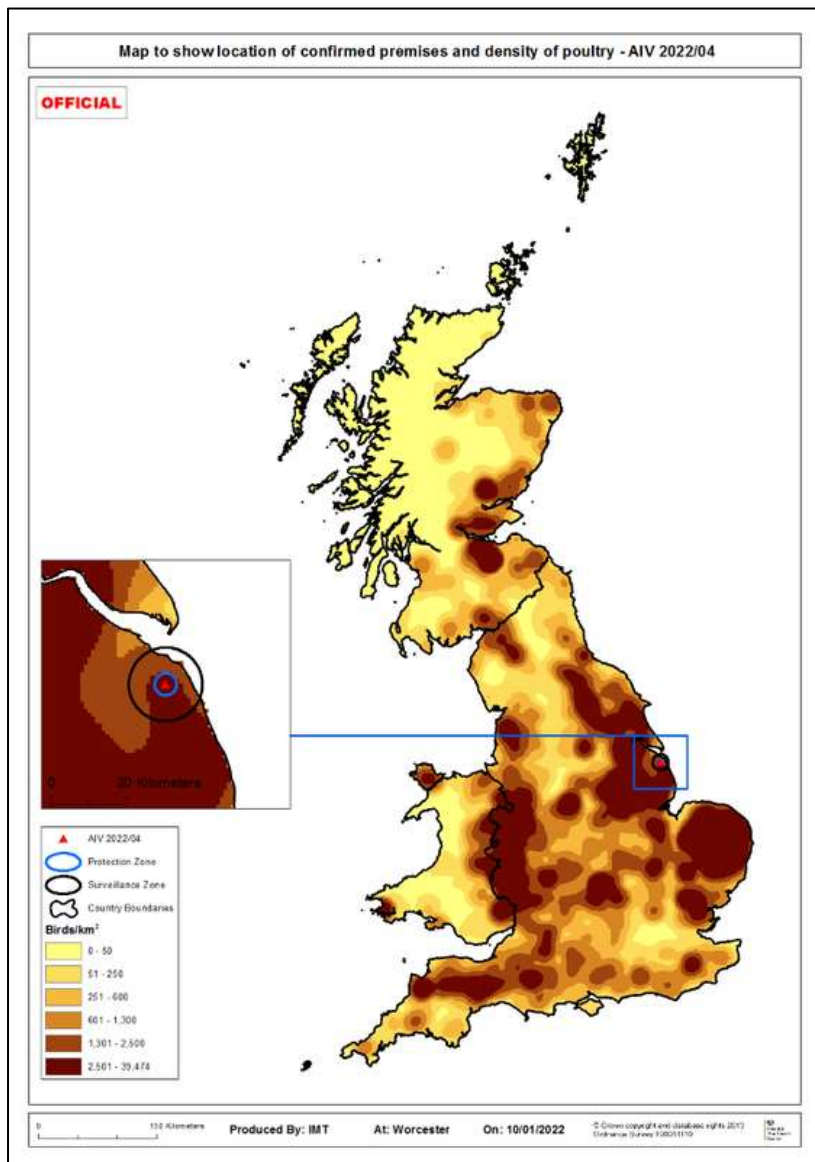
Straw bedding was stored 3 km away in an open-sided barn. It was unwrapped and delivered directly to the houses when required, with no C & D precautions taken. This bedding store was shared with AIV 2021/71.

Visitor records were poor, although by the time of disease confirmation the company had made some improvements to biosecurity in terms of reducing staff movements between sites.

A vehicle disinfection point had been established; however, there was no facility for cleaning gross contamination, and only a 1-litre sprayer to disinfect the vehicles. There was no clear delineation of clean and dirty areas for the vehicles. There was high uncertainty about the effectiveness of this C & D measure.

Map with location in Great Britain and poultry density

Figure 251: Location of IP and poultry density



Overview of the surrounding area

The local geography was flat and had few features. Land use was predominantly arable. The IP was approximately 1.25 km from the coast; in an area of bridge species and waterfowl. It was situated between the Humber and the Wash, so in a direct flightline for flying waterfowl.

Ornithological assessment:

Desktop assessment: The IP was in a predominantly arable and featureless landscape. Most waterbodies close to it were small ponds, though one large waterbody with a known aggregation of waterbirds was close enough to be significant. Bridge species were considered likely to be common and appeared to be

the most likely infection pathway onto the IP, with both gulls and corvids likely to exploit the farm and contaminate operational surfaces.

Local intelligence: Nothing further to add.

Clinical picture

27/12/2021 – the premises was assessed to be a Dangerous Contact of AIV 2021/71 based on shared staff. This IP (AIV 2022/04) was inspected on 30/12/2021. Concerns with biosecurity were identified, but no clinical signs were observed in the turkeys at that time.

04/01/2022 – disease was suspected by the keeper after 61 birds were found dead. 12 were culled in the morning.

At the APHA investigation on the same day, 15-20% of the birds were affected with recumbency, gasping and coughing, swollen and cyanotic heads, sinusitis and lacrimation, pyrexia, diarrhoea and tremors.

Timeline

Tracings windows

Source tracings window:

High-risk:	31/12/2021 to 02/01/2022
Likely:	20/12/2021 to 30/12/2021
Precautionary:	14/12/2021 to 19/12/2021

Spread tracings window:

High-risk:	01/01/2022 to 04/01/2022
Likely:	21/12/2021 to 31/12/2021
Precautionary:	15/12/2021 to 20/12/2021

Most likely date of infection: 31/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 252: Source and spread timeline for AIV 2022/04

Source Tracing Window	Spread Tracing Window	Date	
Day 20		14/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		15/12/21	Start of precautionary spread tracing window (source + 24h).
Day 18		16/12/21	
Day 17		17/12/21	
Day 16		18/12/21	
Day 15		19/12/21	
Day 14		20/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	21/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	22/12/21	
Day 11	Day 3	23/12/21	
Day 10	Day 4	24/12/21	
Day 9	Day 5	25/12/21	
Day 8	Day 6	26/12/21	
Day 7	Day 7	27/12/21	
Day 6	Day 8	28/12/21	
Day 5	Day 9	29/12/21	
Day 4	Day 10	30/12/21	Premises was visited as a Dangerous Contact. No changes in mortality noted.
Day 3	Day 11	31/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	01/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	02/01/22	
	Day 14	03/01/22	Precautionary onset of clinical signs.
	Day 15	04/01/22	Increase in mortality. Notification of suspicion of disease to APHA. Restrictions served. (DPR 2022/06)
	Day 16	05/01/22	
	Day 17	06/01/22	Culling complete and prelim C and D applied
	Day 18	07/01/22	Prelim C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

42 premises with poultry holding between 1-237,000 birds (5 premises with 50 or more birds)

SZ (3-10 km)

143 premises with poultry holding between 1-106,000 birds (30 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for a feed delivery in the high-risk tracing windows. This was assessed as very low risk and closed. As this IP was part of a company with other IPs already disclosed and other linked company premises, tracing investigations to a shared ABP collection site and staff movements were already under investigation and the other linked premises were already under restrictions. Several tracing visits were completed in association with the linked

premises, all were assessed as very low risk after 21 days had elapsed since the last date of contact with the IP and all tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds. Although direct contact was possible, indirect was more likely. AIV 2021/71 was a potential source, with a hypothesis of spread by non-avian wildlife. It would have been possible for a fox to pick up an infected bird from the sheds of AIV 2021/71 and infect AIV 2022/04 by fomite action.

Assessment and evidence base for the likely source

Biosecurity was poor at this site as with the company's other sites. There were a number of potential pathways for infection (shared staff, shared bedding store and vehicles). On the basis of probability an independent incursion is thought most likely.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

All other spread pathways investigated, with no further action needed.

Remaining uncertainty

No remaining uncertainties.

AIV 2022/05, Near Upholland, West Lancashire, Lancashire, England

Description of the premises

Overview of the premises and the wider business

This was a small hobbyist paddock with mixed poultry. There had been no egg production for two months.

Species and number of each present

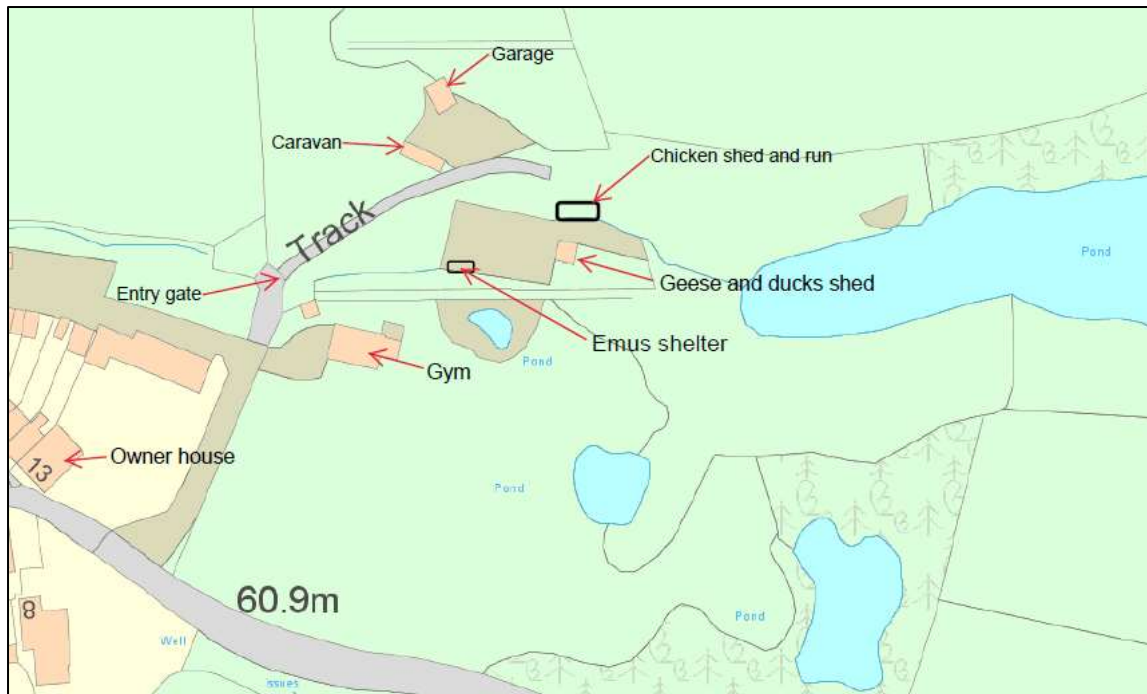
12 geese, four ducks, two emus and six chickens

Description of the housing

The geese ducks and emus were kept in an uncovered fenced enclosure and the chickens in a covered coop. There were ponds and watercourses on the paddock attracting wild waterfowl.

Plan of the infected premises

Figure 253: Plan of AIV 2022/05

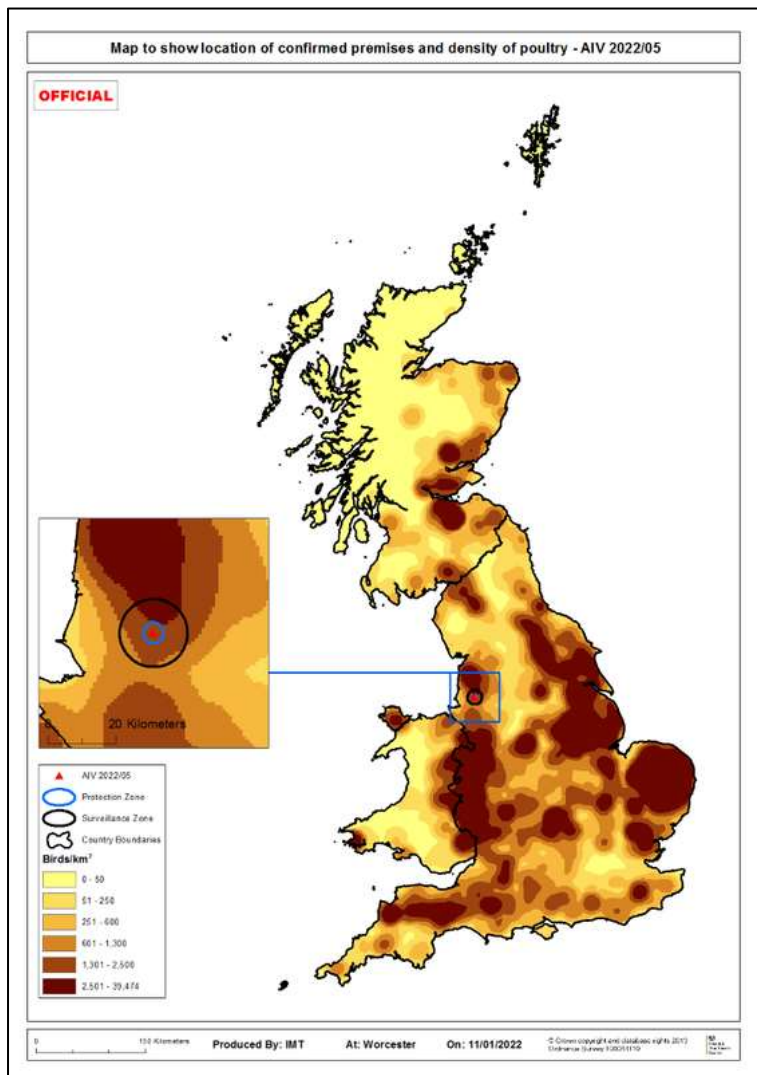


Overview of biosecurity

Although the birds were in enclosures, these did not prevent contact with wild birds. No other biosecurity measures were in place.

Map with location in Great Britain and poultry density

Figure 254: Location of IP and poultry density



Overview of the surrounding area

The site was between the PZ and SZ zones for other IPs and near the Captive Bird (Monitoring) Controlled Zone in Clitheroe.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intel: There were ponds and watercourses nearby attracting wildfowl.

Clinical picture

25/12/2021 and 04/1/2022 – Four chickens died with no prior clinical signs.

04/1/2022 – PVS visit to two emus which were reported as being depressed. One goose of 12 showed ataxia.

05-06/01/2022 – The remaining two chickens died.

06/01/2022 – Suspicion of avian notifiable was reported. APHA investigation found four geese with diarrhoea, one was also ataxic and one emu was subdued and lame. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	22/12/2021 to 24/12/2021
Likely:	11/12/2021 to 21/12/2021
Precautionary:	16/12/2021 to 21/12/2021

Spread tracings window:

High-risk:	23/01/2022 to 24/12/2021
Likely:	12/12/2021 to 22/12/2021
Precautionary:	17/12/2021 to 22/12/2021

Note the overlap between precautionary and likely source and spread windows due to late reporting of disease.

Most likely date of infection 22/12/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 255: Source and spread timeline for AIV 2022/05

Source Tracing Window	Spread Tracing Window	Date	
Day 14		11/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/12/21	
Day 11	Day 3	14/12/21	
Day 10	Day 4	15/12/21	
Day 9	Day 5	16/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 8	Day 6	17/12/21	Start of precautionary source tracing window (source tracing window +24h).
Day 7	Day 7	18/12/21	
Day 6	Day 8	19/12/21	
Day 5	Day 9	20/12/21	
Day 4	Day 10	21/12/21	
Day 3	Day 11	22/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	24/12/21	
	Day 14	25/12/21	Precautionary onset of clinical signs.
	Day 15	26/12/21	
	Day 16	27/12/21	
	Day 17	28/12/21	
	Day 18	29/12/21	4 chickens died over Christmas to New Year period
	Day 19	30/12/21	
	Day 20	31/12/21	
	Day 21	01/01/22	
	Day 22	02/01/22	
	Day 23	03/01/22	
	Day 24	04/01/22	Private Vet visited. Emus depressed, geese showing neurological symptoms.
	Day 25	05/01/22	
	Day 26	06/01/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/10). Restrictions served. Over 5th and 6th last two chickens died.
	Day 27	07/01/22	Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-05. Samples from ducks serologically positive which ties in with likely infection date.
	Day 28	08/01/22	
	Day 29	09/01/22	Cull commenced and completed. Preliminary C and D completed
	Day 30	10/01/22	Preliminary C and D considered effective
	Day 31	11/01/22	Preliminary C and D reapplied and completed
	Day 32	12/01/22	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

44 premises with poultry holding between 1-196 birds (2 premises with 50 or more birds)

SZ (3-10 km)

85 premises with poultry holding between 1-200,000 birds (17 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

Ponds and watercourses in the area, visited by waterfowl. Contact between wild and kept birds possible and no biosecurity measures. No movements of birds or their products during the tracing windows.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2022/06, Near Louth, East Lindsey, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a commercial free-range laying farm with 2 houses, but only one (House 6) was populated. The birds had been housed since the housing order came into place on 20/11/2021.

The farm also had some activity.

Species and number of each present

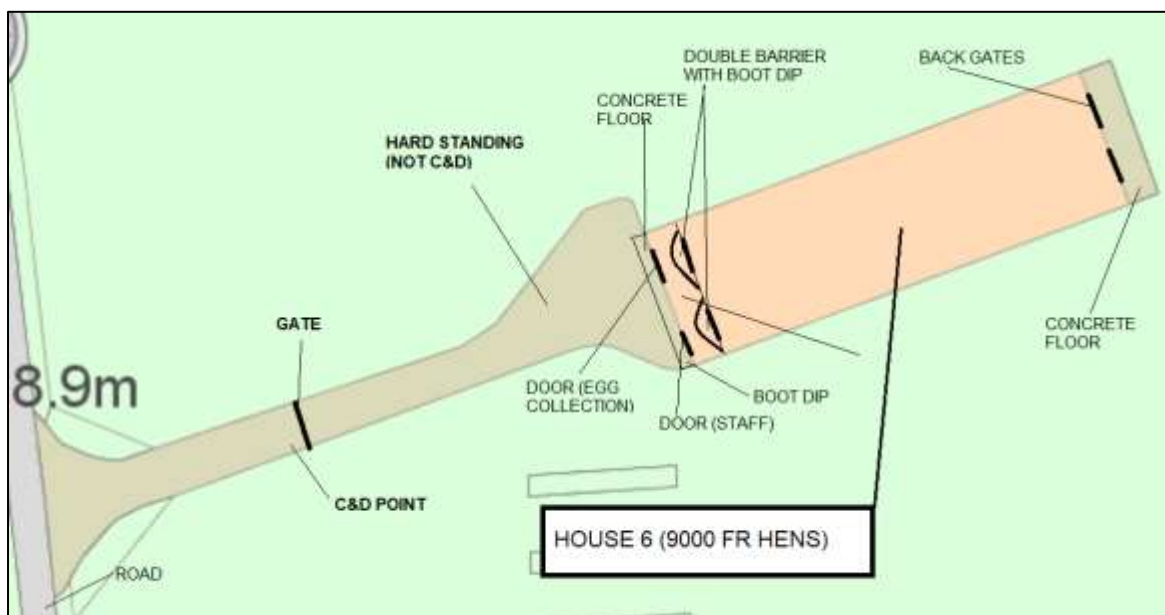
There were 9,000 chicken (laying hens), 46 weeks of age.

Description of the housing

House 6 was a flat deck hen shed approximately 25 years old (wooden, in relatively good maintenance condition). It had natural ventilation and nesting boxes in the middle of the shed.

Plan of the infected premises

Figure 256: Plan of AIV 2022/06



Overview of biosecurity

Biosecurity arrangements were reported to be average-good for this type of premises, with buildings in a good state of repair and a lockable gate with C&D facilities. However, the area surrounding the infected shed was not concreted and it was never cleaned and disinfected. Routine egg collection therefore presented a risk

for disease introduction/spread. There was a double barrier system in place separating access to bird area with dedicated footwear for the house (wellington boots). Dedicated house overalls were also used by staff and supplied by the owner. Dedicated footwear (clogs) was used in the service area and available at the building entrance with shoe covers given to visitors and available on site.

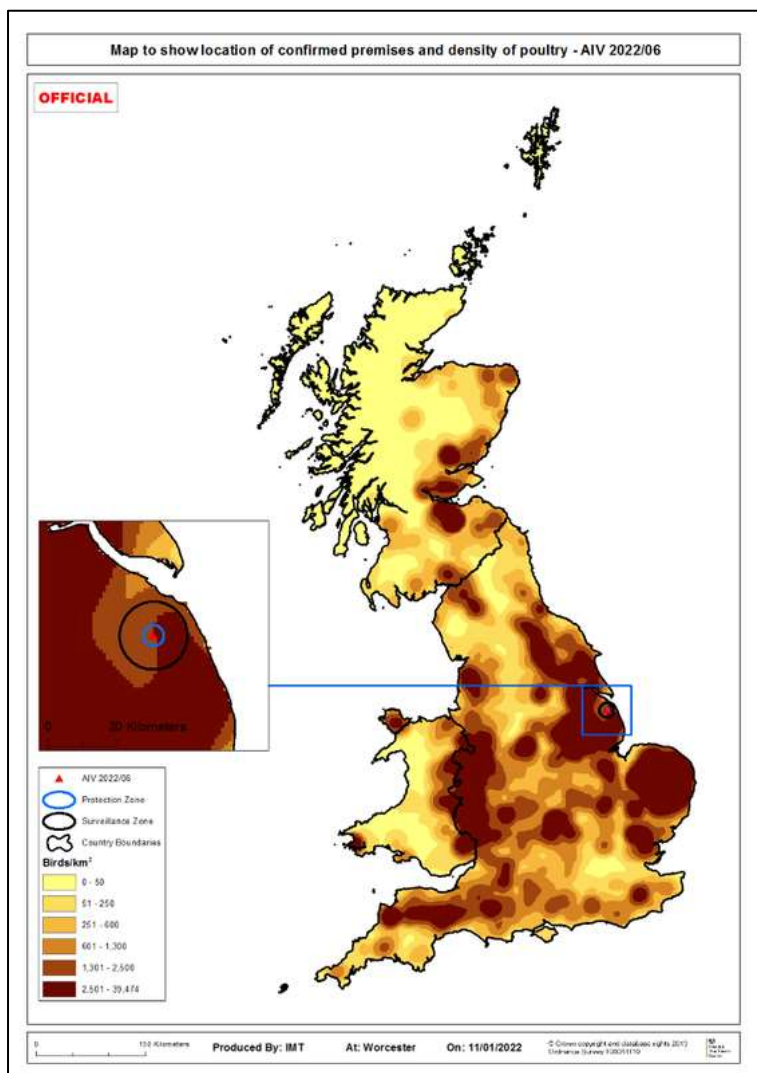
Feed was produced in the farm's own mill. Inspection of the mill identified some gaps in doors that could allow bird entry but according to the owner, birds were never observed inside. Good practices were observed at inspection and the risk of contamination of the feed from bird droppings appeared to be low

ABP were disposed of on site in the on-farm incinerator.

Gates and doors had warning signage advising of biosecurity requirements.

Map with location in Great Britain and poultry density

Figure 257: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density where other AIV outbreaks had been recently identified, with the affected house falling within the SZ of 3 other AIV outbreaks: AIV 2021/71, AIV 2021/74 and AIV 2022/04. AIV 2021/74 was the closest, 6 km from AIV 2022/06. There were no identified epidemiological links with any of those 3 outbreaks.

Ornithological assessment:

Desktop assessment: The assessment concluded that wildfowl and bridge species were likely to represent a source of infection pressure and contamination of the environment.

Wildfowl were abundant in the wider landscape and one waterbody close to the IP hosted moderate aggregations considered to be a likely source of infection. Bridge species were considered likely to be common with both gulls and corvids likely to have exploited the farm and contaminate operational surfaces.

Local intelligence: The farm was approximately 2.5 km away from a wild bird reservoir. Numerous wild birds were seen around the farm and there was knowledge of game birds in the area with shoots within 2 km.

Clinical picture

07/01/2022 – Increase in mortality first noticed (11 dead birds). Otherwise, no clinical signs were reported. Feed and water intake were normal.

08/1/2021 – Suspicion of avian notifiable disease (NAD) was reported to APHA following increased (250 birds) mortality. The farm was visited by an APHA vet on the same day and the APHA vet observed approximately 10% of birds were quieter and with congested wattles and combs. Very few respiratory signs were noticed. Sudden deaths were observed while sampling and approximately 25 birds died during inspection, with over 500 birds reported dead at the time of inspection. Farm checks on production parameters records did not show any significant changes other than mortalities. Post-mortem carried out on 3 carcasses by the APHA vet was unremarkable. Samples were collected and submitted for diagnostic testing.

09/1/2022 – approximately 40% mortality overnight.

Timeline

Tracings windows

Source tracings window:

High-risk: 03/01/2022 to 05/01/2022
 Likely: 23/12/2021 to 02/01/2022
 Precautionary: 18/12/2021 to 22/12/2021

Spread tracings window:

High-risk: 04/01/2022 to 08/01/2022
 Likely: 24/12/2021 to 03/01/2022
 Precautionary: 19/12/2021 to 23/12/2021

Most likely date of infection (Start of high-risk source tracing window): 03/01/2022

Timeline chart

Figure 258: Source and spread timeline for AIV 2022/06

Source Tracing Window	Spread Tracing Window	Date	
Day 19		18/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		19/12/21	Start of precautionary spread tracing window (source + 24h).
Day 17		20/12/21	
Day 16		21/12/21	
Day 15		22/12/21	
Day 14		23/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	24/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	25/12/21	
Day 11	Day 3	26/12/21	
Day 10	Day 4	27/12/21	
Day 9	Day 5	28/12/21	
Day 8	Day 6	29/12/21	Poultry housed.
Day 7	Day 7	30/12/21	
Day 6	Day 8	31/12/21	
Day 5	Day 9	01/01/22	
Day 4	Day 10	02/01/22	
Day 3	Day 11	03/01/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	04/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	05/01/22	
	Day 14	06/01/22	Precautionary onset of clinical signs - based on production records.
	Day 15	07/01/22	
	Day 16	08/01/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/14). Restrictions served.
	Day 17	09/01/22	HPAI H5N1 confirmed (AIV 2022/06). Cull commenced.
	Day 18	10/01/22	Cull completed.
	Day 19	11/01/22	Preliminary C&D completed.
	Day 20	12/01/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

34 premises with poultry holding between 1-50,000 birds (8 premises with 50 or more birds)

SZ (3-10 km)

168 premises with poultry holding between 1-237,000 birds (29 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for three private vets, egg collection routes and procedures, and a staff member. Risk assessments for the private vets and staff were either negligible or very low risk and the tracings were closed with no further action required. Three tracing visits were completed in relation to other poultry premises that were tracing contacts either before or after the egg collections occurred on the IP. This resulted in two premises requiring no further action and the tracings were closed and one premises required a further tracing visit 21 days from the last contact date with the IP. This final visit was assessed as having a very low risk of disease transmission and the tracing was closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds (high likelihood/medium uncertainty).

Assessment and evidence base for the likely source

Wildfowl were abundant in the wider landscape and one waterbody close to the IP hosted moderate aggregations considered to be a likely source of infection.

The area surrounding the infected shed was not concreted and could not be cleaned and disinfected. Routine egg collection operations therefore presented a risk for disease introduction via external contamination with wild bird droppings.

Natural ventilation inlets were not meshed and although they were protected by a wooden opening, the possibility of bird droppings entering via this route could not be ruled out.

There was evidence of water pooling outside the house with a potential for entering under the door, although no evidence of water ingress was seen from inside the house.

Other potential sources investigated were assessed as very low or negligible likelihood and were subsequently closed.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

Other potential spread pathways were investigated and assessed as low (or lower) likelihood and were subsequently closed

Remaining uncertainty

No remaining uncertainty.

AIV 2022/07, Near Tattenhall, Cheshire West & Chester, Cheshire, England

Description of the premises

Overview of the premises and the wider business

The premises was a large commercial turkey breeding rearing unit owned by a large poultry breeding company.

This unit operated an all-in, all-out policy and was last restocked between 11/08/2021 and 09/09/2021 with one day old turkeys from the company hatchery. The site rears stags and hens to supply breeding stock for two company laying farms. Birds that are selected out go direct to slaughter.

The birds were all housed with no outdoor access.

At the time of the report of suspicion of disease the birds were between 19 and 21 weeks old and the hens had not reached point of lay.

Species and number of each present

The site contained 9559 birds in four houses.

House 1: 1,050 stags. House 2: 3,739 hens. House 3: 2,250 hens. House 4: 2,520 hens

Description of the housing

The houses, constructed in 2007, were well built with concrete floors, a steel frame with wooden exterior cladding and interior walls lined with plastic-coated steel, with the edges sealed with silicone for easy cleaning. Side ventilation fans and roof inlet vents were covered with weld mesh to prevent bird access. The roof was metal profile sheeting that was free from any debris.

The perimeter of the whole site was mainly post and rail with no netting or barbed wire. The drive to the main entrance from the public road was not paved, and the gate to the poultry unit was situated next to the landowner's house. The poultry unit was separated from the land next to it by a wooden fence, and from the co-located dairy farm sheds to the north and west, with a fence and locked gate. The houses are further isolated by a metal chain and a linked 2-metre high fence that was embedded in a large tidy concrete apron.

At the end of the driveway next to House 4 was a large fallen-stock freezer. There was also a smaller one in the corridor within the sheds (a chest freezer) between House 1 & 2.

Plan of the infected premises

Figure 259: Plan of AIV 2022/07

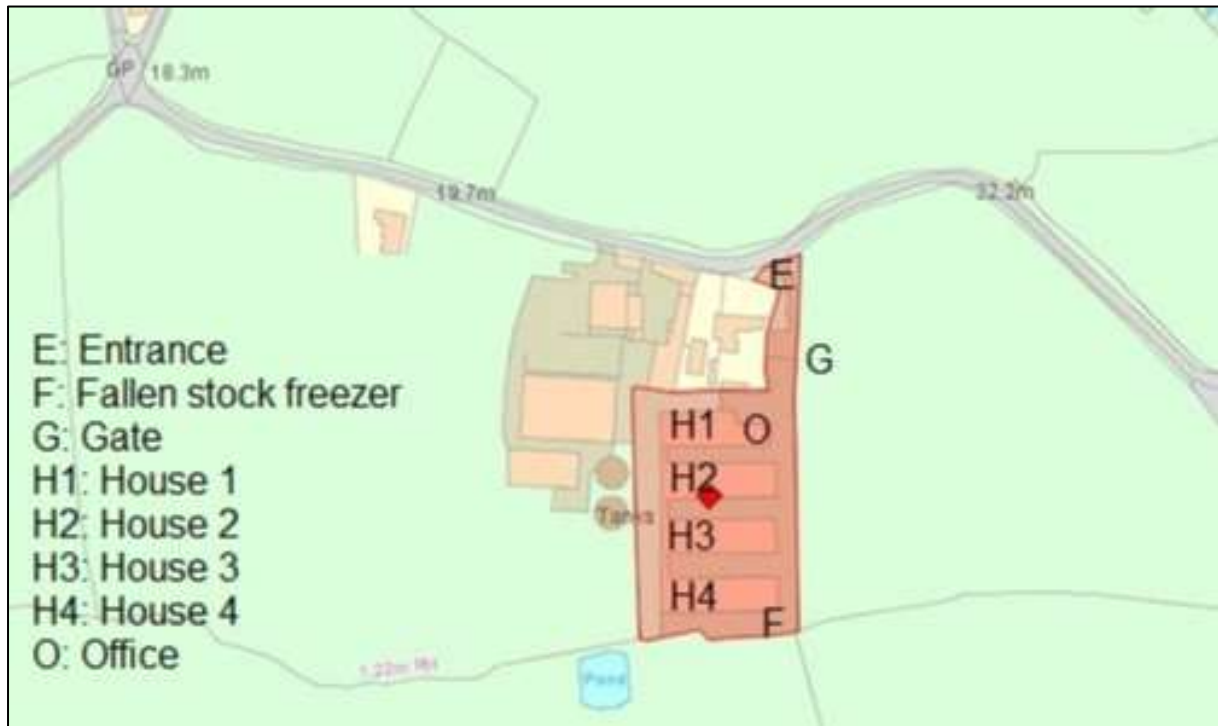
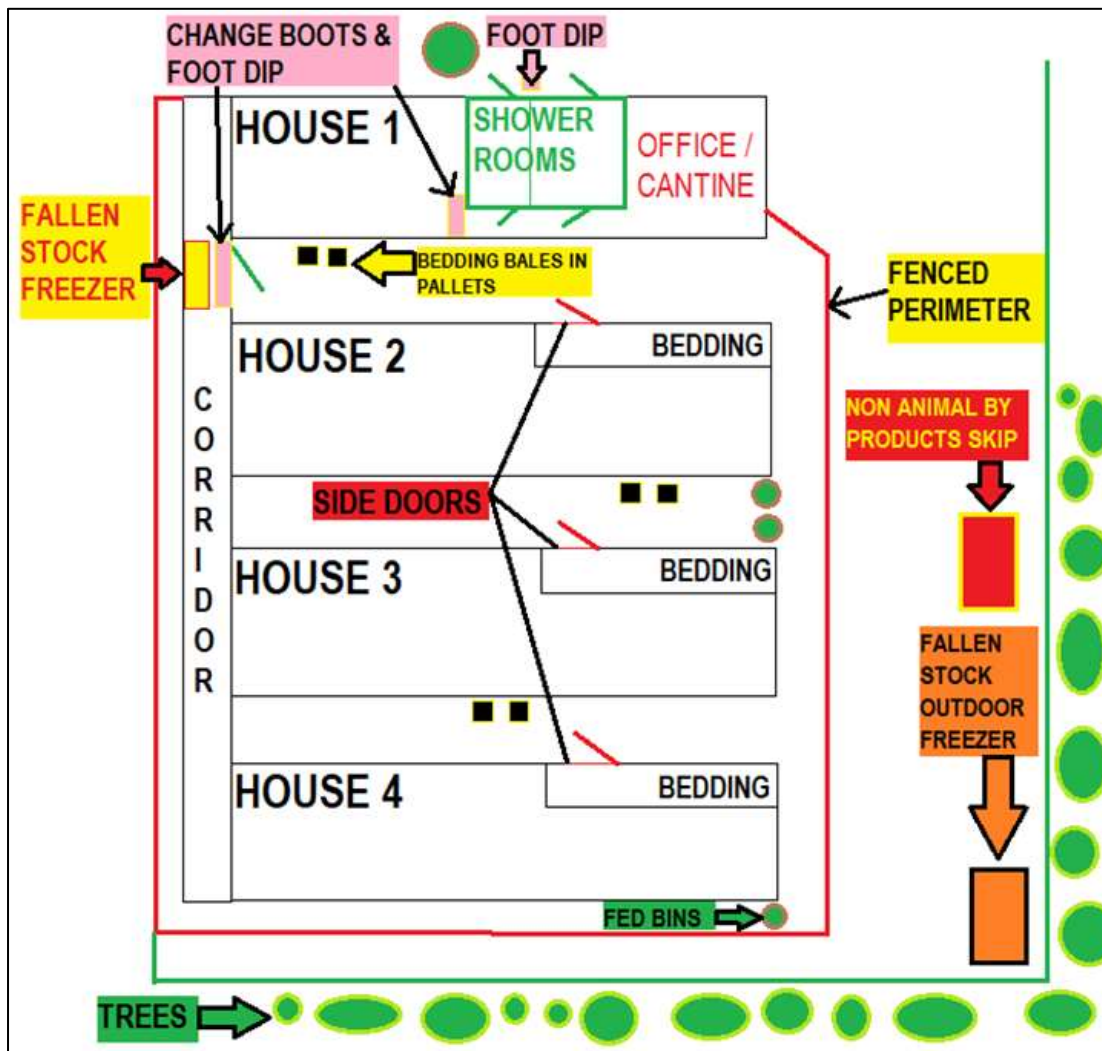


Figure 260: Detailed plan of house layout



Overview of biosecurity

The site was a shower-in shower-out facility and there were written biosecurity protocols in place on site. The main gate and the one before entering the premises was padlocked at night.

No wheel wash was in place, but there was a manual spraying unit filled with Virkon LSP that must be used by delivery drivers. Any visitors entering the gate were expected to sign in, use PPE and spray their wheels. Wheel cleansing and disinfection had limitations, as the wheels were static when sprayed and the surface contacting the ground would not be totally disinfected. The wheels would also be soiled from the track when approaching the farm and there was no cleaning point.

The feed delivery drivers wore their own PPE and gloves, which created a potential means of bypassing the company SOPs. In addition, some feed pipes to allow feed to be blown into the silos were seen to be left lying on the ground allowing potential contamination by vermin and birds.

To enter the buildings, staff were required to shower-in and disinfect their footwear in an uncovered foot dip, before entering the locked (keypad entry only) showers. There was no boot cleaning facility prior to disinfection. The foot dip was poorly positioned due to the building design, which resulted in anyone entering the site having to step back onto the outside concrete before entering the shower block.

Two separate showers were available for male and female staff. They were both single rooms with the showers in the middle. The separation between the dirty and clean areas was the shower itself. Having passed through the showers there was a door that led to a corridor with access to the office and House 1.

There was a boot changing and disinfection point before entering House 1 (the “stags’ house”). This consisted of a manual sprayer with Virkon LSP and a foot dip. This station provided access to all the houses. There was a step-over barrier that was also a wooden bench to facilitate the changing of footwear. The wood was not waterproofed and so was not easy to clean and disinfect.

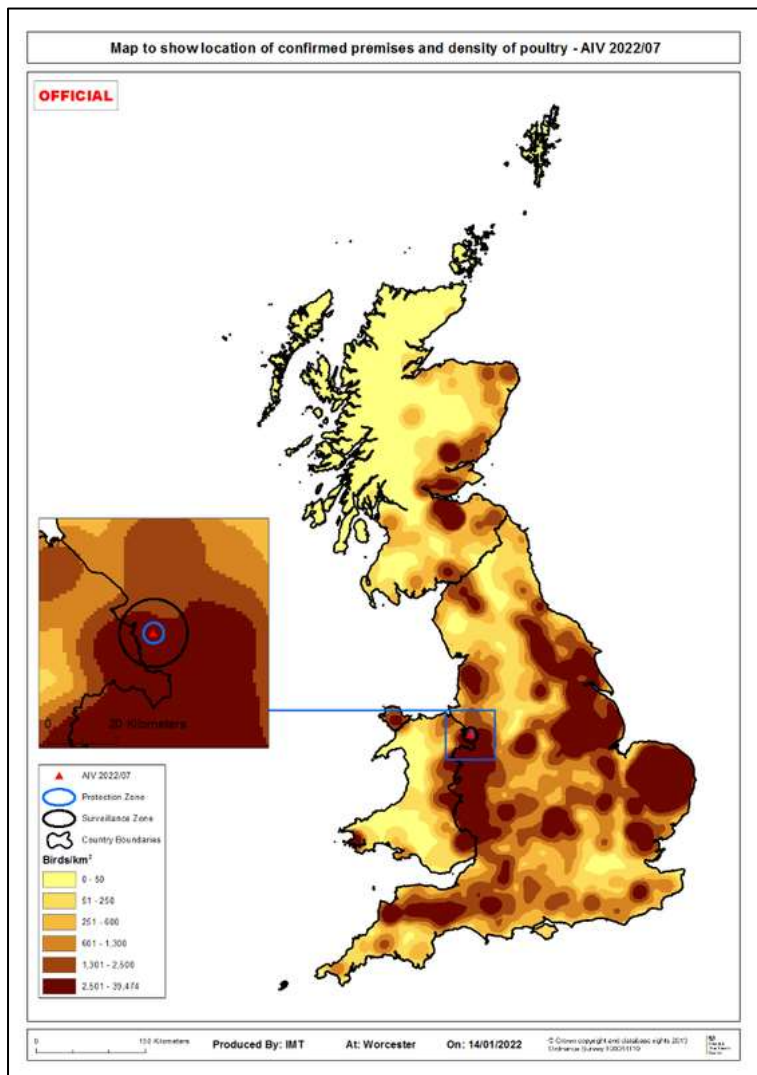
All the houses were linked by an internal corridor, and each shed had a side door to the outside that could be used to add additional bedding if required. It offered a plausible route of disease incursion however they are not used during a crop apart from House 3 (affected house) that had been used to restock shavings in the middle of December. Strict biosecurity protocols were followed during the shavings restocking requiring disinfection of the outer wrapper of the shavings pallet then removed before the individual bales are passed through the door. No staff entered via this door.

Access to the outside was also possible from the corridor between House 1 and House 2 and an additional boot changing station was located at that point. This had a full boot changing barrier and foot dip with an outside overall being donned prior to exit which was removed on re-entry with hands being sanitised and the area then sprayed with disinfectant following re-entry. This door had not been used in the 10 days prior to the outbreak.

The ventilation system had ridge inlets and side outlets and could result in a biosecurity breach if the weld mesh barrier was to be breached.

Map with location in Great Britain and poultry density

Figure 261: Location of IP and poultry density



Overview of the surrounding area

This lowland and inland IP was set in a rural context, close to the border with Wales. While there were isolated hills nearby to the south and east, and at greater distance to the west, the location was in the wider vale around the river Dee. It was therefore generally flat and managed relatively intensively for agriculture. The wider landscape was a roughly equal mix of arable and pasture, but pasture predominated around the IP. In addition, other extensive grass/parkland uses also occurred nearby, including a very large area of pasture, amenity grass such as a golf course and parkland, plus grass around a stately home. There were also some semi-natural habitats (such as rough grazing and scrub) around a castle site.

Ornithological assessment:

Desktop assessment: This lowland and rural IP was set in a generally mixed agricultural landscape, although grassland land-uses predominated immediately around the site. All of the many waterbodies close to the IP were too small to host many waterbirds; the largest were distant and only likely to hold moderate numbers.

Wildfowl were likely to be generally common, although it was unlikely that any waterbodies close to the IP hosted aggregations likely to have produced a source of infection. There did not appear to be any plausible risk pathways or risk factors for wildfowl to produce specific infection pressure.

Waders and other waterbirds were not thought to be common, and it appeared unlikely that their behaviour would support plausible pathways to produce specific infection pressure.

Bridge species were considered likely to be at least common and appear to produce the most likely infection pathways onto the IP, with both gulls and corvids likely to exploit this mixed farm setting, and contaminate operational surfaces.

Woodpigeon and starlings may also have contributed several alternative infection pathways to add to the infection pressure here, but the low likelihood of a local source of infection suggested that small passerines produced little infection pressure.

The closest distinct settlements were a small village 1 km to the south, a large village 3.2 km NNE and 4.5 km WSW being the only other significant settlements; a large town WSW and a small city NNW lie just out of scope. although an extensive industrial and commercial zone associated with the large town was noteworthy (closest 8.8 km SW). Other settlements were too small or too distant to provide support for populations of wild birds that might use the IP (such as supplementary food).

Local intelligence: During the investigation numerous bridge species (gulls and corvids) were seen on the surrounding grassland.

Clinical picture

11/01/2022 – Three birds were found dead in House 3 in a pen of 40 birds; two had died overnight and one in the evening.

12/01/2022 – 80 turkeys were found dead in House 3 and two stags were found dead in House 1. The rest of the flock was assessed as clinically normal.

Suspicion of avian notifiable disease was reported by PVS and an APHA investigation was conducted that day.

In House 3 birds were generally looking distressed, a few with dropped heads and one showing respiratory distress (died shortly afterwards). Birds were displaying nervous symptoms, unsteady on their feet, tremors, diarrhoea, collapsing and dying. At the end of the day mortality had increased with a total of 200 deaths and sample were submitted. The other houses (1,2 & 4) seemed to be unaffected.

13/01/2022 – the number of deaths in House 3 rose to 600 birds; four deaths in House 1 (same pen): five deaths in House 2 and one death in House 4.

14/01/2022 – by 17:30 hours only 190 birds remained alive in House 3 and these were culled on welfare grounds.

Timeline

Tracings windows

Source tracings window:

High-risk:	07/01/2022 to 12/01/2022
Likely:	27/12/2021 to 06/01/2022
Precautionary:	22/12/2021 to 26/12/2022

Spread tracings window:

High-risk:	08/01/2022 to 12/01/2022
Likely:	28/12/2021 to 07/01/2022
Precautionary:	23/12/2021 to 27/12/2021

Most likely date of infection (Start of high-risk source tracing window): 07/01/2022

Timeline chart

Figure 262: Source and spread timeline for AIV 2022/07

Source Tracing Window	Spread Tracing Window	Date	
Day 19		22/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		23/12/21	Start of precautionary spread tracing window (source + 24h).
Day 17		24/12/21	
Day 16		25/12/21	
Day 15		26/12/21	
Day 14		27/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	28/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	29/12/21	Vaccination team on site
Day 11	Day 3	30/12/21	
Day 10	Day 4	31/12/21	
Day 9	Day 5	01/01/22	
Day 8	Day 6	02/01/22	
Day 7	Day 7	03/01/22	
Day 6	Day 8	04/01/22	ABP removed from internal freezer to external one.
Day 5	Day 9	05/01/22	
Day 4	Day 10	06/01/22	Feed delivery
Day 3	Day 11	07/01/22	Start of high risk source tracing window (-3d). Most likely (earliest) infection date for this outbreak.
Day 2	Day 12	08/01/22	Weekend worker: Three selectors visit house two: Start of high risk spread tracing window (source +24h).
Day 1	Day 13	09/01/22	Weekend worker on site
	Day 14	10/01/22	Precautionary onset of clinical signs given mortalities found in the morning on the 11th.
	Day 15	11/01/22	Onset of clinical signs. 3 mortalities
	Day 16	12/01/22	80 Mortalities. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/017). Restrictions served.
	Day 17	13/01/22	300 mortalities overnight. VFEI visit initiated. Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2021-07.
	Day 18	14/01/22	600 mortalities overnight. Cull commenced. Rest of house 3 culled on welfare grounds.
	Day 19	15/01/22	
	Day 20	16/01/22	Cull completed
	Day 21	17/01/22	Preliminary C and D completed
	Day 22	18/01/22	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread on these dates.

Surveillance activity

PZ (0-3 km)

16 premises with poultry holding between 1-7,000 birds (1 premises with 50 or more birds)

SZ (3-10 km)

70 premises with poultry holding between 1-64,000 birds (8 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for a private vet, company staff and feed deliveries. Farm staff consisted of a permanent farm manager working during weekdays and one worker covering weekends. They were dedicated to the site, and none had poultry at home, nor worked anywhere else. Three company staff visited to deliver weighing equipment. Company policy required staff to visit only one poultry premises per day.

There was one feed delivery within the high-risk window. It was a single load with transport C&D at the mill before and after the delivery.

All tracings were assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was assessed as being indirect contact with wild birds.

Assessment and evidence base for the likely source

Direct contact with wild birds and vermin was assessed as very low likelihood with low uncertainty, as the birds were housed, vermin control was thorough, and the buildings were in a good state of repair.

The likelihood of indirect contact with wild birds/vermin was assessed as being medium with a medium uncertainty. The addition of new bedding into the houses was a weakness in the overall biosecurity practiced on the site. The building design was not ideal with regards to the placement of foot dips at the entrance to the shower blocks, and at the entrance in the corridor where staff access the concrete apron where bedding is stored. There was a large number of wild birds seen in the immediate surrounding farmland at the time of the investigation.

A breach of biosecurity via the ventilation system as a result of leaves/feathers gaining access was possible however the mitigation of weld mesh to bird proof the ridge vents would have reduced but not eliminated the likelihood of this risk pathway.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low risk.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/08, Near Tattenhall, Cheshire West & Chester, Cheshire, England

Description of the premises

Overview of the premises and the wider business

This infected premises was an integrated turkey breeder site.

The breeding stock originated from the company's hatchery from where the birds were sent to company rearing sites. At 32 weeks-old, they were moved to a breeding site, such as this IP, where they were kept for breeding, before being sent to slaughter.

Approximately 4000 eggs were produced per day and these were dispatched three times a week to the company's hatchery.

Species and number of each present

There were 4,575 51-week-old breeding turkeys spread across six houses.

Description of the housing

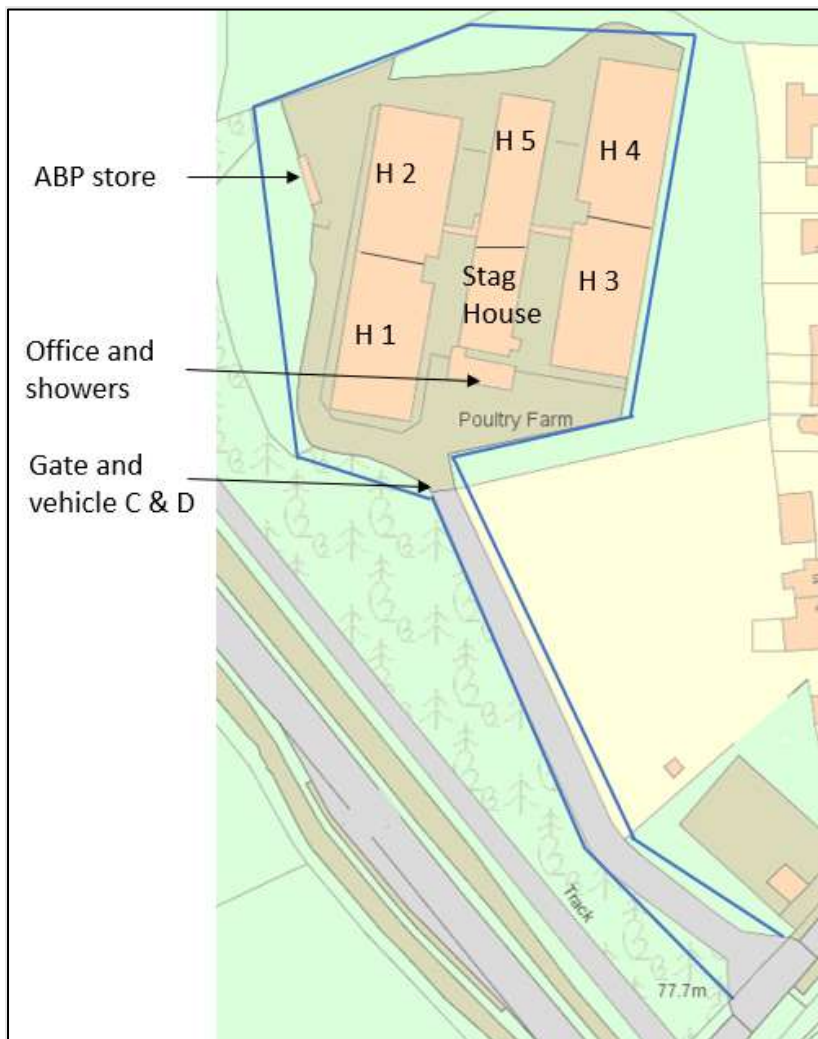
There was an outer shell to the premises, composed of wire fencing approximately 1.5 m high. The yard was a mixture of concrete and hardcore. There was a shower complex at the office area, which staff and visitors used. The shower complex opened into the utility and egg store, which was directly linked to the stag house. From there all other houses could be accessed.

All six houses were solid sided with fans and vents covered in fine mesh. In houses 1-4, air was drawn in passively through the roof ridge and actively removed through the sidewalls. House 5 had no active fans. In the stag house, there were outlet fans on the roof, which caused air to be drawn in via sidewall vents.

Inside houses 1-4 the walls were lined with plastic-coated steel panels for ease of cleaning between batches.

Plan of the infected premises

Figure 263: Plan of AIV 2022/08



Overview of biosecurity

Entry to the bird area was via the shower room. Once showered, dedicated internal clothing and footwear should be worn. All bird areas were linked and foot dips were present at each portal between the houses and at each end of connecting corridors. All staff had access to all houses at all times. The doors between houses were often left open and so the unit was considered to be one epidemiological unit.

Bedding was delivered as individually wrapped bales on pallets, which were shrink-wrapped. It was stored outside in gravelled areas between the houses. When moved into the bird area, the protocol was for bales to be cleansed and disinfected then placed in houses via side doors into central stores. One staff member stood outside and passed bales through.

Feed deliveries were weekly and the delivery was dedicated to the IP. Feed bins were outside each house and were behind a wire fence. Feed was blown into the bins through pipes, which were capped, but left at ground level and not routinely

cleaned. There was no dust breather outlet, meaning that feed dust could accumulate on top of the silos and attract wild birds.

Deadstock and rejected eggs were removed from the houses via the side doors, placed on a dedicated trolley and taken to the freezer at the side of house 2. All ABP remained frozen and on site until the site was depopulated.

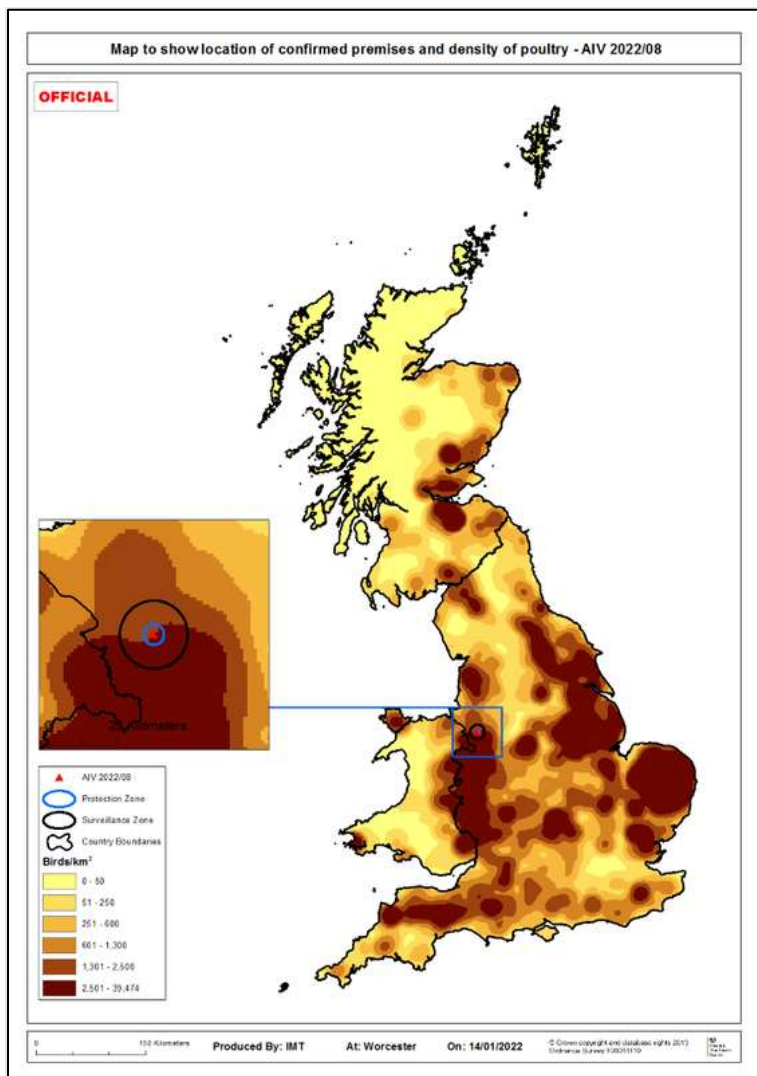
Rodent control – No evidence of rodent activity was observed, or reported, at the time of the investigation.

Clothing was dedicated to outside or inside work. The overalls were laundered on site in a room next to the egg room This could have provided a source of fomite infection if wild bird faeces contaminated outdoor clothing.

Vehicles had to drive past a wheel C&D point. However, this was not automated and so was reliant on individual compliance.

Map with location in Great Britain and poultry density

Figure 264: Location of IP and poultry density



Overview of the surrounding area

The farm was situated in a rural area adjacent to a small village. There were no contiguous livestock and no susceptible domestic poultry were known to be located nearby.

Ornithological assessment:

Desktop assessment: This rural and lowland area had features that may have encouraged waterbirds to forage across wet fields close to the IP although a few larger waterbodies were present at significant distances. Wildfowl, waders and other water birds were thought common in the wider landscape, but thought unlikely to use operational surfaces on the IP and not produce much infection pressure. Gulls were at least common and corvids may have been abundant, with both groups likely to produce the most significant infection pathways. Wild passerines and Woodpigeon might have supported indirect infection pathways from sources of infection, though the likely absence of these close to IP suggests pathways from small passerines to be particularly unlikely. Together this might have contributed some infection pressure.

Local intelligence: Geese and starlings were regularly seen flying overhead. No pigeons, crows or pheasants were observed at the time of the investigation but had been seen at previous visits. At the time of the visit, passerines were observed. No gross contamination of the roofing was observed suggesting that birds didn't rest on the house roofing.

Clinical picture

11/01/2022 – six stags died.

12/01/2022 to 23 more stags died and suspicion of avian notifiable disease was reported. At the APHA investigation the same day, the turkeys were found to be quiet, dull and inappetent. There were some neurological signs but no respiratory signs, cyanosis, diarrhoea or pyrexia. Egg production was normal.

Semen was collected from stags on 10/01/2022 and inseminated into hens in House 3 on the same day. Semen was also collected on 11/01/2022 and inseminated into hens in House 1 on the same day. Disease was noted in the hens on 13/01/2022

It was notable that the stag house was affected first, then the hens that were inseminated (co-located birds in the affected hen house were unaffected initially). It is therefore likely that virus first affected the stags and was transferred to the hens through fomite spread. Venereal spread could not be ruled out.

Timeline

Tracings windows

Source tracings window:

High-risk: 07/01/2022 to 09/01/2022
 Likely: 27/12/2021 to 06/01/2022
 Precautionary: 22/12/2021 to 26/12/2021

Spread tracings window:

High-risk: 08/01/2022 to 12/01/2022
 Likely: 28/12/2021 to 07/01/2022
 Precautionary: 23/12/2021 to 27/12/2021

Most likely date of infection: 07/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 265: Source and spread timeline for AIV 2022/08

Source Tracing Window	Spread Tracing Window	Date	
Day 19		22/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		23/12/21	Start of precautionary spread tracing window (source + 24h).
Day 17		24/12/21	
Day 16		25/12/21	
Day 15		26/12/21	
Day 14		27/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	28/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	29/12/21	
Day 11	Day 3	30/12/21	
Day 10	Day 4	31/12/21	
Day 9	Day 5	01/01/22	
Day 8	Day 6	02/01/22	
Day 7	Day 7	03/01/22	
Day 6	Day 8	04/01/22	
Day 5	Day 9	05/01/22	
Day 4	Day 10	06/01/22	
Day 3	Day 11	07/01/22	Start of high risk source tracing window (-3d). Most likely earliest infection date for this outbreak.
Day 2	Day 12	08/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	09/01/22	
	Day 14	10/01/22	Precautionary onset of clinical signs. Five stags dead between overnight on 10th-11th
	Day 15	11/01/22	
	Day 16	12/01/22	Notification of suspicion of disease to APHA following further deaths. APHA investigation and sampling (DPR 2022/018). Restrictions served.
	Day 17	13/01/22	H5N1 confirmed by CVO with case reference AIV 2022-08
	Day 18	14/01/22	
	Day 19	15/01/22	Culling started
	Day 20	16/01/22	Culling completed
	Day 21	17/01/22	Preliminary C & D applied
	Day 22	18/01/22	Preliminary C & D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

43 premises with poultry holding between 1-4,540 birds (4 premises with 50 or more birds)

SZ (3-10 km)

154 premises with poultry holding between 1-5,000 birds (18 premises with 50 or more birds)

Investigations on the infected premises

Source investigations

Tracings were initiated for the farm staff, two company vets, one AI technician, one company staff who visited for routine maintenance (fix a light), one company staff who visited to carry out pest control activities, two contractors who visited to service the sewage treatment system, feed deliveries and the collection of eggs to the company hatchery.

The hatchery was visited and after their biosecurity arrangements were assessed and egg disposal procedures were verified, the tracing was assessed as very low risk and closed.

However, it also identified as part of the egg collection route, three poultry premises, part of the same company, which had been visited by the same egg collection vehicle immediately after collecting from the IP during the high-risk spread window. This resulted in an immediate tracing visit to these three potential contact premises to inspect the birds.

For one of these contact premises, no sign of notifiable disease was observed on the immediate tracing visit but subsequently became a report case, HPAI confirmed, and the premises became AIV 2022/10.

For the other two premises, no sign of notifiable disease was observed, and restrictions were lifted at the 21-day post-contact tracing visit as the likelihood of spread was assessed as very low. However, one of these premises became subsequently AIV 2022/14.

On enquiries, it was confirmed the feed delivery had not occurred in the high-risk tracing windows, no further action was required, and the tracing was closed.

No other poultry contacts were identified for the farm and company staff; these tracings were assessed as very low risk and closed.

Hypothesis for the source

The most likely source identified was indirect transmission from a wild bird source of virus via a breach in the biosecurity or through the stag house ventilation system.

Assessment and evidence base for the likely source

Disease was first apparent in the stags, so it is reasonable to assume that was where virus entered. The proximity of the stag house to the entrance and its alternative ventilation system to other houses adds further evidence that this area was the site of incursion. It is difficult to be more specific, but a breach in biosecurity allowing indirect transmission is the most likely pathway.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

All other spread pathways investigated, with no further action needed. This included ruling out lateral spread to the company's other premises, which became IPs at a similar time.

Remaining uncertainty

No remaining uncertainties.

AIV 2022/09, Near Ross-on-Wye, Hereford and South Herefordshire, Herefordshire, England

Description of the premises

Overview of the premises and the wider business

This was a smallholder beef farm with a small non-commercial flock of poultry. The poultry were looked after by the family and any eggs were used for their own consumption. None were given away.

Species and number of each present

11 chickens, nine geese and three ducks.

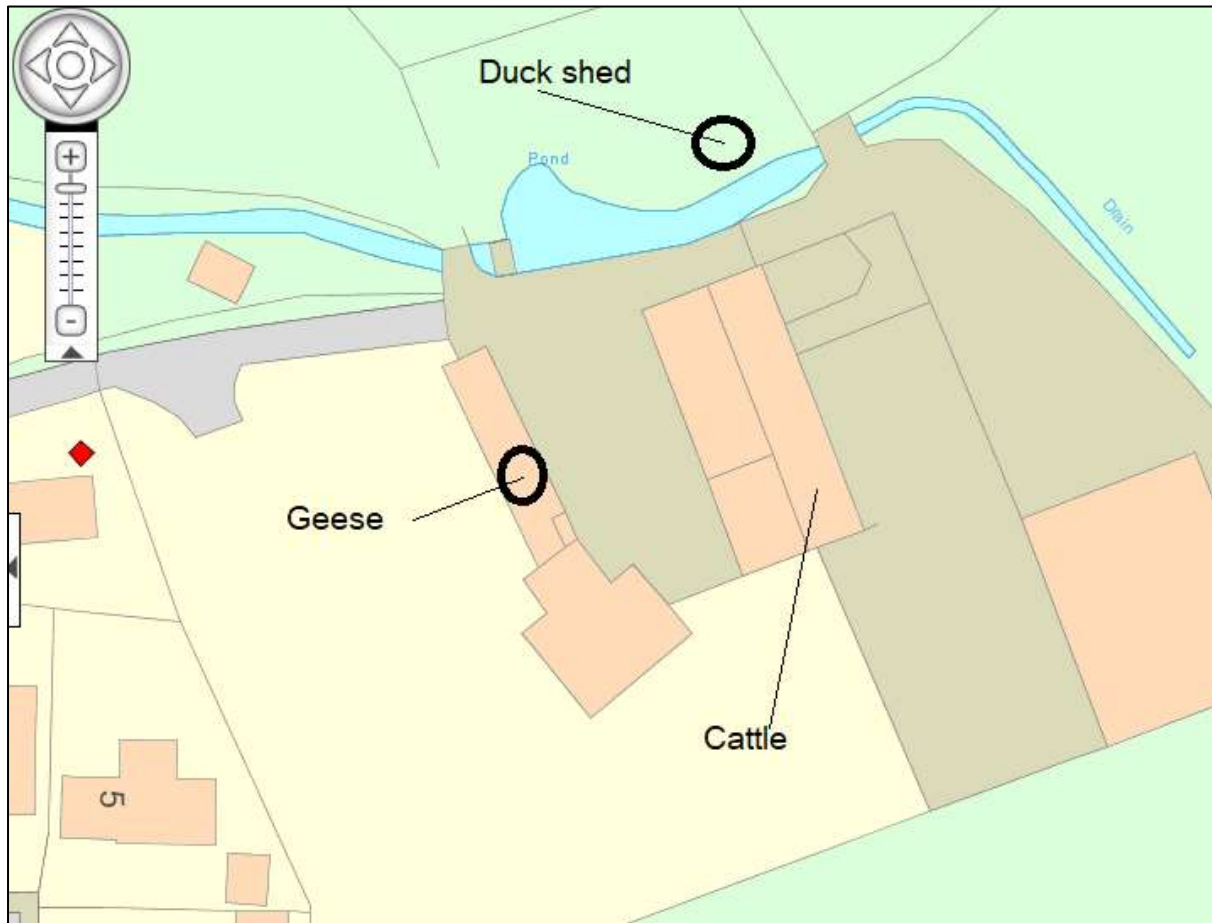
25 cattle

Description of the housing

The ducks and chickens were housed together in a wooden poultry house in the paddock. The geese were kept in a stable in the farmyard. All birds were allowed to mix outside in the paddock for an hour each day.

Plan of the infected premises

Figure 266: Plan of AIV 2022/09

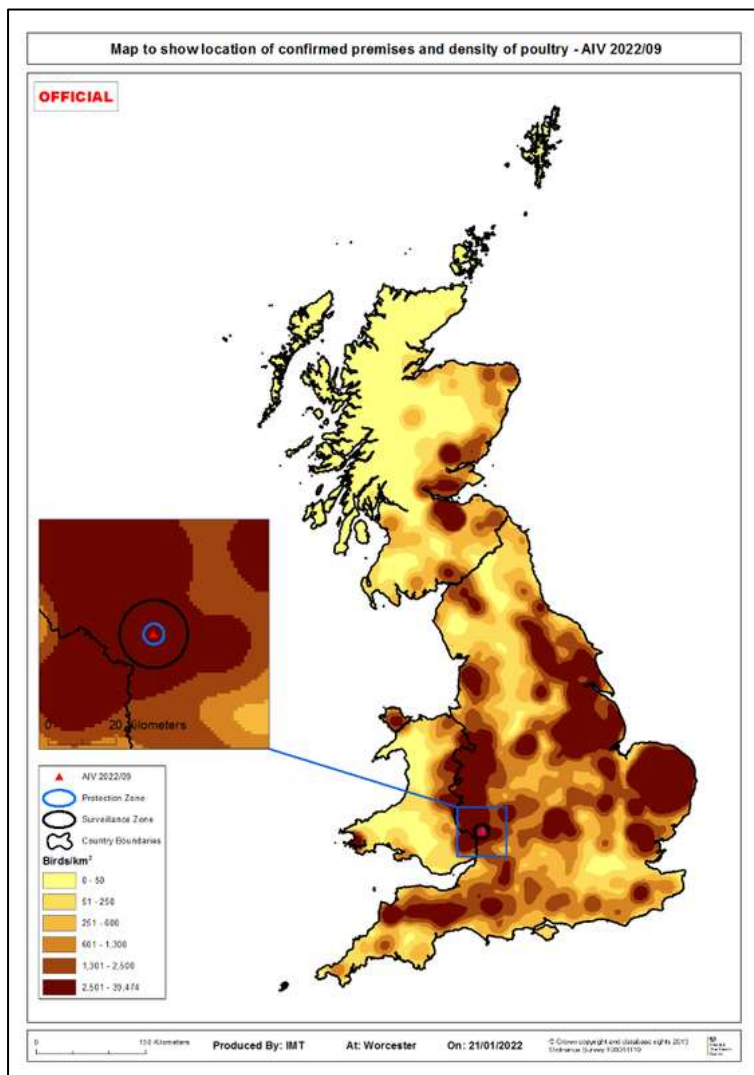


Overview of biosecurity

A footbath using Defra approved disinfectant was available outside the poultry housing but no dedicated clothing was used. There was no visitors book and no pest control although vermin were not considered to be a problem. The level of biosecurity was low.

Map with location in Great Britain and poultry density

Figure 267: Location of IP and poultry density



Overview of the surrounding area

The premises was in an area of high poultry density

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: There was a stream and a small pond with a resident population of wild waterfowl located immediately adjacent to the chicken and duck housing. When allowed outside, the kept birds could access this area.

Clinical picture

17/01/2022 – Clinical signs were first seen as inappetence in the geese.

18/01/2022 – One goose and two chickens died.

19/01/2022 – A second goose died and suspicion of disease was reported. An APHA investigation was carried out the same day and one chicken and one goose were showing clinical signs of respiratory difficulties and nervous signs respectively. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	14/01/2022 to 16/01/2022
Likely:	03/01/2022 to 13/01/2022
Precautionary:	29/12/2021 to 02/01/2022

Spread tracings window:

High-risk:	15/01/2022 to 19/01/2022
Likely:	04/01/2022 to 14/01/2022
Precautionary:	30/12/2021 to 03/01/2022

Most likely date of infection: 14/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 268: Source and spread timeline for AIV 2022/09

Source Tracing Window	Spread Tracing Window	Date	
Day 21		27/12/21	
Day 20		28/12/21	
Day 19		29/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		30/12/21	Start of precautionary spread tracing window (source + 24h).
Day 17		31/12/21	
Day 16		01/01/22	
Day 15		02/01/22	
Day 14		03/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	04/01/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	05/01/22	
Day 11	Day 3	06/01/22	
Day 10	Day 4	07/01/22	
Day 9	Day 5	08/01/22	
Day 8	Day 6	09/01/22	
Day 7	Day 7	10/01/22	
Day 6	Day 8	11/01/22	
Day 5	Day 9	12/01/22	
Day 4	Day 10	13/01/22	
Day 3	Day 11	14/01/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	15/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	16/01/22	
	Day 14	17/01/22	Precautionary onset of clinical signs. 1 goose inappetent.
	Day 15	18/01/22	
	Day 16	19/01/22	Notification of suspicion of disease to APHA. APHA investigation and sampling. Restrictions served.
	Day 17	20/01/22	HPAI H5N1 confirmed by CVO
	Day 18	21/01/22	Culling completed; Preliminary C&D Completed
	Day 19	22/01/22	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

66 premises with poultry holding between 1-176,000 birds (7 premises with 50 or more birds)

SZ (3-10 km)

110 premises with poultry holding between 1-210,000 birds (24 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The poultry were housed but were let outside into the paddock daily. Wild ducks were present in the waterways on this paddock.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/10, Near Crewe, Cheshire East, Cheshire, England

Description of the premises

Overview of the premises and the wider business

The infected premise (IP) was a non-pedigree turkey breeding-laying farm, located in Crewe and part of a large turkey breeding company.

This IP was accessed by a private road and consisted of a shower room, office, and 4 poultry sheds, three of them containing hens and one with stags. Breeding was via artificial insemination carried out by company technicians. The houses were between 20 to 50-year-olds and were due to be replaced and were only used due to HPAI zones disrupting the ability to place at the programmed laying site.

The current flock was placed on 06/12/2021 when the birds were between 28-29 (hens) weeks old and had not yet achieved full production. It was usual practice for eggs to be collected for 6 months before the flock was then depopulated to slaughter. Usual practice would have been for full cleansing and disinfection to be carried out before restocking with a new flock some four weeks.

Species and number of each present

At the time of the disease outbreak, the site contained 3,604 birds (3,382 hens and 222 stags).

Description of the housing

Houses 1, 2 and 3 were over 50 years old. They had a concrete floor, with a 50-60 cm dwarf concrete wall with wood above. The roofs of these buildings were covered in moss. The ventilation was controlled by the site manager through inlet vents at the top that could be regulated, with air flowing from the roof to the floor, and then out through the sides-fans.

House 4 was of more recent construction and was about 20 years old. The structure was timber framed on a concrete base. Half of the length of the shed was fully enclosed and housed the turkey stags. The lower walls were made of blockwork. The door and the section above of the blockwork was wood frame with corrugated sheet metal sections up to half of the total height. Above the metal sheet section there was approximately 50 cm of plastic screens/sheets followed by 50 cm of wire mesh. The roof was made of timber joists and purlins, covered by a metal profile sheet. Ventilation was natural through the wire-mesh. The second half of the shed (storage) was formed by a timber-framed structure with no façade.

Feed silos for houses 1-3 were located to the north of the sheds, meaning that the feed vehicles needed to drive through between the sheds to deliver feed. The silo for shed 4 was situated to the south of the shed, and the delivery driver needed to drive past sheds 1-3 to deliver the feed.

The egg store was part of shed 3 and egg collections occurred to the south of that building.

Plan of the infected premises

Figure 269: Plan of AIV 2022/10



Overview of biosecurity

Access to the IP was via the main gate, and an additional gate, before entering the poultry premises, both of which were padlocked at night. This was not considered secure, as people could have walked into the surrounding area with little effort. A manual spraying unit filled with Virkon S (150 ml / 1 gram dilution) was situated at the entrance to be used by delivery drivers. The unit manager declared that drivers always stayed inside their vehicles. As the wheels were static when sprayed, the surface contacting the ground would not be fully disinfected and they would be soiled from the track when approaching to the farm.

Access to the poultry unit was via shower rooms that had a spacious dirty area, with bench and hangers to store the outside clothes and shoes. It also had shelves for clean towels. The room was warm and there was evidence of it being used frequently.

After the shower, there was another room with clean protective clothes and dedicated shoes for the clean area. In this room the visitor's book for mandatory signing in/out was located and it also acted as the laundry room. Staff left the shower block and walked across the yard to enter the office and bird accommodation.

Covered disinfectant boot dips were present on entry to each building. After entering House 1, 2 and 3 (hens) there was an area with a clean/dirty barrier to ensure boots were changed. Once in the clean side there was a second door to enter the bird

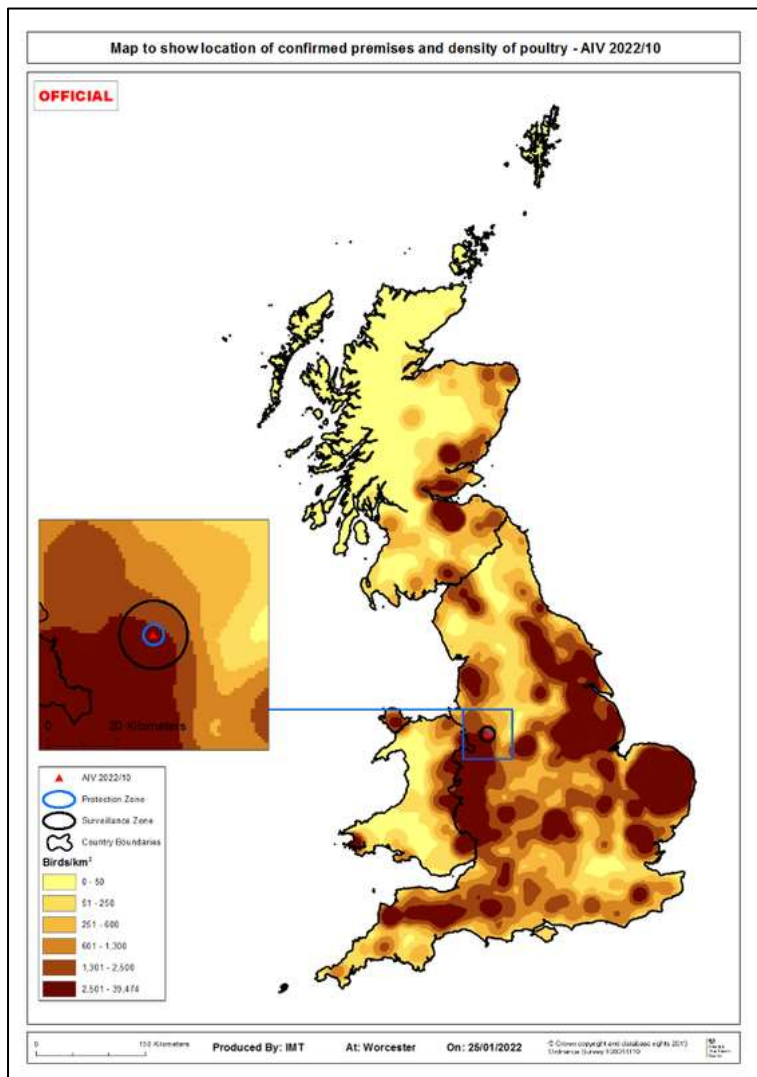
accommodation. If staff were working outside, separate footwear and outside overalls were worn that were changed on entry to the sheds.

In House 4 (the stags' house) the entrance door gave direct access to the bird space, although there was a clean/dirty barrier to ensure boots were changed. House 4 was known to have a rat infestation that was in the process of being controlled by company staff. Rat runs had been identified, with three distinct access points into House 4.

It was reported that the egg collection lorry had an automatic wheel washer on it. As described in the company SOPs a staff member opened the gate to the driver, the wheels were disinfected prior to entering the premises, the driver parked at the front door of house 3, the person on site disinfected the loading area and make sure that foot dip was available and at the correct concentration for use. After that they took the egg trolleys to the loading area and helped the driver to load them onto the tail-lift. There was a requirement to dip feet every time a member of the staff went into the egg room and it was noted that the driver did not enter the egg room. Feed delivery and egg collections did not require shower-in, shower-out procedures.

Map with location in Great Britain and poultry density

Figure 270: Location of IP and poultry density



Overview of the surrounding area

This rural and lowland IP was in a peri-urban setting, although surrounded by an intensively managed mixed agricultural landscape, with pasture predominant in its immediate neighbourhood. The proximity of the Sandbach flashes was significant as these are a protected network of lakes and pools which, along with wetland habitats, supported substantial aggregations of wild birds important to this assessment.

Ornithological assessment:

Desktop assessment: Wildfowl, waders and other waterbirds were thought to be abundant in the neighbourhood of the IP and likely to produce a significant source of infection close to this case, though they were thought unlikely to use operational surfaces on the farm and so not produce infection pressure here.

Gulls and corvids may have been abundant, with both groups of bridge species having the potential to produce substantial infection pressure. The substantial aggregation of gulls close to the IP, together with the behaviour of these species on farms made these a likely source of infection.

Wild passerines and woodpigeon might also have supported multiple indirect infection pathways from nearby sources of infection, contributing potential infection pressure.

Local intelligence: The roofs of shed 1-3 were covered in moss that would be attractive to birds.

Clinical picture

Suspect notifiable disease was reported by the PVS on 20/01/2022. At the morning check 14 dead stags were found. This represented a 12 times increase in the usual daily mortality for the affected shed.

The manager of the premises contacted the company veterinary surgeon who attended the premises the same morning. At the end of the visit they contacted APHA and notified suspicion of disease, as the stags presented the same symptoms of lethargy and high increase of mortality had been witnessed in a previous AI case in the company's farms.

Later that afternoon, an APHA Senior Veterinary Inspector visited the premises. The mortality in the stag house had increased to 31 dead birds, clinical examination of the rest identified lethargy and respiratory difficulties. On inspection of the hen houses only house 3 was showing clinical signs of lethargy.

Timeline

Tracings windows

Source tracings window:

High-risk:	16/01/2022 to 20/01/2022
Likely:	05/10/2022 to 15/01/2022
Precautionary:	30/12/2021 to 04/12/2022

Spread tracings window:

High-risk:	17/01/2022 to 20/01/2022
Likely:	06/01/2022 to 16/01/2022
Precautionary:	31/12/2021 to 05/01/2022

Most likely date of infection: 16/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 271: Source and spread timeline for AIV 2022/10

Source Tracing Window	Spread Tracing Window	Date	
Day 20		30/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		31/12/21	Start of precautionary spread tracing window (source + 24h).
Day 18		01/01/22	
Day 17		02/01/22	
Day 16		03/01/22	
Day 15		04/01/22	
Day 14		05/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	06/01/22	Start of likely spread tracing window (source tracing window +24h). Egg collection
Day 12	Day 2	07/01/22	
Day 11	Day 3	08/01/22	
Day 10	Day 4	09/01/22	
Day 9	Day 5	10/01/22	Egg collection with vehicle that visited AIV2022/08 in that cases high risk spread trace window,
Day 8	Day 6	11/01/22	Egg collection
Day 7	Day 7	12/01/22	
Day 6	Day 8	13/01/22	Last egg collection before report case
Day 5	Day 9	14/01/22	
Day 4	Day 10	15/01/22	
Day 3	Day 11	16/01/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	17/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	18/01/22	Tracing visit by APHA due to contact with AIV2022/08 via egg collection route on 10/1/2022
	Day 14	19/01/22	Precautionary onset of clinical signs.
	Day 15	20/01/22	14 stags in house 4 died overnight. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/024). Restrictions served. Further 17 stags died and in house 3 with 1000 hens very quiet and 7-8 birds gasping.
	Day 16	21/01/22	CVO declared case as SOS 2022/03 and culling authorised.
	Day 17	22/01/22	Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2022-10. Culling commenced
	Day 18	23/01/22	Cull completed. Preliminary C and D completed
	Day 19	24/01/22	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread.

Surveillance activity

PZ (0-3 km)

44 premises with poultry holding between 1-473,000 birds (8 premises with 50 or more birds)

SZ (3-10 km)

193 premises with poultry holding between 1-57,713 birds (22 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the farm staff, including three part-time workers, one company vet, one company staff who visited for routine maintenance (fix front door), feed deliveries and the collection of eggs to the company hatchery.

On enquiry, it was confirmed that eggs collections had not occurred in the high-risk tracing windows, no further action was required, and the tracing was closed after the company hatchery, which was investigated under AIV 2022/08 was subjected to temporary restrictions.

In addition, three rearing and three laying poultry premises under the same company management were identified as requiring a clinical inspection, and biosecurity assessment. The six poultry premises were visited, no signs of notifiable disease were observed and overall biosecurity practices were considered acceptable (with minor recommendations in some cases) so no further action was required.

No other poultry contacts were identified for the farm and company staff, and feed deliveries; these tracings were assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds through vermin activity.

Assessment and evidence base for the likely source

The likelihood of direct contact with wild birds was assessed as negligible with low uncertainty due to the biosecurity practiced however indirect contact via vermin was assessed as a medium with a medium uncertainty. It was clear that vermin were accessing the shed where disease was first noted.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/11, Near Inverurie, Aberdeenshire, Scotland

Description of the premises

Overview of the premises and the wider business

This was a non-commercial premises, keeping mixed poultry as pets. None of the birds had been in lay for some months.

Species and number of each present

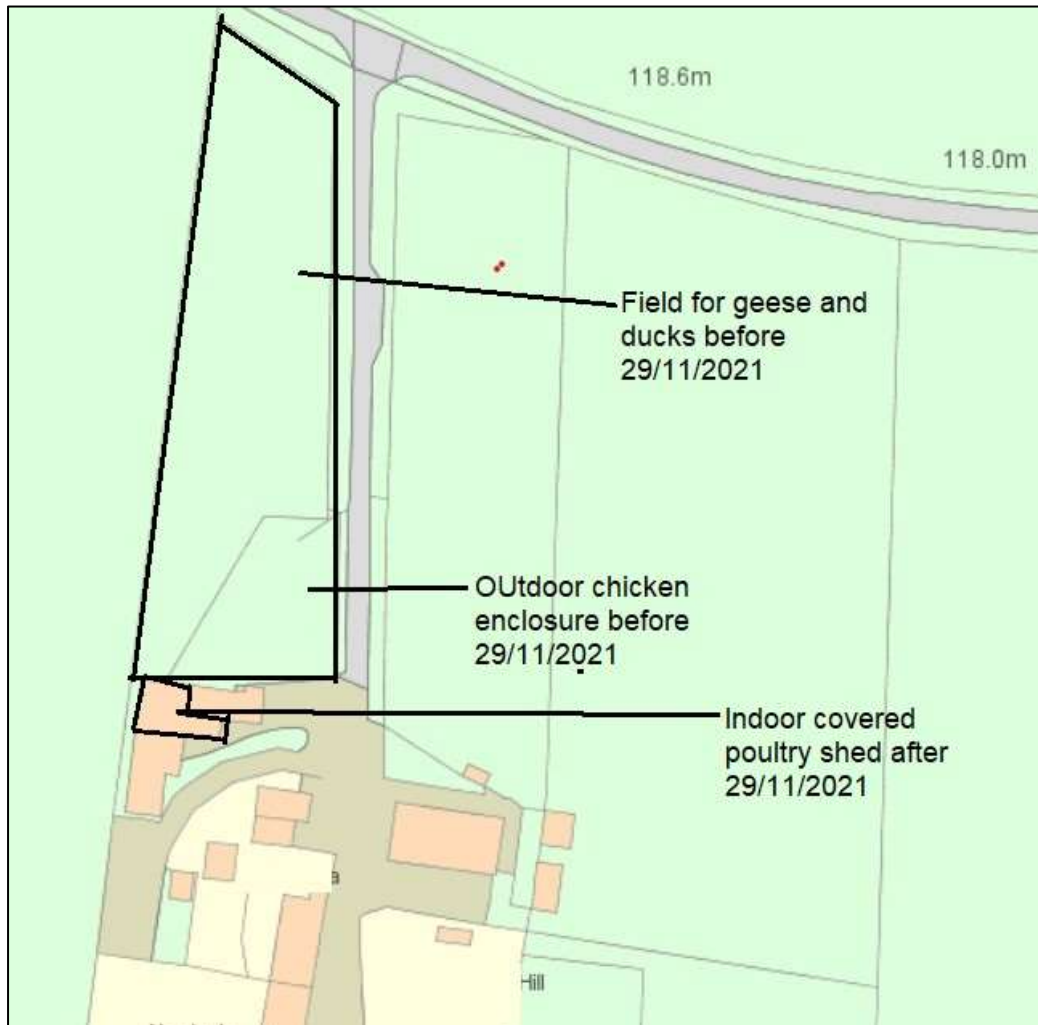
13 chickens, 4 geese, 7 turkeys, 2 guineafowl, 12 ducks.

Description of the housing

The birds had been housed since 29/11/2021 and were kept inside in a fully closed shed. They were fully protected from direct contact with wild birds. The wooden shed had a hard roof with plastic windows and artificial lighting. No other biosecurity measures were taken (such as no disinfectant foot dips)

Plan of the infected premises

Figure 272: Plan of AIV 2022/11

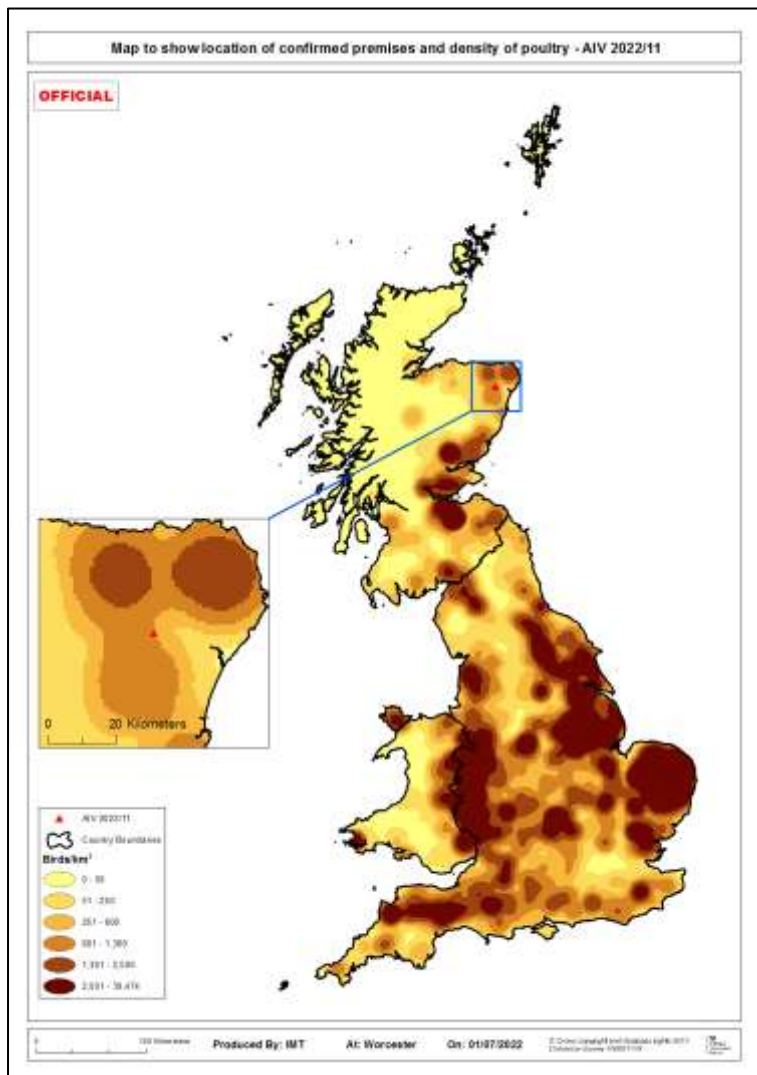


Overview of biosecurity

The birds were housed, but no other biosecurity measures were taken (such as no disinfectant foot dips)

Map with location in Great Britain and poultry density

Figure 273: Location of AIV 2022/11 and poultry density



Overview of the surrounding area

The holding was set in a rural, undulating landscape, 120 m above sea level surrounded by largely agricultural land with some commercial forestry and scattered commercial and industrial activity nearby. It was considered to be a good habitat for a number of wild bird species.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: This area contained good habitat for a number of wild bird species.

Clinical picture

25/11/2021 – One duck and one chicken were found dead

10/12/2021 – A second duck was found dead and sampled under the wild bird surveillance scheme. After a positive result had been recorded, investigations indicated that the duck was a kept rather than a wild bird, triggering an on-farm investigation.

21/01/2022 – During the APHA investigation no clinical signs or mortality was reported and there were no further positive results.

Timeline

Tracings windows

Source tracings window:

High-risk:	22/11/2021 to 24/11/2021
Likely:	11/11/2021 to 21/12/2021
Precautionary:	N/A

Spread tracings window:

High-risk:	23/11/2021 to 21/01/2022
Likely:	12/11/2021 to 22/11/2021
Precautionary:	N/A

Precautionary source and spread tracing windows were not relevant due to the long delay in reporting of disease.

Most likely date of infection: 22/11/2021 (Start of high-risk source tracing window)

Timeline chart

Figure 274: Source and spread timeline for AIV 2022/11

Source Tracing Window	Spread Tracing Window	Date	
Day 14		11/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/11/21	
Day 11	Day 3	14/11/21	
Day 10	Day 4	15/11/21	
Day 9	Day 5	16/11/21	
Day 8	Day 6	17/11/21	
Day 7	Day 7	18/11/21	
Day 6	Day 8	19/11/21	
Day 5	Day 9	20/11/21	
Day 4	Day 10	21/11/21	
Day 3	Day 11	22/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/11/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	24/11/21	
	Day 14	25/11/21	Precautionary onset of clinical signs as duck and chicken found dead
	~~~~	~~~~	
	Day 29	10/12/21	Second duck found dead
	~~~~	~~~~	
	Day 33	14/12/21	
	Day 34	15/12/21	Samples submitted to SAC for PME. Ducks swabbed and submitted to APHA via wildbird surveillance.
	~~~~	~~~~	
	Day 51	01/01/22	
	Day 52	02/01/22	
	~~~~	~~~~	
	Day 70	20/01/22	
	Day 71	21/01/22	One duck positive reported to APHA . Restrictions in place on farm and disease investigation initiated. APHA found 13 chickens on site along with other various birds and no mortality or illness reported.
	Day 72	22/01/22	Avian Influenza HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2022-11.
	Day 73	23/01/22	
	Day 74	24/01/22	Cull commenced and completed. Preliminary C and D completed
	Day 75	25/01/22	Preliminary C and D considered effective All samples taken at investigation serologically negative and PCR negative.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the

Surveillance activity

No zones in place.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The birds were free range until they were housed on 29/11/2021 but they were reportedly seen outside on 15/12/2021.

Biosecurity on site was poor. There were no movements of birds on or off the premises during the tracings window.

Infection of the dead duck was likely to have been before the housing order came into place on 29/11/2021

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2022/12, Near Byker, Newcastle Upon Tyne, Tyne & Wear, England

Description of the premises

Overview of the premises and the wider business

This was a small multispecies 'city farm' open to the public. It operated as a petting zoo, serving the local community by providing different activities, including educational visits. Eggs were collected and sold at a café on site.

Species and number of each present

45 chickens, 16 ducks and 2 turkeys.

2 geese.

1 cow, 5 sheep and 2 goats (in pens by the poultry, usually taken daily to a nearby paddock).

A small colony of guinea pigs.

1 parrot.

There was a distinctly separated area for non-petting which also contained exotic animals including snakes.

Description of the housing

Access by the public to the bird area had been restricted since 27/11/2021 when they were also permanently housed. Access to the zoo yard (outside the poultry pens) continued.

The geese were housed in a locked garden shed, separate to the main group of poultry. This was an entirely closed shed but did have a cracked window and was very close to a watercourse where waterfowl were known to congregate.

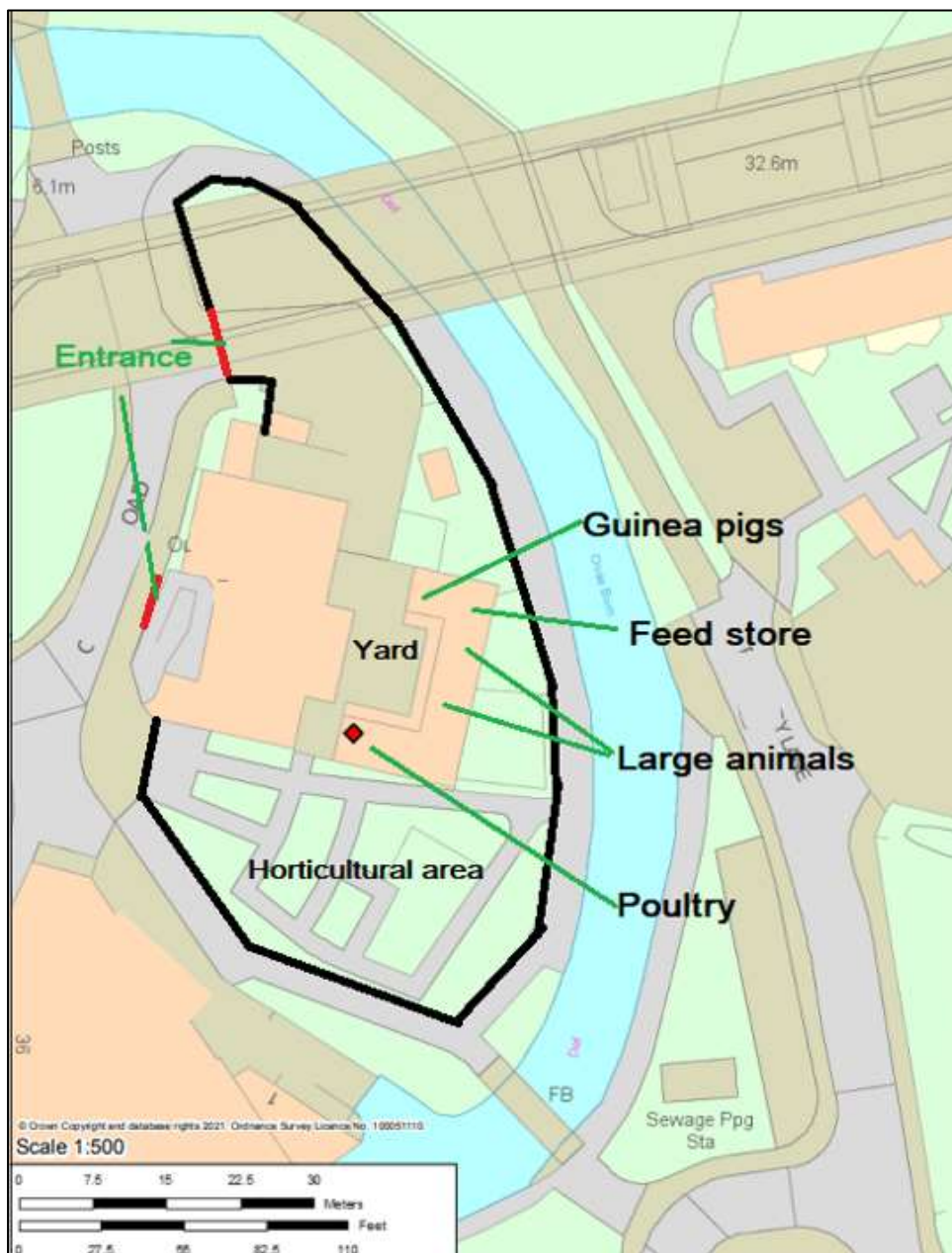
The chickens, ducks and turkeys were housed in a solid roofed shed, with mesh netting covering all open sides (naturally ventilated). However, there were some gaps in the mesh that did allow wild feral pigeons access to the enclosure and have direct access with the birds and their feed and water.

The roof of the building had a significant build-up of moss, likely to also attract wild birds.

The parrot was housed in a secure cage inside the main office building that would have had no contact with any wild birds and was managed separately. The parrot was exempted from culling following an assessment due to this epidemiological separation.

Plan of the infected premises

Figure 275: Plan of AIV 2022/12



Overview of biosecurity

No production records were kept and biosecurity was poor as this was an open farm, with public access and multiple activities taking place in addition to poultry petting/display.

Although access to the birds had been restricted since November 2021 due to the AI risk, the biosecurity was limited to netting to stop access of wild birds to the poultry accommodation and there were some disinfectant footbaths at the entrance to the bird accommodation.

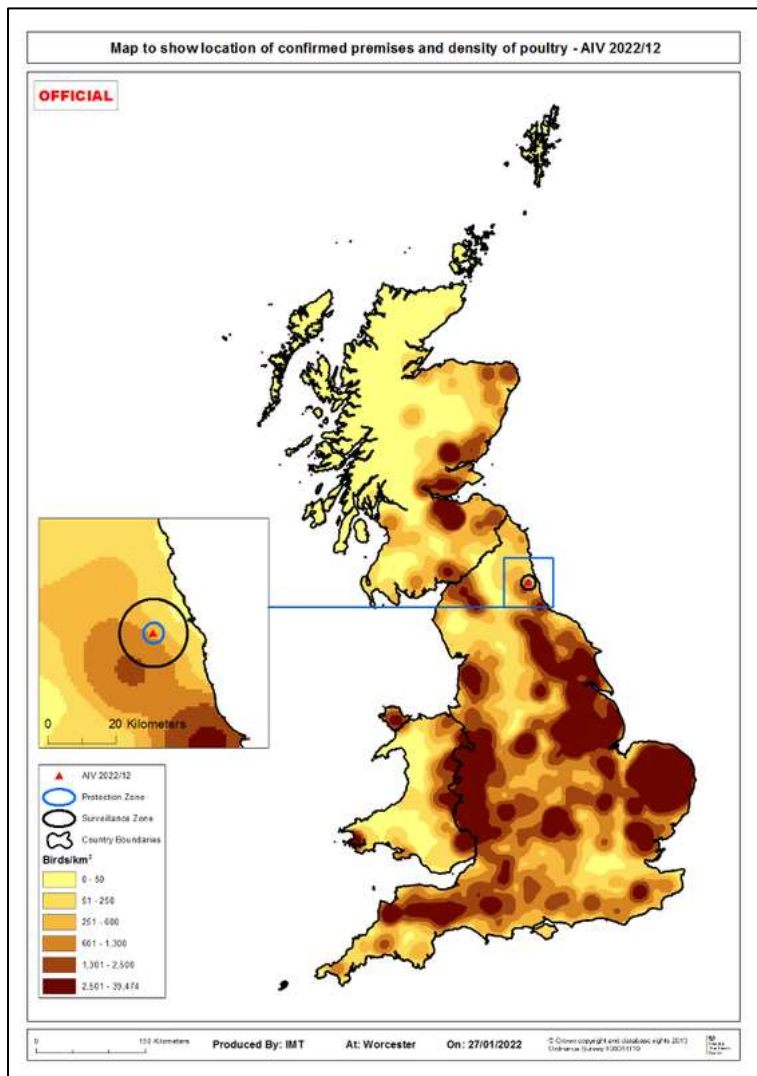
Given the high number of unknown visitors (no records) walking into yard and outside areas, plus gaps in the netting, the overall biosecurity was assessed as poor.

Bedding (straw) was stored outside where it was accessible to wild birds.

Feed was relatively well stored indoors.

Map with location in Great Britain and poultry density

Figure 276: Location of IP and poultry density



Overview of the surrounding area

The site was in an urban area with a river adjacent to the farm, only separated by a concreted footpath and frequently walked by staff and visitors. The main group of poultry were about 30 metres from this watercourse.

No recent floods had been reported.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Pigeons had often been seen inside the premises and wild waterfowl were seen frequently in the area. A swan was recently found dead nearby and there had been four positive wild bird events within a 12 miles radius between December 21st and January 17th. An ornithological report was not considered necessary and a likely AI pressure from wild birds was assumed given the local intelligence.

Clinical picture

22/01/2022 – two chickens were found dead.

23/01/2022 – No chickens were found dead. No obvious signs of disease had been seen before the deaths. The remaining chickens and the ducks were lethargic and there were signs of brownish diarrhoea in the enclosure. Suspicion of notifiable avian disease was reported.

Two further chickens died during the investigation and 85% of the chickens were depressed/lethargic and some had green diarrhoea. Some chickens and one turkey had mildly swollen heads with mild cyanosis of the combs. No obvious nervous signs were present.

Approximately 50% of the ducks were depressed and lethargic.

The geese appeared unaffected.

Timeline

Tracings windows

Source tracings window:

High-risk:	18/01/2022 to 20/01/2022
Likely:	07/01/2022 to 17/01/2022
Precautionary:	02/01/2022 to 06/01/2022

Spread tracings window:

High-risk:	19/01/2022 to 23/01/2022
Likely:	08/01/2022 to 18/01/2022
Precautionary:	03/01/2022 to 07/01/2022

Most likely date of infection: 18/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 277: Source and spread timeline for AIV 2022/12

Source Tracing Window	Spread Tracing Window	Date	
Day 19		02/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		03/01/22	Start of precautionary spread tracing window (source + 24h).
Day 17		04/01/22	
Day 16		05/01/22	
Day 15		06/01/22	
Day 14		07/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	08/01/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	09/01/22	
Day 11	Day 3	10/01/22	
Day 10	Day 4	11/01/22	
Day 9	Day 5	12/01/22	
Day 8	Day 6	13/01/22	
Day 7	Day 7	14/01/22	
Day 6	Day 8	15/01/22	
Day 5	Day 9	16/01/22	
Day 4	Day 10	17/01/22	
Day 3	Day 11	18/01/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	19/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	20/01/22	
	Day 14	21/01/22	Precautionary onset of clinical signs.
	Day 15	22/01/22	
	Day 16	23/01/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/29). Restrictions served.
	Day 17	24/01/22	
	Day 18	25/01/22	CVO confirmed HPAI H5N1. Culling completed
	Day 19	26/01/22	Preliminary C&D completed
	Day 20	27/01/22	Preliminary C&D considered to be effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

46 premises with poultry holdings between 1-160 birds (8 premises with 50 or more birds)

SZ (3-10 km)

353 premises with poultry holdings between 1-250 birds (63 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

There was one telephone tracing to a volunteer. He confirmed that he had no other poultry contacts besides the IP and this tracing was closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct/indirect contact with infected wild birds

Assessment and evidence base for the likely source

The area attracted wild birds (nearby stream, moss in roof, accessible straw). Biosecurity was poor and wild birds were seen in the poultry enclosure so direct contact was possible.

Indirect contact was also very likely through-

1. Potential contamination of bedding (open store)
2. Potential introduction by farm staff via fomites
3. Potential contamination from wild birds (open faced pens, damaged mesh).

Other potential sources investigated were assessed as very low or negligible likelihood and were subsequently closed.

Spread investigations: Assessment of potential and likelihood of spread

The likelihood of onward transmission through wildlife was assessed as medium likelihood (not higher than the background risk).

Other potential spread pathways were investigated and assessed as low (or lower) likelihood and were subsequently closed.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/13, Near Whitby, Scarborough, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The IP was a wildlife rescue centre established in 2009 in North Yorkshire, and moved to the current location in 2020. Birds and mammals were rescued and rehabilitated with the intention of releasing them back into the wild where at all possible. The site had an osprey present, which from a Great Britain perspective is a bird of high conservation value. This bird was placed in quarantine and spared from culling, but subjected to enhanced surveillance measures.

There was a team of over 84 volunteers who worked on the site, and a further cadre involved in the transportation of injured birds and mammals.

In addition to the numerous gulls, chickens, ducks and geese on site, there were also various raptors present, including the osprey and some mammals.

Species and number of each present

Table 15: Species and number of each present on AIV 2022/13

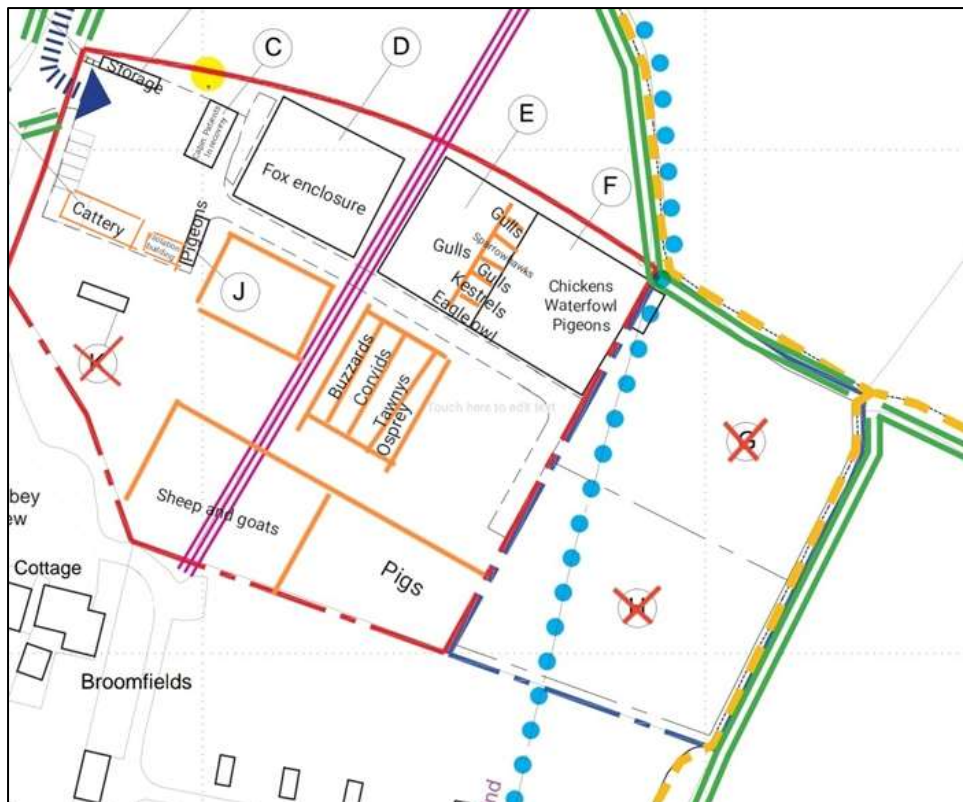
Area	Species	Number
Isolation Portacabin	Swan	3
	Geese	2
	Chickens	14
Outdoor enclosure	Geese	8
	Chickens	~120
	Ducks	7
Aviaries	Herring Gulls	100
	Heron	1
	Eagle Owl	1
	Black headed Gulls	3
	Kestrel	3
	Sparrowhawk	2
	Osprey	1
	Tawny Owl	5
	Corvids	10
	Buzzards	3
	Wood Pigeon	10
Feral Pigeons	50	
Others	Foxes	30
	Badgers	2
	Cats	30
	Ferrets	2
	Hedgehogs	60
	Rabbits	5
	Tortoise	1

Description of the housing

The site contained numerous enclosures that were constructed of either (i) metal post and mesh sides with a netted roof, or (ii) wooden posts and fencing with a net roof. The floor of the enclosures was either earth or gravel.

Plan of the infected premises

Figure 278: Plan of AIV 2022/13



Overview of biosecurity

Overall, biosecurity was considered to be poor, although biosecurity measures had been taken on site to attempt to reduce the risk of an incursion of avian influenza and its subsequent spread.

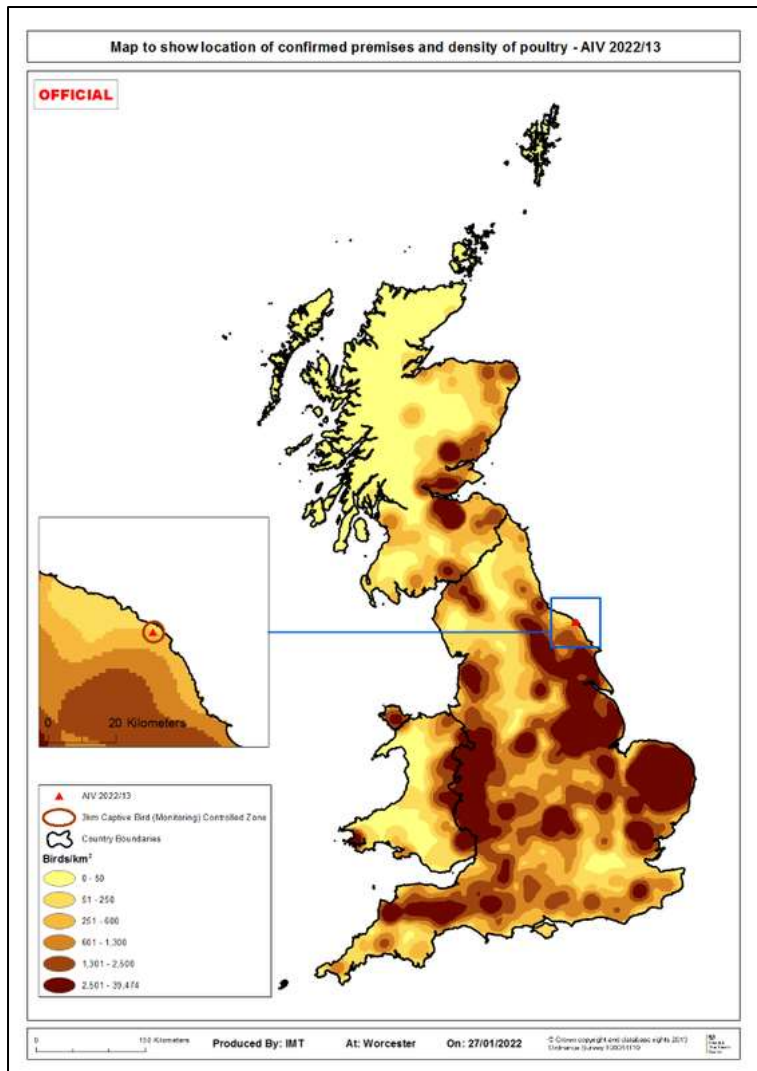
The site was staffed by a large number of volunteers, no official training was provided and full records were not kept.

Foot-dips containing a pre-diluted, Defra approved disinfectant were present at the entrance to the enclosures. This was reportedly replaced daily; however, at the time of the visit the contents appeared to be minimal and contained a significant amount of organic matter. The dips were also shallow, and as the volunteers were not provided with boots, it was unlikely it would be used unless the volunteer had provided their own wellington boots. No brushes were provided to remove organic matter prior to disinfection.

Wild birds were particularly prevalent on the premises, due to the location and availability of feed. Pest control was carried out on site by the premises manager, and there was evidence of rats and mice on site.

Map with location in Great Britain and poultry density

Figure 279: Location of IP and poultry density



Overview of the surrounding area

This site was set in a mixed agricultural landscape close to the coast. Whitby was the largest local town (closest 600 m NNW) and included an extensive industrial or commercial estate (260 m NE) in addition to the river Esk, which discharges into the sea at the town harbour. Apart from Sleights, other settlements were small, existing as small villages or hamlets. Other notable land use included a sewage works (180 m SW), a golf club (4.2 km NW) and extensive areas of managed grass on caravan parks (5 km SE, 8.5 km SSE and 8.8 km E).

Ornithological assessment:

Desktop assessment: This peri-urban and lowland IP is set in a mixed agricultural landscape close to the coast. Whilst close to the river Esk where it meets the sea, coastal habitats favoured by wintering waterbirds appear rare and no significant waterbody was found nearby.

Wildfowl may have been present in the landscape though no waterbodies close to the IP could have hosted even moderate aggregations. Proximity to the coast may have been significant but it was not clear if dense aggregations of marine species produced a source of infection and there appeared to be limited pathways of infection due to wildfowl. Infection pressure from wildfowl was considered low in this assessment.

Waders and other waterbirds were likely to have been present in the wider landscape but were unlikely to aggregate close to the IP, produce a source of infection, or support infection pathways.

Bridge species were likely abundant in this landscape with gulls most likely to produce significant infection pathways, where they moved considerable distances between coastal habitats, settlements and farmland, as well as scavenging infected carcasses at sea.

Wild passerines, Pigeon and Starling may have produced an infection pathway due to less than stringent biosecurity, though the absence of clear sources of infection nearby suggest they produced limited infection pressure.

Local intelligence: A significant number of gulls and waders were noted in the local landscape.

Clinical picture

24/01/2022 – clinical signs of general lethargy and depression in some hens were seen. These were in the isolation portacabin shed that contained 14 hens, 3 swans and 3 geese. The following morning five of the chickens were found dead.

25/01/2022 – suspicion of notifiable avian disease was reported and at the clinical inspection further deaths were evident as was pyrexia and diarrhoea. Clinical signs at this time were still localised to the isolation shed only.

26/01/2022 – On the day of confirmation, clinical signs were subsequently noted in hens in the outdoor enclosure, with sudden mortality evident. These signs were ~36 hours after initial onset of signs in the isolation shed.

Timeline

Tracings windows

Source tracings window:

High-risk:	21/01/2022 to 25/01/2022
Likely:	10/01/2022 to 20/01/2022
Precautionary:	04/01/2022 to 09/01/2022

Spread tracings window:

High-risk:	22/01/2022 to 25/01/2022
Likely:	11/01/2022 to 21/01/2022
Precautionary:	05/01/2022 to 10/01/2022

Most likely date of infection: 21/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 280: Source and spread timeline for AIV 2022/13

Source Tracing Window	Spread Tracing Window	Date	
Day 21			
Day 20		04/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		05/01/22	Start of precautionary spread tracing window (source + 24h).
Day 18		06/01/22	
Day 17		07/01/22	
Day 16		08/01/22	
Day 15		09/01/22	
Day 14		10/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	11/01/22	Start of likely spread tracing window (source tracing window +24h). 1 Canadian geese to the iso shed
Day 12	Day 2	12/01/22	
Day 11	Day 3	13/01/22	
Day 10	Day 4	14/01/22	
Day 9	Day 5	15/01/22	
Day 8	Day 6	16/01/22	
Day 7	Day 7	17/01/22	
Day 6	Day 8	18/01/22	
Day 5	Day 9	19/01/22	
Day 4	Day 10	20/01/22	
Day 3	Day 11	21/01/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak. 5 x cockerels arrived - entered iso shed. 3 hens found outside and added to the Big farm enclosure outside. 1 gull arrived from Billingham
Day 2	Day 12	22/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	23/01/22	
	Day 14	24/01/22	Precautionary onset of clinical signs (in iso shed)
	Day 15	25/01/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/30). Restrictions served.
	Day 16	26/01/22	HPAI H5N1 confirmed based on PCR results.
	Day 17	27/01/22	VRA visit to potentially spare some epi groups from cull
	Day 18	28/01/22	
	Day 19	29/01/22	
	Day 20	30/01/22	
	Day 21	31/01/22	Sampling at cull and completion of cull. Ossprey isolated and spared culling. Prelim C&D completed.
	Day 22	01/02/22	Results of sampling at culling (30/01/22). Canada Goose PCR +ve and serologically 1/256. Considered to be immune response given prior exposure. Evidence of infection on site in ducks, gulls and geese only. Prelim C&D considered effective.
	Day 23	02/02/22	Results from PCR faecal sampling of osprey enclosure - negative
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

CBMZ

69 premises with poultry holding between 1-95 birds (8 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

There were 40 telephone tracings identified for volunteers/visitors to the centre during the high-risk period. Two of these also kept poultry at home and these generated tracing visits. In addition, there were telephone tracings to two builders

who had worked on site, two different waste disposal collectors and someone who collected the used bedding/manure. All were deemed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct contact with infected domestic flock of unknown origin.

Assessment and evidence base for the likely source

Direct contact with an infected domestic flock was considered a high likelihood with a medium uncertainty. Five cockerels and three hens were abandoned at the rescue centre on the most likely infection date. These were housed in the isolation enclosure where disease was first identified three days later.

Indirect contact with infected wild birds was considered a medium likelihood with medium uncertainty as in that case disease would have been expected in the wild bird enclosures. Significant wild birds were noted round the site attracted by the birds on site and feed.

Biosecurity on site was considered poor and would have contributed to lateral spread on site.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: risk not higher than the background risk.

Spread by direct contact with domestic flocks was considered a low likelihood with medium uncertainty given the number of volunteers accessing the site. Indirect contact was considered a low likelihood with high uncertainty for the same reason.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/14, Near Calveley, Cheshire East, Cheshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a grandparent turkey breeding-laying unit. It held both hens and stags and artificial insemination procedures were carried out. All eggs produced were sent to a hatchery. This unit and the hatchery were owned by a large integrated company, which had many other turkey breeding and rearing units, some of which had already become IPs.

The unit was self-contained and comprised six poultry houses, a shower room, canteen, office egg collection room and egg storage in three blocks connected by corridors.

Species and number of each present

The unit usually held approximately 7,500 turkeys, some of which were pedigree breeding birds of high genetic merit. They were placed on this unit at 28-30 weeks old, having previously been on one of the company's rearing farms. They all originated from the company's hatchery. At the time of the investigation, the birds were approximately 43-46 weeks old. They were distributed as follows:

House 1 – 1560 hens

House 2 – 1510 hens

House 3 – 1560 hens

House 4 – 1350 hens

House 5 (Pedigree House) – 900 turkeys (hens and stags)

House 6 (Stag House) – 690 stags

Description of the housing

There were two environmentally-controlled turkey houses in each of the three buildings. Each building had a central storage area. Apart from house 5, all had a separate airspace; house 5 shared an airspace with an associated storage area. Houses 1-5 had the same type of ventilation system. There was a different system in House 6.

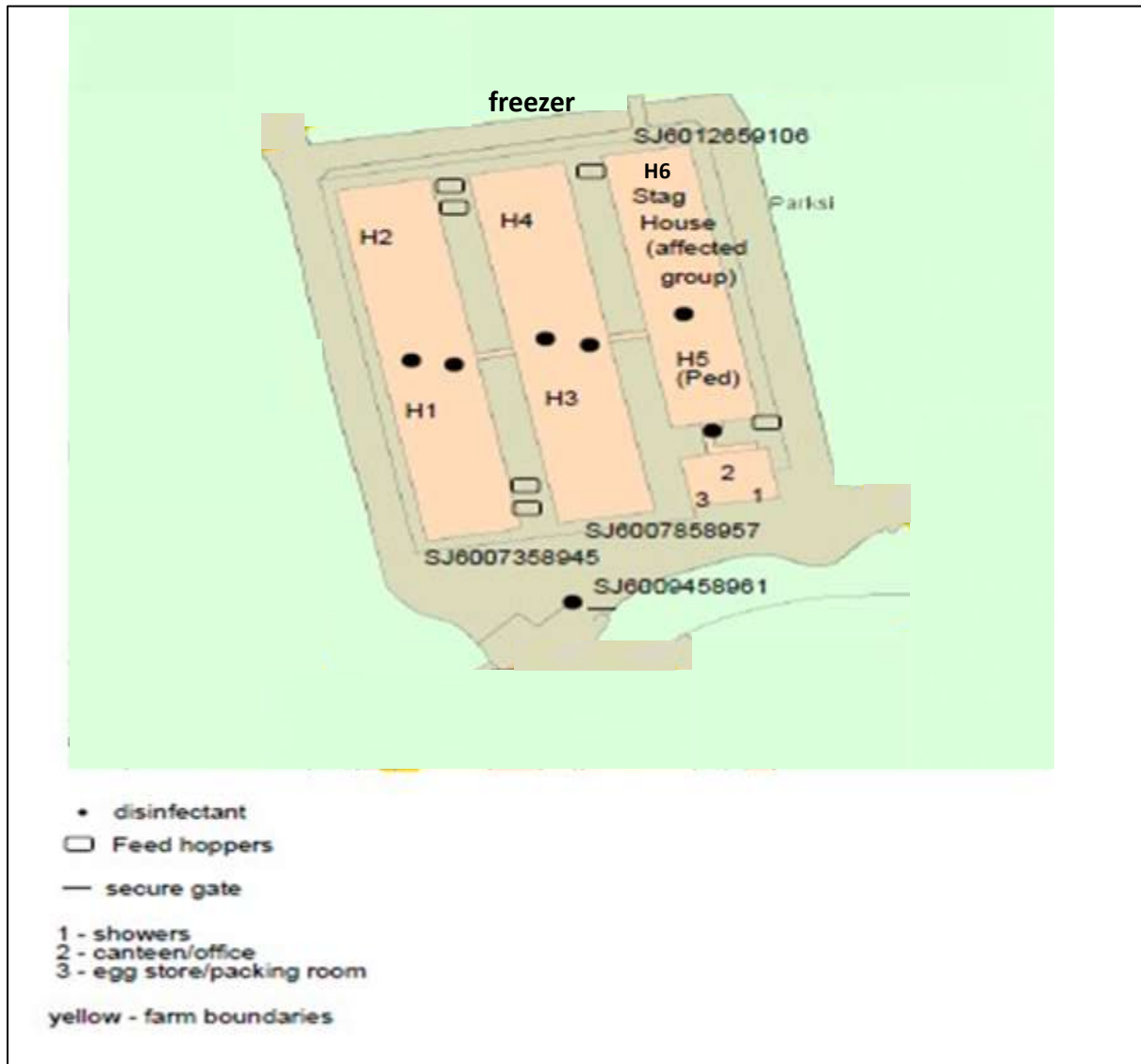
All houses were constructed from breeze blocks, up to a height of about 90 cm. Houses 1-5 had meshed (3 x 3 cm) windows above this, covered with moveable plexiglass panels. House 6 was of wood construction above the breeze blocks and had lidded ventilation inlets.

Personnel entered via the shower room and then went through the canteen before entering the bird area. In order to access all bird areas, personnel had to go through House 5 first.

There were two perimeter fences.

Plan of the infected premises

Figure 281: Plan of AIV 2022/14



Overview of biosecurity

There were good biosecurity protocols detailed however during the investigation, some aspects were found to be deficient. It was not clear whether this was because HPAI had already been confirmed or whether it was representative of the unit during other times. There was therefore some uncertainty about adherence to the protocols.

PERSONNEL: The company employment contract specified that staff must not have contact with any other birds. Permanent members of staff were dedicated to this unit. However, staff from other farms owned by the company may provide holiday or sickness cover. All staff were required to enter via the shower room and sign the visitors' log according to a detailed standard operating procedure (SOP). Staff changed into dedicated clothing and footwear at this point. They then moved through

the canteen to a barriered entry to the bird areas. According to the protocol, a further change of footwear was required here but there was some uncertainty as both types of footwear were seen on both sides of the barrier. There was also a foot dip at this point. All staff had to enter House 5 in order to access the other houses. Routinely, there were no further foot dips prior to entering the bird areas, however some had been placed once there was suspicion of HPAI.

Staff may have had to exit the unit to carry out tasks such as disposal of reject eggs disposal of ABP and checking feed pipes. There was a hygiene barrier, dedicated footwear and an outside coat for this purpose. There was a hand sanitiser and foot dip for use on re-entry. Outside tasks were reportedly carried out at the end of the day and the member of staff would then move directly to the shower unit. This involved going through House 5. There was also an outside area for smoking – this had a roof and was meshed.

The protocol for making up foot dips was found to specify a concentration that was too dilute for control of poultry diseases.

HOUSING: The unit was in a good state of repair; however, the meshed windows could have allowed ingress of contaminated organic matter.

DELIVERY VEHICLES: There was a concrete entrance drive with a locked gate. There was a wooden hut next to the gate containing a power wash unit, through which disinfectant could be applied. According to the protocol, the driver had to leave the vehicle, don dedicated site clothing and footwear and sign the visitors' book prior to using the power wash to disinfect the wheels. The level of compliance with this protocol for people entering the site in vehicles is unknown.

EGGS: These were collected by hand into fibreboard trays and passed over the barrier to the egg room. They were then sorted, sanitised and transferred to disinfected plastic trays ready for collection. The collection vehicle had an automatic wheel wash and came onto the concrete pad outside the egg store. Following disclosure of other IPs within the company, this was now being disinfected after use. Egg trolleys were disinfected once unloaded from the vehicle. The egg collection protocol required the driver to wear dedicated clothing.

FEED: The feed hoppers could be filled from within the outer perimeter fence. There was no need for the driver or the vehicle to enter the next perimeter fence. The vehicle also had an integrated wheel wash. Pipes were capped and there had been a recently introduced protocol to sanitise these before connection to the wagon.

BEDDING AND NESTING: Bales of wood shavings were used. There were two types – coarse shavings used for nesting boxes and fine shavings used as bedding. These were individually wrapped, stacked on pallets and then wrapped again. Some bales were stored outside and some were inside. Bedding was topped up in the stag house every four weeks. Other houses were not topped up with bedding, but nesting material was added weekly. The concrete next to the outdoor bedding storage area was visibly contaminated with bird faeces, so there was potential for bedding stacks to become contaminated. A detailed procedure for disinfection of bales prior adding to the houses was described.

WATER: Mains supply and stored in tanks in the management areas of the sheds.

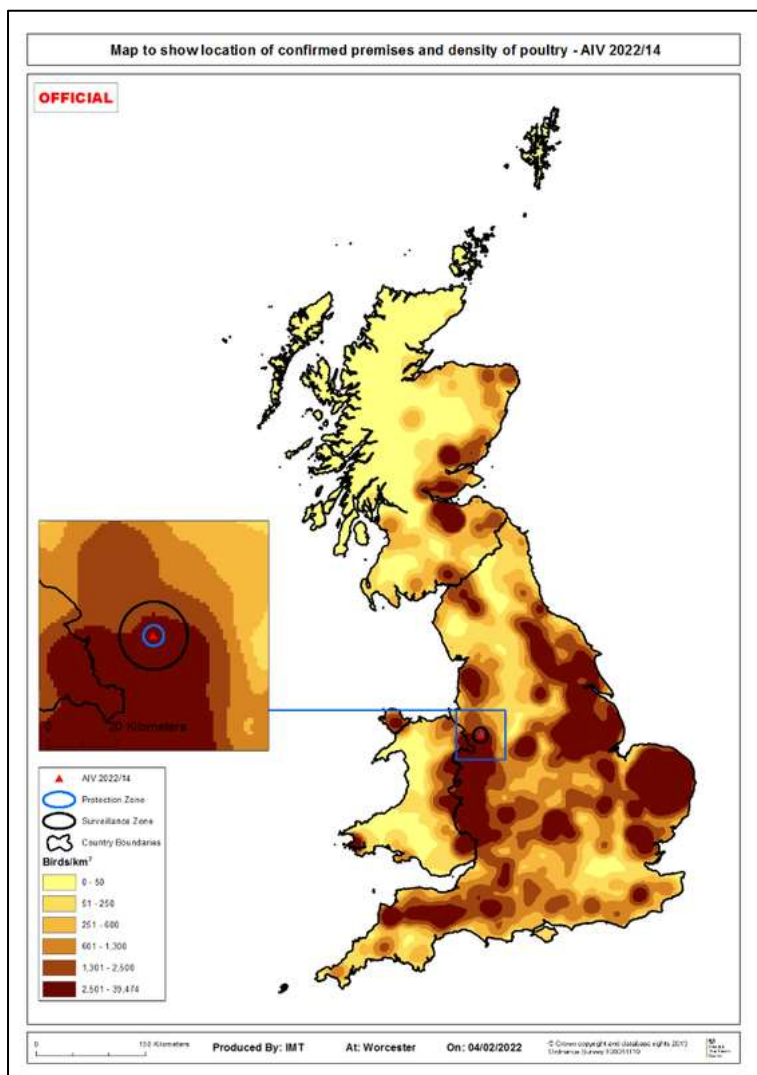
VENTILATION: The construction of the ventilation inlets in house 6 meant that there was the potential for small wild birds to deposit faeces into inlet air channel.

ABP: Deadstock were removed from the houses and then passed via a hatch (between houses 5 and 6) into the bin outside. At the end of the day, a member of staff went outside via a door (between houses 5 and 6) and took the bin to the freezer. The biosecurity protocol for the member of staff is described above. There were washing and disinfecting facilities for cleaning the bin.

VERMIN: Control was carried out by an employee of the company. There was no evidence of rodent activity at the time of the investigation, but their presence had been documented in records.

Map with location in Great Britain and poultry density

Figure 282: Source and spread timeline for AIV 2022/14



Overview of the surrounding area

The IP was located in a high poultry density area; however, there were no directly contiguous commercial poultry premises. The IP was in the SZ of two of the other IPs owned by the same company. In the immediate vicinity, there was arable and grazing land, a few woodlands, and various small waterbodies. There was a canal approximately 800 m away.

Ornithological assessment:

Desktop assessment: Wildfowl were thought to be common in the wider landscape but it was unlikely that there were any waterbodies nearby that would host dense aggregations likely to produce a source of infection. Furthermore, wildfowl were unlikely to use operational surfaces on the IP and therefore produced little infection pressure there. Waders and other waterbirds were common in the wider landscape but it was unlikely that they would have constituted a source of infection or that they would approach the site to support infection pathways. Gulls were common and corvids were abundant. Both these groups of bridge species were likely to produce the most significant infection pathways. It was only these species which were thought to travel regularly from the closest likely source of infection. Wild passerines and woodpigeon might have supported indirect pathways from sources of infection; however these were likely to have been largely absent around the IP.

Local intelligence: It was reported that a variety of wild birds were present around the site. At the time of the investigation, a group of gulls and a flock of sparrows were noted nearby.

Clinical picture

27/01/2022 – 20 dead stags were found during the morning check of house 6. It was reported to the PVS that stags were showing depression and respiratory distress. At the APHA veterinary investigation, a further 10 stags were found dead. The remaining birds had stopped eating and drinking, some were pyrexia and some had malodorous diarrhoea. Also on 27/01/2022, egg drop was recorded amongst the hens in house 3. These hens had been inseminated on 25/01/2022 with semen collected from the stags in house 6 on the same day. The insemination process was carried out by the staff who were working on the site that day.

28/01/2022 – further mortalities were reported in house 6 amounting to a total of 216 deaths in this house. There were also 110 dead birds reported in house 3, mainly among those that had been inseminated.

There was no further spread by the time culling took place on 29/01/2022.

With regard to the first deaths amongst the stags in house 6, it was possible that some of these birds had become affected overnight. Bearing this mind and noting that there had been one mortality on 25/01/2022, none on the 23/01/2022 or 24/01/2022, two on 22/01/2022 and one on 21/01/2022, the precautionary onset of clinical signs was set for 26/01/2022.

It seemed likely that there could have been transfer of virus between house 6 and house 3.

Timeline

Tracings windows

Source tracings window:

High-risk:	23/01/2022 to 25/01/2022
Likely:	12/01/2022 to 22/01/2022
Precautionary:	06/01/2022 to 11/01/2022

Spread tracings window:

High-risk:	24/01/2022 to 27/01/2022
Likely:	03/01/2022 to 23/01/2022
Precautionary:	07/01/2022 to 12/01/2022

Most likely date of infection: 23/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 283: Source and spread timeline for AIV 2022/14

Source Tracing Window	Spread Tracing Window	Date	
Day 20		06/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		07/01/22	Start of precautionary spread tracing window (source + 24h).
Day 18		08/01/22	
Day 17		09/01/22	
Day 16		10/01/22	
Day 15		11/01/22	
Day 14		12/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	13/01/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	14/01/22	
Day 11	Day 3	15/01/22	
Day 10	Day 4	16/01/22	
Day 9	Day 5	17/01/22	
Day 8	Day 6	18/01/22	
Day 7	Day 7	19/01/22	
Day 6	Day 8	20/01/22	
Day 5	Day 9	21/01/22	
Day 4	Day 10	22/01/22	
Day 3	Day 11	23/01/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	24/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	25/01/22	
	Day 14	26/01/22	Precautionary onset of clinical signs.
	Day 15	27/01/22	20 stags died overnight. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/31). Restrictions served. Further 25 stags died during the day and approximately 15-20% morbidity.
		28/01/22	Rapidly increasing mortality, DCVO confirmed SOS AIV 2022 04 HPAI H5N1 confirmed by DCVO based on PCR results with case reference AIV 2022 14 VFEI Investigation
		29/01/22	Culling commenced
		30/01/22	
		31/01/22	Culling Completed, Preliminary C&D completed
		01/02/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

26 premises with poultry holding between 3-7,125 birds (4 premises with 50 or more birds)

SZ (3-10 km)

173 premises with poultry holding between 1-473,000 birds (21 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the farm staff, one company vet, feed deliveries, egg trolley deliveries and the collection of eggs to the company hatchery.

This premises was identified as a tracing contact from AIV 2022/08, due to the egg collection route, and had been subjected to contact tracing activities on 19/01/2022. The company hatchery had also been placed under restrictions. On enquiry, it was confirmed that egg collections had not occurred in the high-risk tracing windows and no further action was required.

In addition, it was confirmed no feed deliveries had occurred in the high-risk tracing windows, no further action was required, and the tracing was closed.

This company has a policy regarding staff not keeping poultry and visiting only one poultry premises per day.

The other tracings were investigated and assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds. This was attributed a medium likelihood assessment with medium uncertainty.

Assessment and evidence base for the likely source

Tracings investigations did not identify any likely lateral transmission pathways onto this unit. All pathways assessed were found to be very low or negligible likelihood with low uncertainty.

Although there were detailed biosecurity protocols for routine management of the unit, some aspects were found to be deficient. There was also some doubt about their implementation and compliance. Potential contributors to indirect transmission pathways from wild birds were as follows:

- (i) wild bird faeces could be deposited in stag house ventilation inlets. The stag house had been affected first.
- (ii) meshed windows could have allowed ingress of contaminated organic matter. Meshed windows were present in the storage area between houses 5 and 6.
- (iii) incorrect dilution of disinfectant in foot dips.
- (iv) foot dips and change of footwear not routinely used for entry to each house. Protocol relies on one change of footwear prior to entering all bird areas. This may not be robust enough.
- (iv) outdoor boots and foot dip for carrying out tasks such as carrying out ABP could be easily bypassed

Spread investigations: Assessment of potential and likelihood of spread

The likelihood of onward transmission through wildlife was not considered to be higher than the background risk.

Tracings investigations have shown that all other potential spread pathways are negligible or low likelihood with low uncertainty.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/15, Near Ashleworth, Tewkesbury, Gloucestershire, England

Description of the premises

Overview of the premises and the wider business

This was a non-commercial flock with the birds kept as pets and any eggs produced consumed by the owners. No birds or eggs were sold or given away.

The farm was primarily a beef farm but there were no cattle present at the time of the outbreak. There were no links to any other farm or susceptible species

Species and number of each present

37 chickens and four ducks

Description of the housing

The birds had been kept indoors since the housing order was introduced, but some chickens had escaped from their house one to two weeks ago (exact date not remembered) before being caught and housed again.

The housing consisted of several old wooden hutches raised off the ground. The windows and doors were covered with chicken mesh but there were several holes through which wild birds could enter. There was no effective perimeter fence around the bird houses. The farm was accessed via a drive and gate and there were no biosecurity facilities.

Plan of the infected premises

Figure 284: Plan of AIV 2022/15

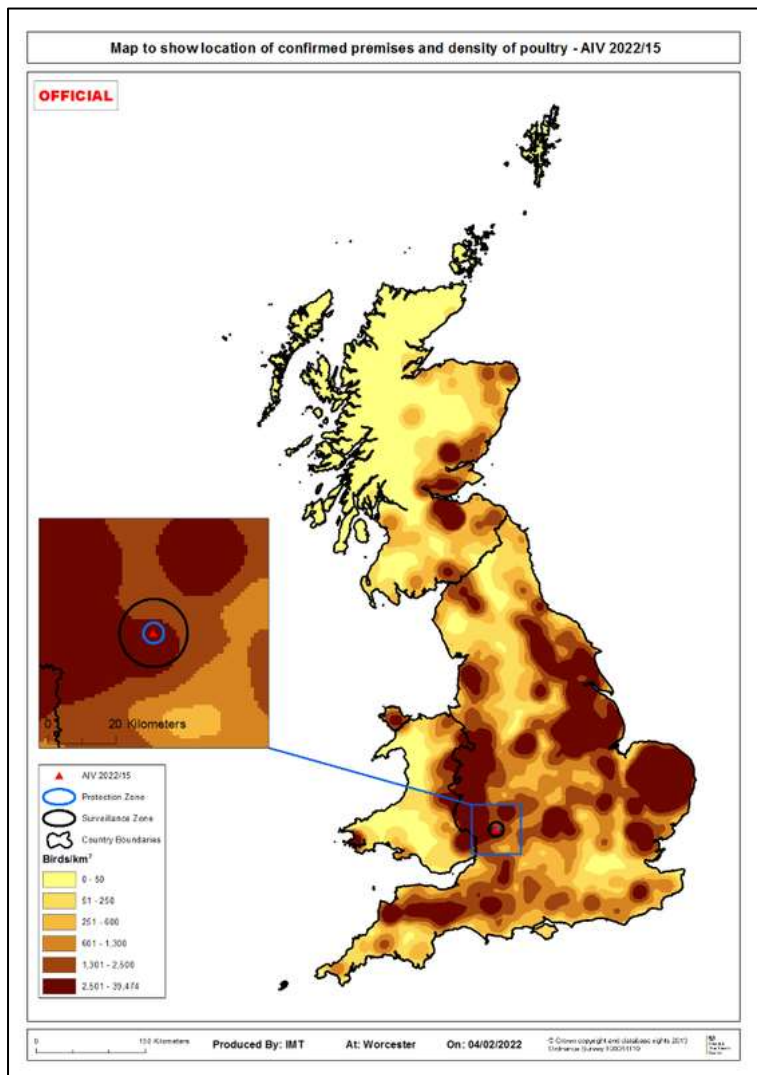


Overview of biosecurity

There was a footbath using Defra approved disinfectant at the entrance of the birds' area but non at the shed entrances. Overall, the biosecurity was assessed as being ineffective due to with cross contamination via farmers footwear once inside the enclosure. Straw was used for bedding but this was not protected from wild birds when in storage. There were no records kept for the poultry.

Map with location in Great Britain and poultry density

Figure 285: Location of IP and poultry density



Overview of the surrounding area

The premises was located on a flood plain within 1 km of a river and had a pond on site. Other ponds were also present in the area and these were often frequented by wild waterfowl.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The premises was close to waterways and waterbodies and was also close to the high-risk HPAI area.

Clinical picture

26/01/2022 – Clinical signs first noticed by owner. Four chickens found dead and two more died during the day.

27/01/2022 - 10 further chickens died and suspicion of disease was reported. At the investigation, one chicken was seen with diarrhoea and a watery discharge from the nose. The ducks were not affected. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk: 22/01/2022 to 24/01/2022
 Likely: 11/01/2022 to 21/01/2022
 Precautionary: 06/01/2022 to 10/01/2022

Spread tracings window:

High-risk: 23/01/2022 to 27/01/2022
 Likely: 12/01/2022 to 22/01/2022
 Precautionary: 07/01/2022 to 11/01/2022

Most likely date of infection: 22/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 286; Source and spread timeline for AIV 2022/15

Source Tracing Window	Spread Tracing Window	Date	
Day 21		04/01/22	
Day 20		05/01/22	
Day 19		06/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		07/01/22	Start of precautionary spread tracing window (source + 24h).
Day 17		08/01/22	
Day 16		09/01/22	
Day 15		10/01/22	
Day 14		11/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/01/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/01/22	
Day 11	Day 3	14/01/22	
Day 10	Day 4	15/01/22	
Day 9	Day 5	16/01/22	
Day 8	Day 6	17/01/22	
Day 7	Day 7	18/01/22	
Day 6	Day 8	19/01/22	
Day 5	Day 9	20/01/22	
Day 4	Day 10	21/01/22	
Day 3	Day 11	22/01/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	24/01/22	
	Day 14	25/01/22	Precautionary onset of clinical signs.
	Day 15	26/01/22	
	Day 16	27/01/22	Notification of suspicion of disease to APHA. APHA investigation. Restrictions served.
	Day 17	28/01/22	HPAI H5N1 confirmed by CVO.
	Day 18	29/01/22	Culling completed. Preliminary C&D completed
	Day 19	30/01/22	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

74 premises with poultry holding between 1-80 birds (3 premises with 50 or more birds)

SZ (3-10 km)

271 premises with poultry holding between 1-651,794 birds (27 premises with 50 or more birds)

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

There was poor biosecurity allowing cross contamination by the farmers activities. There were gaps in the mesh allowing wild bird access directly to the kept birds. Indirect access to wild birds was also possible through contamination of the stored straw bedding. There were ponds nearby attracting waterfowl and the kept birds had escaped some days before the outbreak.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty

AIV 2022/16, Near Bishop's Waltham, Winchester, Hampshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a commercial broiler breeder rearing unit, part of wider poultry production company. This business reared broiler breeder parent stock for supplying hatching eggs.

This intensive indoor unit received day old chicks (pullets and cockerels) and reared them for eighteen weeks at which age they were moved to a laying farm. An all-in/all-out flock placement system was operated with last movement on, on 06/11/2021 (when the affected flock was placed).

Species and number of each present

Stock: 18,000 chickens, aged 13 weeks

Description of the housing

Site was comprised of two houses, with:

9,785 birds placed in House 1 in 4 pens

8,690 birds placed in House 2 in 5 pens

The buildings were approximately 50-60 years old and in a moderate state of repair. A new roof (seen in good condition) was put in eight years ago. Walls of concrete (low wall) and wood fabric were sealed inside with wooden panels.

Plan of the infected premises

Figure 287: Plan of AIV 2022/16



Overview of biosecurity

The site was staffed by one full time poultry worker.

The site had overall good personnel and vehicle biosecurity and the areas between and around the houses were clean and tidy. There was a biosecurity shed beside House 1 where visitors had to sign in the visitors' book and changed into farm designated wellington boots (white) and overalls/boiler suits. At the entrance of each house there was a foot dip and an additional barrier at the entrance to the poultry pens with house designated wellington boots (green).

There was a designated car park outside of premises, with a vehicle wash area after the north entrance to the farm. A one-way system was implemented for vehicles entering the farm.

Evidence of vermin was seen around both houses and due to state of repair of buildings, multiple points of rodent entry were observed.

The ventilation system (side inlet vents in wooden walls and roof outlet vents with fans) led to significant accumulation of dust (feed/litter) in the roof, attracting wild birds and re-introduction of contaminated dust could not be ruled out.

Dead stock were collected by farm staff and placed in bags and in the freezer of H2. These were regularly collected by a company worker in a company vehicle and taken to an ABP collection centre.

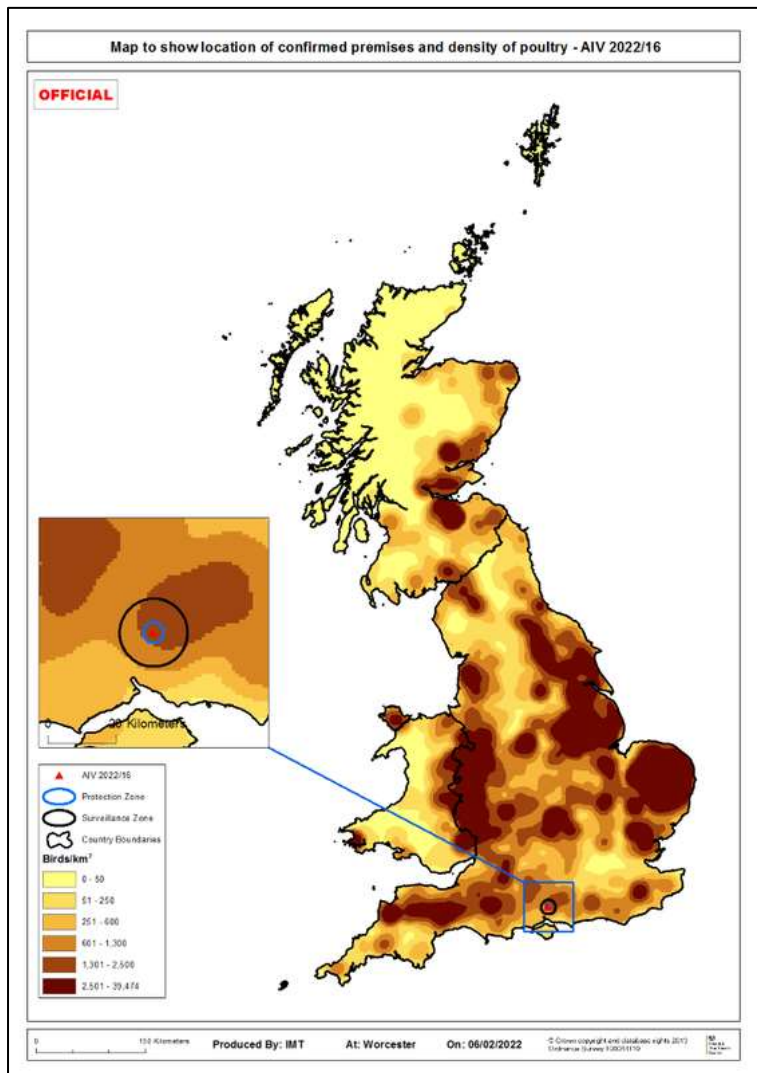
Water supply was mains via continuous drinkers. There were internal lidded containers where medication was added as needed.

Feed supply was provided via an automatic system direct from the silo.

Bedding was stored indoors, no reports of recent replenishment in either house.

Map with location in Great Britain and poultry density

Figure 288: Location of IP and poultry density



Overview of the surrounding area

The IP was located within a high poultry density area and was close to a high-risk HPAI area

Ornithological assessment:

Desktop assessment: This indicated that wild birds were a possible source of infection pressure for the IP

Local intelligence: Pheasants were abundant in the area and were known to visit the IP on a daily basis.

Clinical picture

House 2 was the only affected house during the outbreak

The birds had been vaccinated against E. coli/Salmonella on 20/12/2022 (H1) and 21/01/2022 (H2).

Increased bird activity in house 2 was noticed before mortality started, but the reason for this was not clear.

No changes were noticed in feed/water consumption, but this could be misleading as these birds were kept on a restricted diet so a decrease in appetite could be unnoticed.

27/01/2022 – some mortalities were seen in pen 2, spreading later to birds in adjacent pens (6 died and 20 were culled). Birds also showed lethargy and mild respiratory symptoms. Similar mortality continued for several days before an increase on 31/1/2022 (64 dead and 71 culled in pen 2). Treatment with feed supplement was provided and a small decrease in mortality was seen on 01/02/2022. Treatment with amoxicillin was provided.

02/02/2022 – mortality increased by 157 in pen 2 which was 244 in total.

03/02/2022 – a further 370 birds died and suspicion of notifiable avian disease was reported. This was investigated the same day and samples were taken

The delay between first mortality (27/1/22) and report of suspicion of disease (03/02/2022) was due to the PVS initially suspecting that the mortality was caused by a vaccine reaction.

Timeline

Tracings windows

Source tracings window:

High-risk: 23/01/2022 to 25/01/2022
 Likely: 12/01/2022 to 22/01/2022
 Precautionary: 13/01/2022 to 22/01/2022

Spread tracings window:

High-risk: 14/01/2022 to 12/01/2022
 Likely: 13/01/2022 to 23/01/2022
 Precautionary: 24/01/2022 to 03/02/2022

Most likely date of infection: 23/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 289: Source and spread timeline for AIV 2022/16

Source Tracing Window	Spread Tracing Window	Date	
Day 14		12/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs)
Day 13	Day 1	13/12/21	Start of likely spread tracing window (source tracing window +24h). Start of precautionary source tracing window (-21d from notification of suspicion to APHA)
Day 12	Day 2	14/12/21	Start of precautionary spread tracing window (source + 24h).
Day 11	Day 3	15/12/21	
Day 10	Day 4	16/12/21	
Day 9	Day 5	17/12/21	
Day 8	Day 6	18/12/21	
Day 7	Day 7	19/12/21	
Day 6	Day 8	20/12/21	
Day 5	Day 9	21/12/21	
Day 4	Day 10	22/12/21	
Day 3	Day 11	23/12/21	Start of high risk source tracing window (-3d). Most likely earliest infection date for this outbreak.
Day 2	Day 12	24/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	25/12/21	
	Day 14	26/12/21	Precautionary onset of clinical signs.
	Day 15	27/12/21	Increased mortality.
	Day 16	28/12/21	
	Day 17	29/12/21	
	Day 18	30/12/21	
	Day 19	31/12/21	
	Day 20	01/01/22	
	Day 21	02/01/22	
	Day 22	03/01/22	Notification of suspicion of disease to APHA. APHA investigation. Restrictions served.
		04/01/22	HPAI H5N1 confirmed by CVO.
		05/01/22	
		06/01/22	Cull completed
		07/01/22	
		08/01/22	Preliminary C&D completed
		09/01/22	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

78 premises with poultry holding between 1-18,120 birds (5 premises with 50 or more birds)

SZ (3-10 km)

267 premises with poultry holding between 1-93,000 birds (23 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings investigated included movement of carcasses for PME at private veterinarian practice and at empty sister poultry premises, feed delivery, movements of carcass to ABP collection centre and movement of owner and farm manager between different company sites

Source investigations: Hypothesis for the source

The most likely source of the outbreak was considered to be indirect contact with infected wild birds during the high-risk source window.

All other sources investigated were assessed as very low or negligible likelihood

Assessment and evidence base for the likely source

The building was very old, and even with attempts to seal and it make bio secure, there were obvious biosecurity issues including possible contamination through the ventilation system.

Rodents were present outside the buildings and entry into buildings was considered likely.

There was also the possibility of biosecurity failures by the staff.

Abundant wild pheasants were in the area which was very close to the AI high-risk area.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as low or negligible likelihood

Remaining uncertainty

The unusual progress of mortality introduces some uncertainty. It is possible that the initial mortality could have been caused by initial reaction to the vaccine or by concomitant disease and then later by the subsequent introduction of AI. The vaccination event on 21/01/22 was outside the high-risk source window.

AIV 2022/17, Near Fakenham, North Norfolk, Norfolk, England

Description of the premises

Overview of the premises and the wider business

This infected premises was part of a conservation park and nature reserve, open to the public. It held around 300 birds, including high conservation value species and species kept as part of recognised breeding programmes.

The 700-acre park was situated to the southeast of Fakenham and comprised a few lakes north of the river Wensum, as well as smaller ponds. There were further lakes to the south of the meandering river, and it was frequented by numerous wild birds.

The IP was a series of epidemiologically linked enclosures, in a well delineated area within the boundary of the reserve/park.

Species and number of each present

Forty-two different species of captive ducks, geese, cranes, and flamingos were kept in the wider park, many of which were of high conservation value.

The designated IP was composed of:

Netted Enclosure 1 (the affected pen)

Species	Number	IUCN Status
Baer's Pochard	2	CR
Emperor Goose	2	NT
Goldeneye Duck	2	LC
Hooded Merganser	17	LC

Netted Enclosure 2

Species	Number	IUCN Status
Bar-headed Goose	3	LC
Baer's Pochard	1	CR
Comb Duck	3	LC
Common Crane	1	NT
Emperor Goose	4	NT
Nene	3	LC
Northern Pintail	8	LC

Species	Number	IUCN Status
Red-Breasted Goose	9	VU
Red-Crested Pochard	6	LC
Rosy-Billed Pochard	2	LC
Ross's Goose	15	LC
Shoveler Duck	4	LC
Swan Goose	1	VU
White-faced Whistling Ducks	8	LC
Wigeon	3	LC

Netted Enclosure 3

Species	Number	IUCN Status
Red-Crowned Crane	2	VU

Netted Enclosure 4

Species	Number	IUCN Status
Grey Crowned Crane	2	EN
Red-Crested Pochard	1	LC
White-faced Whistling Ducks	5	LC

Netted Enclosure 5

Species	Number	IUCN Status
Bahama Pintail/White-Cheeked Pintail/Summer Duck	1	LC
Baikal Teal	5	LC
Garganey Duck	5	LC
Marbled Teal	12	VU
Shoveler Duck	1	LC

Netted Enclosure 6

Species	Number	IUCN Status
Bahama Pintail/White-Cheeked Pintail/Summer Duck	1	LC
Common Pochard	6	VU
Falcated Duck	2	NT
Northern Pintail	1	VU Europe LC Global
Red-Crested Pochard	1	LC
Rosy-Billed Pochard	2	LC
Shoveler Duck	6	LC
Tufted duck	2	NT Europe, LC Global
Wigeon	2	LC

Isolation facility

Indoors

Species	Number	IUCN Status
Corncrake	4	LC
Hooded- Merganser	3	LC
Turtle Doves	9	LC

Description of the housing

As a result of the introduction of a Great Britain housing order, the site had constructed netted enclosures as temporary accommodation to protect the birds from direct contact with wild birds. Additional biosecurity procedures were initiated to create separate epidemiological groups of birds.

The enclosures assessed as comprising the IP are identified in Figure 2 and were constructed of wooden posts with either corrugated metal sheets or wire mesh to ½ metre and were netted above.

All captive birds were pinioned and could not escape although mixing was possible between enclosure 1 and 2 and between enclosure 4 and 5.

The isolation facility was a well-constructed steel framed bio secure building with concrete floor and steel profile sides and roof. The walls were lined internally with

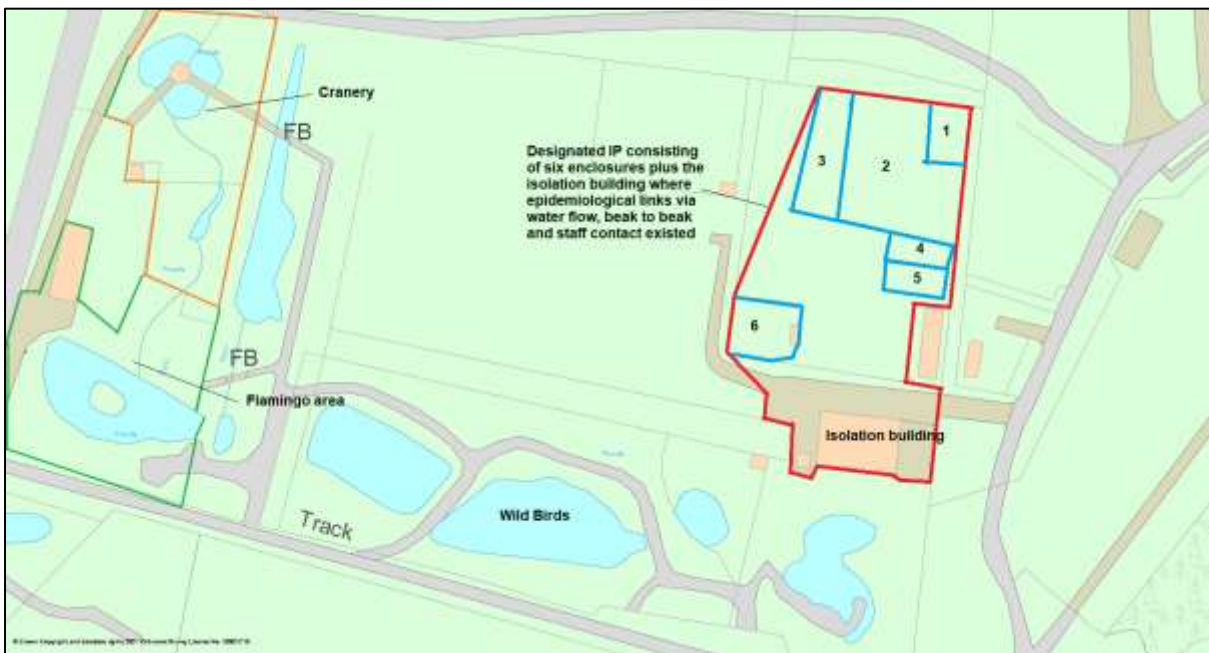
wooden sheets and the building contained large water filled containers for waterfowl and aviaries for non-water birds.

Plan of the infected premises

Figure 290: Plan of the natural park showing 2 areas of enclosures. The west enclosure contained the infected birds.



Figure 291: Plan of designated IP part of the west enclosure. Area in red was designated as the IP.



Overview of biosecurity

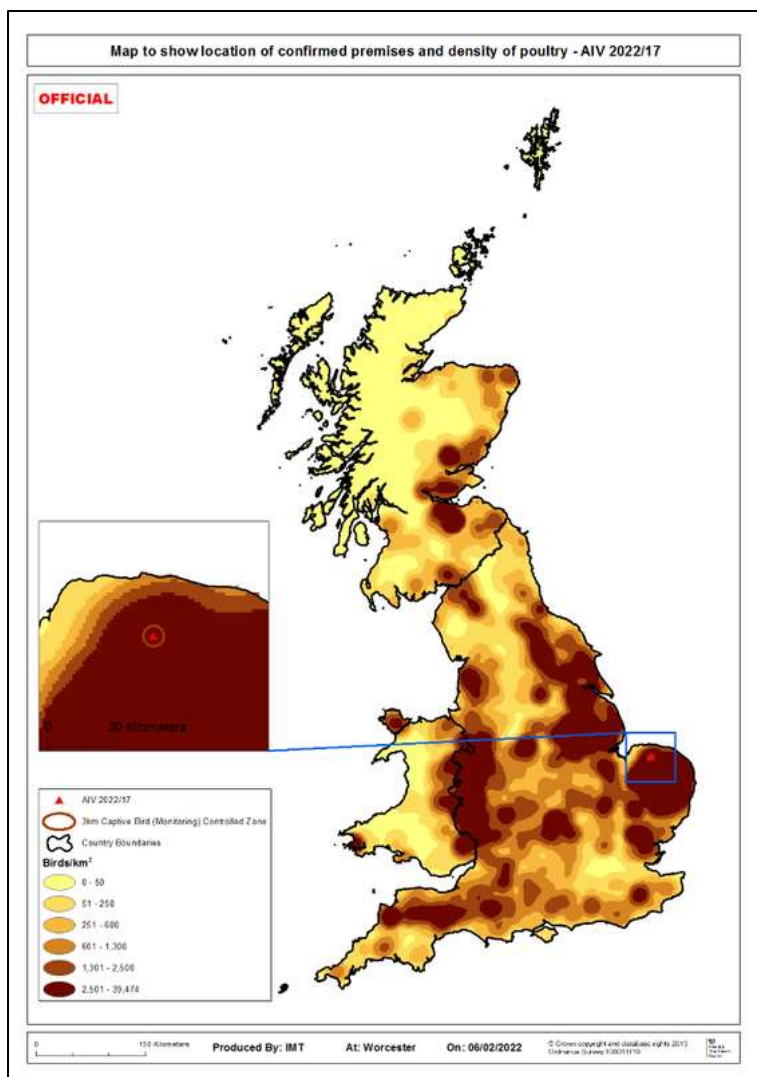
The biosecurity on site between the west and east enclosure was considered good with a change of clothing and the use of adequate C and D points.

The biosecurity within the west enclosures did not involve a change of clothing but did utilise C and D points at the entrance to each enclosure.

The designated IP was assessed considering the presence of beak-to-beak contact, the flow of water between enclosures with all enclosures downstream from the infected enclosure being considered part of the IP. Staff biosecurity practices were also considered along with the distance between infected and non-affected enclosures.

Map with location in Great Britain and poultry density

Figure 292: Location of IP and poultry density



Overview of the surrounding area

The premises was on the outskirts of Fakenham town situated some 900 m NW and just under 25 km northwest of Norwich. It was also 7 miles south of the east coast's higher risk area.

It was a collection of captive birds in an inland, lowland and rural context. Set adjacent to a nature reserve managed to promote attendance by local wild waterbirds as well as a river system and an extensive network of lakes, it was considered attractive to waterbirds of all types.

Ornithological assessment:

Desktop assessment: Wildfowl were likely to have been locally abundant, with a moderately sized aggregation of mixed species associated with the adjacent lakes. Whilst this aggregation was not large enough to assume it might easily acquire AIV, it probably was just large and diverse enough to maintain circulation of the disease and become a local source of infection. If this was the case here, very many strong infection pathways were enabled.

Waders and other waterbirds were considered to be only common close to the IP, though it was unlikely that they would have consistently formed any aggregations sufficiently large to produce local sources of infection and were unlikely to produce strong infection pathways towards captive birds.

Corvids were likely to have been abundant around the IP, and although gulls may only have been common, their known association with the adjacent lakes suggests significant traffic of gulls across the IP. These species were likely to produce strong infection pathways if the aggregation of wildfowl on the adjacent lakes became a source of infection.

Wild passerines and Wood pigeon might have supported strong infection pathways where there was a local source of infection. As we assumed this to be the case here, we considered that wild passerines (including Starling) and pigeon all produced substantial infection pressure towards captive birds.

Assessment of the overall infection pressure was equivocal and depended on the likelihood that Pensthorpe lakes became a local source of infection and assumptions around the biosecurity of the captive bird collection. A naïve assessment of a relatively biosecure site in this location would assume only a 'Likely source of infection pressure' based on the inland setting, limited number of relatively isolated local waterbodies and the marginal size of the wildfowl aggregation. However, should the lakes have become a local source of infection, many very strong infection pathways were enabled such that that an assessment would deserve 'Obvious substantial infection pressure'.

Local intelligence: Nothing further to add.

Clinical picture

02/02/2022 – a single duck (Hooded Merganser) was found dead in enclosure 1 (Figure 291).

03/03/2022 – five ducks were hunched, had a head tremor and were ataxic when walking. These Hooded Mergansers had been moved from a separate netted enclosure into their current accommodation on 26/01/2022 where they joined other birds.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/01/2022 to 30/01/2022
Likely:	17/01/2022 to 27/01/2022
Precautionary:	13/01/2022 to 16/01/2022

Spread tracings window:

High-risk:	29/01/2022 to 03/02/2022
Likely:	18/01/2022 to 28/01/2022
Precautionary:	14/01/2022 to 17/01/2022

Most likely date of infection: 28/01/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 293: Source and spread timeline for AIV 2022/17

Source Tracing Window	Spread Tracing Window	Date	
Day 18		13/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		14/01/22	Start of precautionary spread tracing window (source + 24h).
Day 16		15/01/22	
Day 15		16/01/22	
Day 14		17/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/01/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	19/01/22	
Day 11	Day 3	20/01/22	
Day 10	Day 4	21/01/22	
Day 9	Day 5	22/01/22	
Day 8	Day 6	23/01/22	
Day 7	Day 7	24/01/22	
Day 6	Day 8	25/01/22	
Day 5	Day 9	26/01/22	Affected groups of ducks were moved from CP enclosure to netted enclosure 1.
Day 4	Day 10	27/01/22	
Day 3	Day 11	28/01/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/01/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/01/22	
	Day 14	31/01/22	Precautionary onset of clinical signs.
	Day 15	01/02/22	
	Day 16	02/02/22	One Hooded Merganser found dead
	Day 17	03/02/22	Five more birds ill in same pen. Notification of suspicion of disease to APHA. Restrictions served.
	Day 18	04/02/22	APHA investigation and sampling (DPR 2022/039).
	Day 19	05/02/22	Influenza A (M gene), N1 and highly pathogenic H5 Influenza A virus RNA was detected by PCR. HPAI confirmed by CVO as AIV 2022-17.
	Day 20	06/02/22	
	Day 21	07/02/22	Cull started. Cull samples taken. PCR +ve birds plus seropositive birds likely infected 10 days previously.
	Day 22	08/02/22	
	Day 23	09/02/22	
	Day 24	10/02/22	
	Day 25	11/02/22	
	Day 26	12/02/22	Cull completed. Cull samples taken. PCR +ve birds plus seropositive birds.
	Day 27	13/02/22	
	Day 28	14/02/22	One of two spared Nenes died. Submitted for testing. PCR Positive for HPAI H5N1
	Day 29	15/02/22	The second of two spared Nenes put down on welfare grounds. Submitted for testing. PCR Positive for HPAI H5N1
	~	~	
	Day 43	01/03/22	Remaining spared birds sampled prior to movement. OP and CL swabs all negative.
	Day 44	02/03/22	
	Day 45	03/03/22	Preliminary C and D completed.
	Day 46	04/03/22	Preliminary C and D considered effective. Spared birds moved to isolation facility.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on

Surveillance activity

CBMCZ (0-3 km)

50 premises with poultry holding between 1-150,000 birds (3 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

There were three telephone tracings identified for workers on the site. One of these kept their own poultry which generated a visit. In addition, a pest controller was also contacted and visited as he kept birds at home too.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds.

Assessment and evidence base for the likely source

The initially affected birds were moved into their enclosure two days prior to the likely infection period. No evidence of disease was identified in the original enclosure with disease being restricted to the designated IP.

The enclosures the birds occupied were not considered bird proof and indirect contact from overflying birds was almost certain and wild birds were noted roosting on the netted enclosure.

This natural part was in an area where wild wildfowl were considered to be abundant and the infection pressure from those wildfowl would be very high.

Spread investigations: Assessment of potential and likelihood of spread

The natural park contained numerous birds that were assessed as having high conservation value and that were spared from culling under a legislative derogation. High conservation value birds tested negative for HPAI were moved to approved quarantine buildings where they were restricted until two rounds of testing 21 days apart with negative results were achieved. No contact with wild birds was possible for this group once in quarantine.

No birds moved off the site in the risk periods and all tracings identified were closed with no further disease being disclosed.

The areas of the natural park assessed as not being part of the IP were subjected to additional surveillance including testing of all captive birds that died without a definitive alternative diagnosis.

Wild birds could have direct and indirect contact with the affected captive birds prior to culling however any additional risk of spread through wild birds was considered to be very low compared to the surrounding background risk.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/18, Near Holy Island, Berwick Upon Tweed, Northumberland, England

Description of the premises

Overview of the premises and the wider business

This was a small-holder premises holding rare breed poultry. Fertilised eggs were incubated and sometimes exchanged with other rare breed experts. Eggs that were not kept for breeding purposes were given away to neighbours. However, the birds had been out of lay recently, so no eggs had been given away since early January.

There are also approximately 260 sheep on the premises, but these do not belong to the same keeper.

Species and number of each present

165 chickens, 13 geese and 85 ducks.

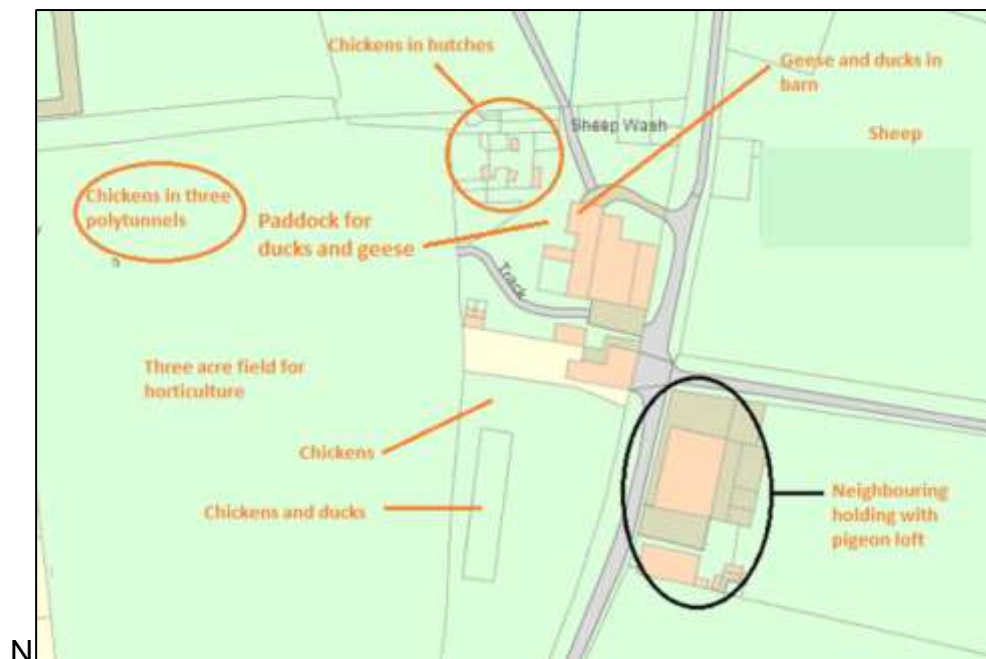
Description of the housing

The geese, ducks and 3 chickens were kept in farm buildings. The remaining chickens were kept in small groups of assorted sizes, within covered pens and one polytunnel.

The geese were Chinese Geese that were hatched from eggs purchased more than 2 years ago. Given their rarity, the owner requested an exemption from culling. This was accepted following a risk assessment, the geese tested negative and were moved to an isolation facility on 24/02/2022. Following the completion of the required procedures, they were subsequently released from isolation.

Plan of the infected premises

Figure 294: Plan of AIV 2022/18

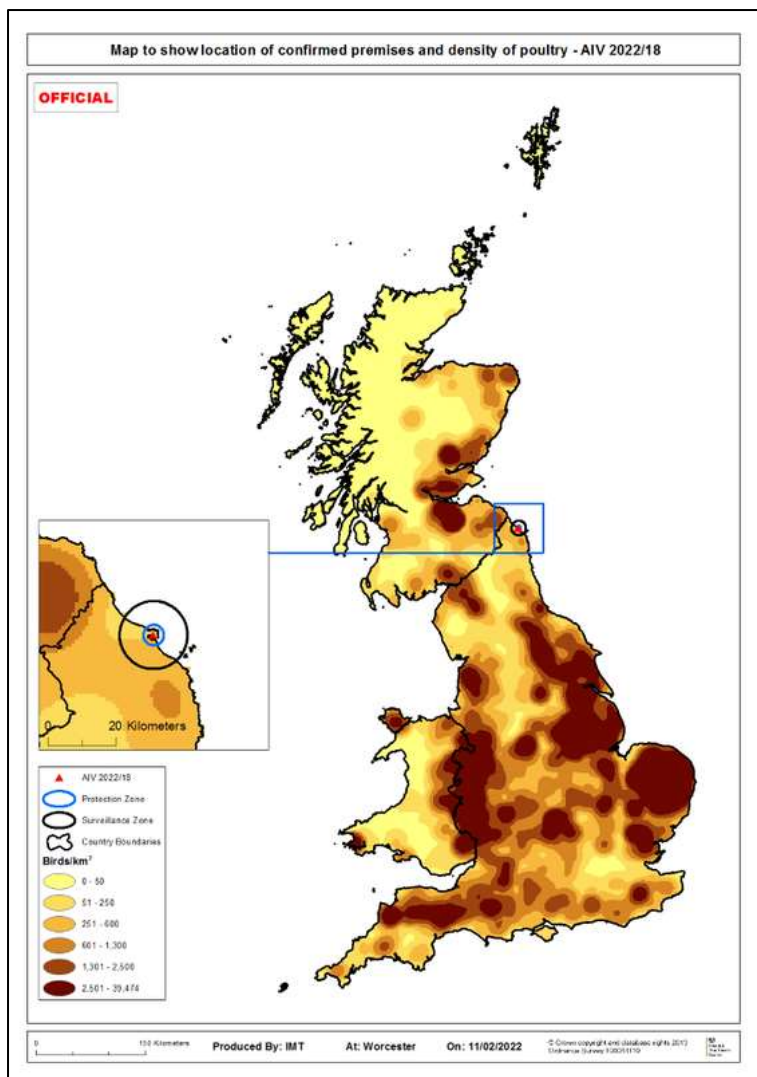


Overview of biosecurity

Biosecurity was considered to be poor and the housing was generally in a state of disrepair following Storm Arwen, which caused flooding and considerable damage on the site at the end of November. The property was rented, and this led to delays in the necessary repairs being carried out. Attempts had been made to place foot dips/mats both inside and outside the housing, and while only the keeper tended to the birds, they did not change clothing or footwear between the pens. There was also a considerable rodent problem. Rats had gained access to the hutches and damaged the polytunnel.

Map with location in Great Britain and poultry density

Figure 295: Location of IP and poultry density



Overview of the surrounding area

The area around the premises was run mainly as a nature reserve and was known to attract large numbers of migratory birds especially Brent Geese. There were a few sheep and horses grazing in the area, some other small poultry keepers but otherwise no other agriculture.

Ornithological assessment:

Desktop assessment: The ornithological expert assessment concluded that wild birds posed an obvious substantial source of infection pressure.

This rural and lowland premises was located close to coastal habitats favoured by many waterbirds. (such as intertidal habitats, waterlogged fields, extensive areas protecting wintering wild waterbirds)

Wildfowl, waders and other waterbirds were abundant in the coastal habitats and included substantial aggregations of migrant species known to graze farmland. As such wildfowl were likely to produce both a substantial and nearby source of infection, as well as potentially producing some infection pathways. They would have produced significant infection pressure here.

Gulls were abundant and corvids were also present. Gulls may support their own AIV infection cycles and produce their own contribution to a source of infection. Both groups of bridge species produced significant infection pathways, with gulls perhaps producing the greatest pressure where they move between coastal habitats, settlements and pasture, as well as scavenging infected carcasses from the coast or at sea.

Wild passerines, feral pigeon and Starling might have supported indirect infection pathways, acquiring infection at coastal habitats close to the IP and producing additional infection pressure.

Local intelligence: The birds had gone off lay after the November storm Arwen that caused a lot of damage including blowing part of the roof off the barn. This barn had large numbers of feral pigeons coming in through the damaged roof and it was also where infection and clinical signs were first seen.

Clinical picture

07/02/2022 – Five chickens and one duck were found dead with no apparent clinical signs beforehand. Two of the remaining ducks were lethargic, hunched up and ataxic. Some of the chickens had congested combs. Suspicion of notifiable avian disease was reported.

Timeline

Tracings windows

Source tracings window:

High-risk:	03/02/2022 to 05/02/2022
Likely:	23/01/2022 to 02/02/2022
Precautionary:	17/01/2022 to 22/01/2022

Spread tracings window:

High-risk:	04/02/2022 to 07/02/2022
Likely:	24/02/2022 to 03/02/2022
Precautionary:	18/02/2022 to 23/02/2022

Most likely date of infection: 03/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 296: Source and spread timeline for AIV 2022/18

Source Tracing	Spread Tracing Window	Date	
		15/01/22	
		16/01/22	
Day 20		17/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		18/01/22	Start of precautionary spread tracing window (source + 24h).
Day 18		19/01/22	
Day 17		20/01/22	
Day 16		21/01/22	
Day 15		22/01/22	
Day 14		23/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	24/01/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	25/01/22	
Day 11	Day 3	26/01/22	
Day 10	Day 4	27/01/22	
Day 9	Day 5	28/01/22	
Day 8	Day 6	29/01/22	
Day 7	Day 7	30/01/22	
Day 6	Day 8	31/01/22	
Day 5	Day 9	01/02/22	
Day 4	Day 10	02/02/22	
Day 3	Day 11	03/02/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	04/02/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	05/02/22	
	Day 14	06/02/22	Precautionary onset of clinical signs.
	Day 15	07/02/22	5 chickens and 1 duck found dead in the morning (died overnight) and clinical signs noted in others. Notification of suspicion of disease to APHA. Verbal Restrictions served.
		08/02/22	APHA investigation and sampling (DPR 2022/41). Hard copy restrictions served
		09/02/22	H5N1 confirmed by CVO based on PCR results with case reference AIV2022-18
		10/02/22	Culling commenced
		11/02/22	Culling completed (except Chinese Geese)
		12/02/22	
		13/02/22	
		14/02/22	
		15/02/22	
		16/02/22	
		17/02/22	
		18/02/22	
		19/02/22	
		20/02/22	
		21/02/22	
		22/02/22	
		23/02/22	
		24/02/22	
		25/02/22	Preliminary C&D completed
		26/02/22	Preliminary C&D considered effective
	Purple colour reflects source tracing window . Increasing intensity of colour reflects increased possibility of source for IP on these dates		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these		

Surveillance activity

PZ (0-3 km)

2 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 17-263 birds.

0 premises holding both pigs and poultry.

SZ/RZ (3-10 km)

5 premises with poultry are reported to be within 10 km of the IP holding between 8-39,000 birds.

0 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There was a wild bird reserve on the island and high vermin activity across farm and wider area.

Wild birds and vermin could easily enter the premises and birds were not permanently housed.

The biosecurity measures were poor.

Spread investigations: Assessment of potential and likelihood of spread

No eggs given away during high-risk spread window.

No other tracings were identified.

Onward transmission through wildlife: Risk not higher than the background risk.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/19, Near Wooler, Berwick Upon Tweed, Northumberland, England

Description of the premises

Overview of the premises and the wider business

The IP was a non-commercial mixed and semi-feral poultry smallholding.

Species and number of each present

- 15 ducks,
 - 3 geese,
 - 16 chickens (10 hens and 6 cockerels) and
 - 1 guinea fowl.
- Two sheep and 3 horses were also present on the site.

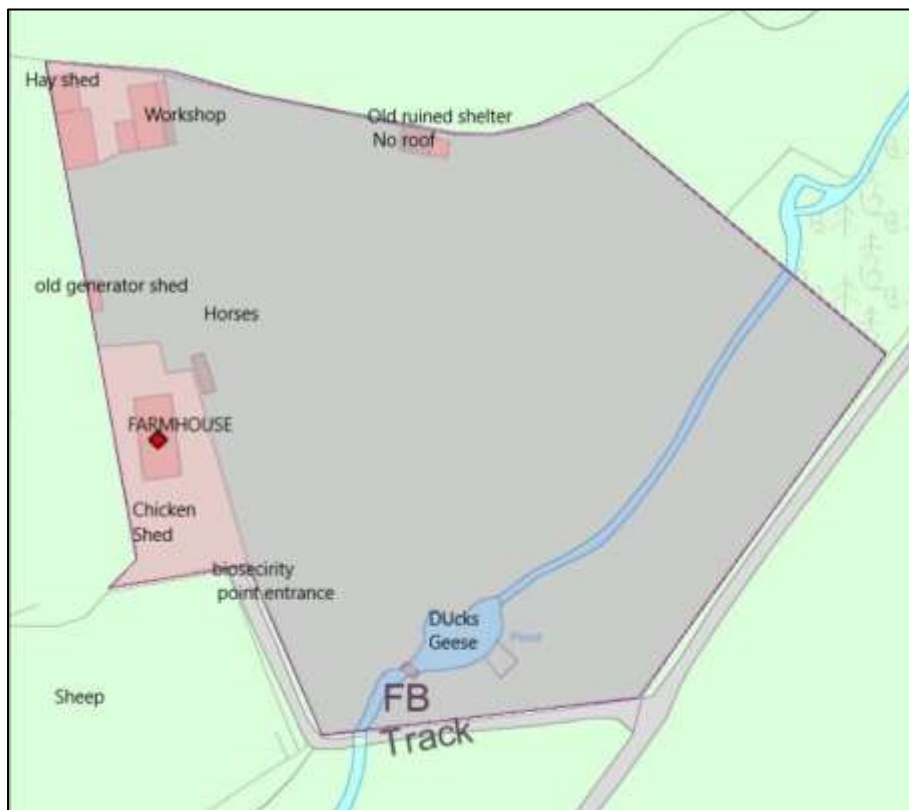
Description of the housing

The birds were not housed and roamed the holding freely (approximately 2.8 ha).

Several small wooden sheds and runs were present, but these were poorly maintained and/or damaged and in most cases unable to contain birds.

Plan of the infected premises

Figure 297: Plan of AIV 2022/19

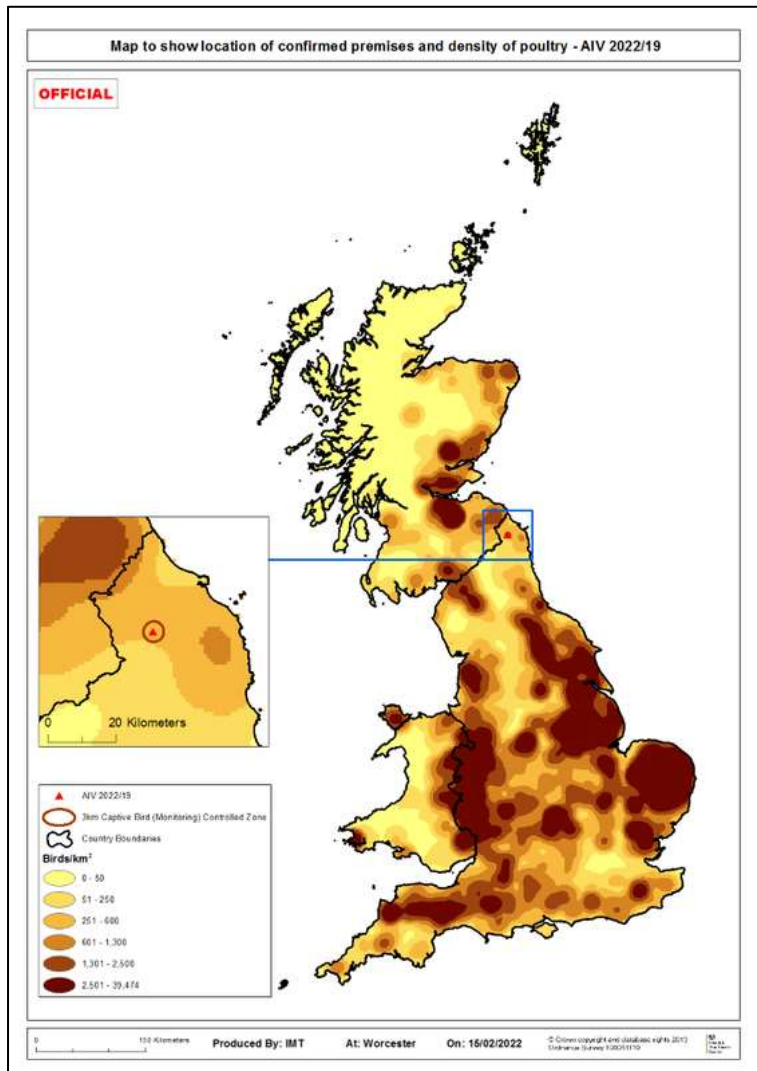


Overview of biosecurity

The biosecurity was very basic and there were no written biosecurity protocols. Wellington boots were worn when tending the birds and a footbath with disinfectant (Virkon) was placed at the entrance gate on 11/02/2022. A public footpath was frequently used by walkers.

Map with location in Great Britain and poultry density

Figure 298: Location of IP and poultry density



Overview of the surrounding area

The premises was in a medium-density poultry area and situated within 15 km of the northeast coast high-risk area. It was 20 km from IP AIV 2022/18, confirmed on 09/02/2022.

There was a pond within the paddock where birds ranged. This was connected via a relatively fast-moving stream to other ponds to the north and south.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Wood pigeons were seen in the sheds and wild moorhens and herons were reported by the owner as sharing the pond with the poultry.

Clinical picture

11/02/2022 – five birds were found dead, two of which showed signs of having died within the previous two days. One of the cockerels had shown neurological signs of torticollis and spasms the previous night. Suspicion of notifiable avian disease was reported.

12/02/2022 – at the APHA investigation 17 birds had died (34% mortality) and 3 birds appeared depressed, lethargic, some with abnormal gait and discharge from the eyes and beak. Cyanosis of the combs and swelling of the feet was observed in the carcasses examined.

Timeline

Tracings windows

Source tracings window:

High-risk:	06/02/2022 to 09/02/2022
Likely:	26/01/2022 to 05/02/2022
Precautionary:	21/01/2022 to 25/01/2022

Spread tracings window:

High-risk:	07/02/2022 to 11/02/2022
Likely:	27/01/2022 to 06/02/2022
Precautionary:	22/01/2022 to 26/01/2022

Most likely date of infection: 06/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 299: Source and spread timeline for AIV 2022/19

Source Tracing Window	Spread Tracing Window	Date	
Day 19		21/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		22/01/22	Start of precautionary spread tracing window (source + 24h).
Day 17		23/01/22	
Day 16		24/01/22	
Day 15		25/01/22	
Day 14		26/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	27/01/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	28/01/22	
Day 11	Day 3	29/01/22	
Day 10	Day 4	30/01/22	
Day 9	Day 5	31/01/22	
Day 8	Day 6	01/02/22	
Day 7	Day 7	02/02/22	
Day 6	Day 8	03/02/22	
Day 5	Day 9	04/02/22	
Day 4	Day 10	05/02/22	
Day 3	Day 11	06/02/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	07/02/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	08/02/22	
	Day 14	09/02/22	Precautionary onset of clinical signs.
	Day 15	10/02/22	
	Day 16	11/02/22	5 Birds found dead Two showing evidence of death 48hr previously Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/042). Restrictions served.
	Day 17	12/02/22	
	Day 18	13/02/22	
	Day 19	14/02/22	DPR2022/042 confirmed by CVO as AIV2022/19. Positive PCR evidence of H5N1 HPAI
	Day 20	15/02/22	Start and completion of cull. Preliminary C and D completed
	Day 21	16/02/22	Preliminary C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

CBMZ

26 premises with poultry holding between 1-49 birds (0 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were instigated for two visitors and a pest controller. The pest controller had birds of his own at home which generated visits. All were deemed very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct/indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Mixing of free-roaming birds with wild birds was likely with evidence of wild birds in the area and other confirmed IPs relatively close in time and space.

All other potential source pathways were assessed as very low (or lower) likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife was assessed as highly likely as mixing of free-roaming birds with wild-birds was possible.

Other potential spread pathways were assessed as very low (or lower) risk.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/20, Near Grimsby, Northeast Lincolnshire, Lincolnshire, England

Description of the premises

Overview of the premises and the wider business

This was a turkey finishing unit. The birds were near finishing and the site was due to be fully depopulated in 2 weeks. Turkeys were placed from 8-9 weeks of age and finished for slaughter. There was no breeding activity on the farm.

This was one of six premises belonging to the same enterprise placed under restrictions due to biosecurity concerns and the 4th premises of that same company to become an IP following AIV 2021/71, AIV 2021/74 and AIV 2022/04. The previous incidents occurred between 21/12/2021 to 04/01/2022 more than 5 weeks from the end of the spread windows.

Species and number of each present

7,500 turkeys.

Description of the housing

There were four houses on site, which were rented from an arable farm.

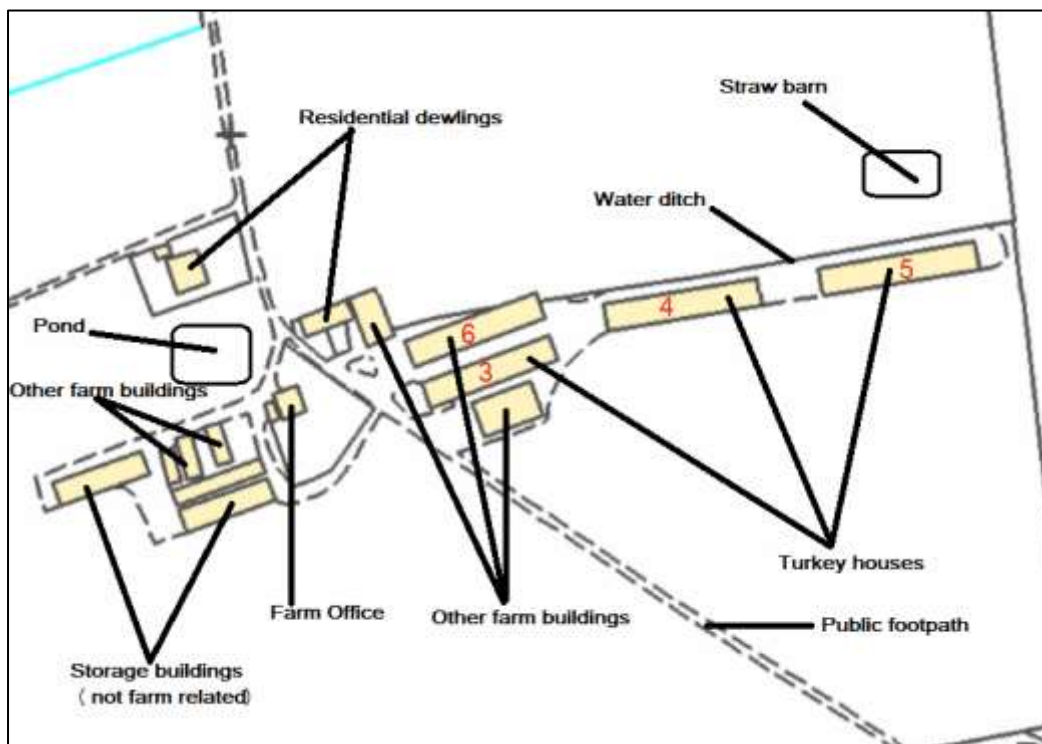
The 4 houses (numbered 3, 4, 5 and 6) were originally built for cattle/pigs and the farm owner had kept pigs in the sheds until last summer.

House 6 (the first affected house) was the oldest one, with wooden planks making up the top half of the building while the other houses were made of concrete blocks.

Ventilation was natural and consisted of roof vents and open side vents with mesh for houses 3 to 5 and open barn doors with mesh in the lower half for House 6. The infrastructure was worn in parts and damage to the vents and wooden panels created large openings allowing entry to birds and rodents

Plan of the infected premises

Figure 300: Plan of AIV 2022/20



Overview of biosecurity

Biosecurity was generally very poor, with multiple opportunities for direct/indirect contact with infected wild birds. The entrance to the farm did not have a barrier. Buildings were not purpose made for poultry and were poorly maintained

There was a pond (with wild ducks) near the houses and several water-filled ditches. Roofs were heavily covered in moss. These factors would have attracted wild birds.

There were footbaths with Virkon LSP at the entrance and inside the sheds, where there was a small preparation area with dedicated wellington boots for each shed. However, the preparation area was not clearly separated from the birds and was very untidy and dirty, and it was considered to be very unlikely that effective biosecurity could be achieved with these facilities.

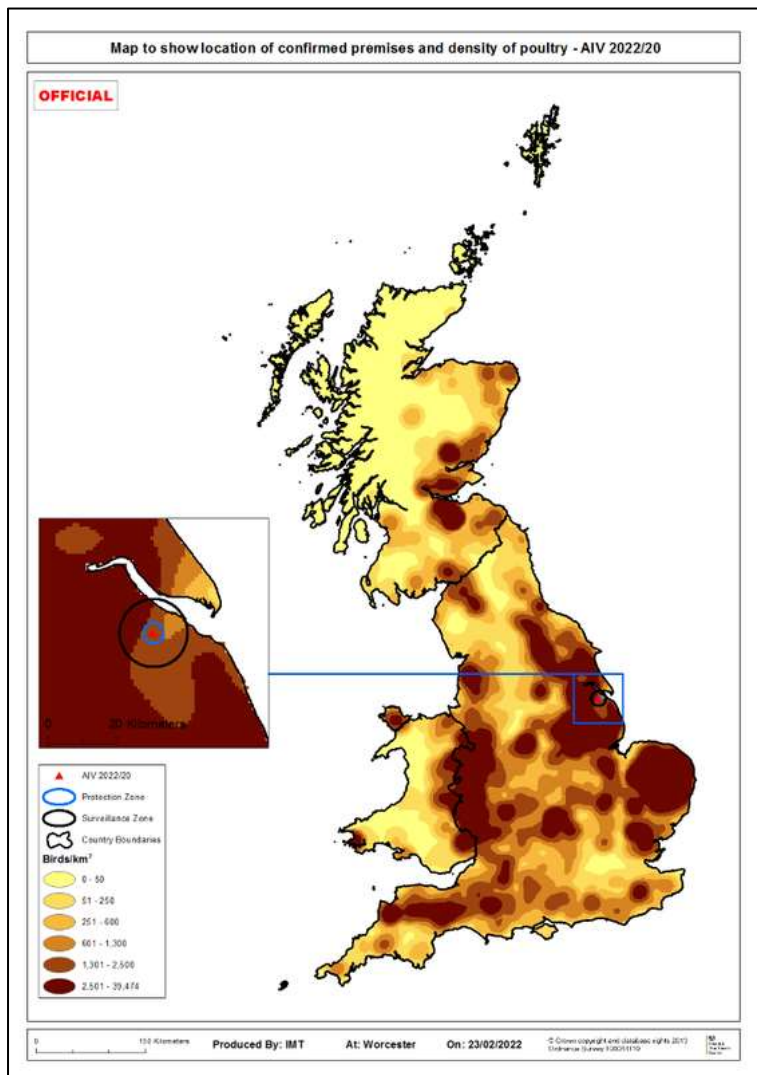
Straw provided to the birds was made and stored by the farm owner in a shed that had a roof, but no side walls, making it easily accessible to wildlife

Two members of staff worked on site and neither worked on another poultry farm or owned poultry.

There was an overall lack of training and SOPs for biosecurity.

Map with location in Great Britain and poultry density

Figure 301: Location of IP and poultry density



Overview of the surrounding area

The area was close to the coastline and with medium-high poultry density.

Ornithological assessment:

Desktop assessment: This indicated that wild birds presented a possible source of infection pressure for this IP

Local intelligence: There was local knowledge of wild bird activity, including waterfowl, in the area.

Clinical picture

19/02/2022 – 20/02/2022 – sudden increase of mortality in House 6. From 8 dead on Saturday, they found more than 60 dead on Sunday morning. Suspicion of notifiable avian disease was reported and at APHA investigation some turkeys had congested

comb/wattles and some had their entire head with abnormal red colour. Some turkeys displayed respiratory signs with panting and some had signs of diarrhoea. A few were observed with mild neurological signs such as head shaking and head tilted on one side.

21/2/2022 – due to the clinical picture the CVO decided to slaughter on suspicion. On the same day, lab results allowed the UK CVO to confirm HPAI H5N1.

22/02/2022 – mortality in House 6 was around 90% while started increasing in House 5. Houses 3 and 4 still appeared unaffected.

Timeline

Tracings windows

Source tracings window:

High-risk:	15/02/2022 to 17/02/2022
Likely:	04/02/2022 to 14/02/2022
Precautionary:	30/01/2022 to 03/02/2022

Spread tracings window:

High-risk:	16/02/2022 to 20/02/2022
Likely:	05/02/2022 to 15/02/2022
Precautionary:	31/01/2022 to 04/02/2022

Most likely date of infection: 15/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 302: Source and spread timeline for AIV 2022/20

Source Tracing Window	Spread Tracing Window	Date	
Day 19		30/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		31/01/22	Start of precautionary spread tracing window (source + 24h).
Day 17		01/02/22	
Day 16		02/02/22	
Day 15		03/02/22	
Day 14		04/02/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	05/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	06/02/22	
Day 11	Day 3	07/02/22	
Day 10	Day 4	08/02/22	
Day 9	Day 5	09/02/22	
Day 8	Day 6	10/02/22	
Day 7	Day 7	11/02/22	
Day 6	Day 8	12/02/22	
Day 5	Day 9	13/02/22	
Day 4	Day 10	14/02/22	
Day 3	Day 11	15/02/22	Start of high risk source tracing window (-3d). Most likely infection date
Day 2	Day 12	16/02/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	17/02/22	
	Day 14	18/02/22	Precautionary onset of clinical signs.
	Day 15	19/02/22	7 Birds dead overnight
	Day 16	20/02/22	Suspicion of disease reported to APHA. Restrictions served. APHA veterinary investigation
	Day 17	21/02/22	HPAI H5N1 confirmed by CVO.
	Day 18	22/02/22	
	Day 19	23/02/22	
	Day 20	24/02/22	Culling completed 14:30 Preliminary C&D completed
	Day 21	25/02/22	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

67 premises with poultry holding between 1-10,364 birds (3 premises with 50 or more birds)

SZ (3-10 km)

124 premises with poultry holding between 1-71,500 birds (28 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

The farm had been under EXD 07 restrictions since 07/02/2022 which required movements on and off the premises to be licenced. Licenced movements that occurred during the high-risk tracing windows were for feed deliveries and ABP collections. These were investigated and assessed as very low risk. No further actions were required, and the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was: Direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

This assessment was based on the following key pieces of evidence:

The shed construction (Yorkshire boarding and holes) enabled possible access of wild birds.

Poor biosecurity at staff entrances and poor vermin control enabled possible introduction of contamination via fomites.

Bedding (straw) made from arable business on site. This was accessible to wild birds as there was no sides on storage shed.

All other source pathways investigated were assessed as very low or negligible likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

Other spread pathways investigated included: feed deliveries and ABP collections and were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/21, Near Newtown, Montgomeryshire, Powys, Wales

Description of the premises

Overview of the premises and the wider business

This was a pheasant breeding premises which was part of a large gamebird commercial business that included a hatchery, game farms and shoots. The game farms consisted of rearing farms, overwintering fields, and breeding farms.

The IP was linked to AIV 2022/22, located 15 miles away. This premises and AIV 2022/22 were under the same ownership and received birds from the same source premises.

Species and number of each present

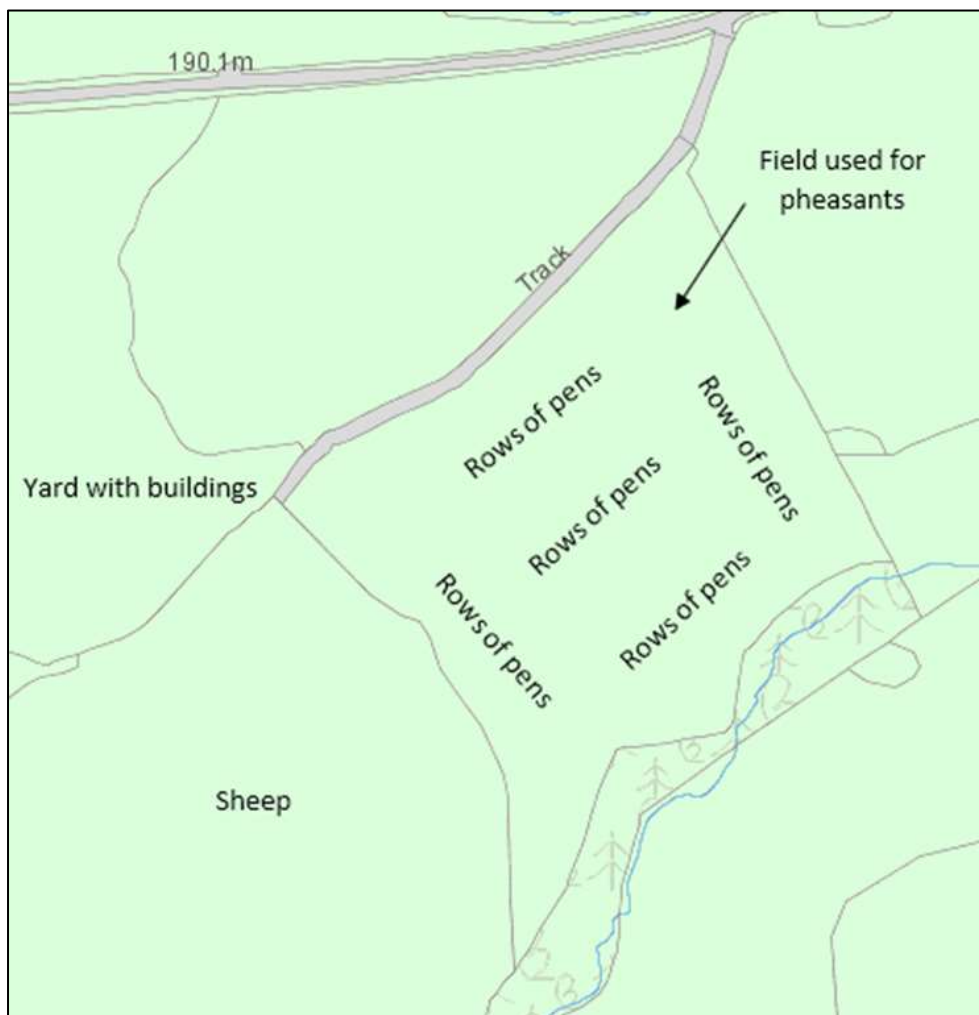
6,000 breeding pheasants. Birds were eight-month-old and in the pre-laying period.

Description of the housing

Birds were kept in a field in 600 pens (400 floor pens and 200 raised pens) with nine hens and one male per pen. Pens were netted (birds were confined but contact with wild birds was possible) and had water dispensers (borehole), feeders (pre-breeding pellets) and nesting boxes.

Plan of the infected premises

Figure 303: Plan of AIV 2022/21

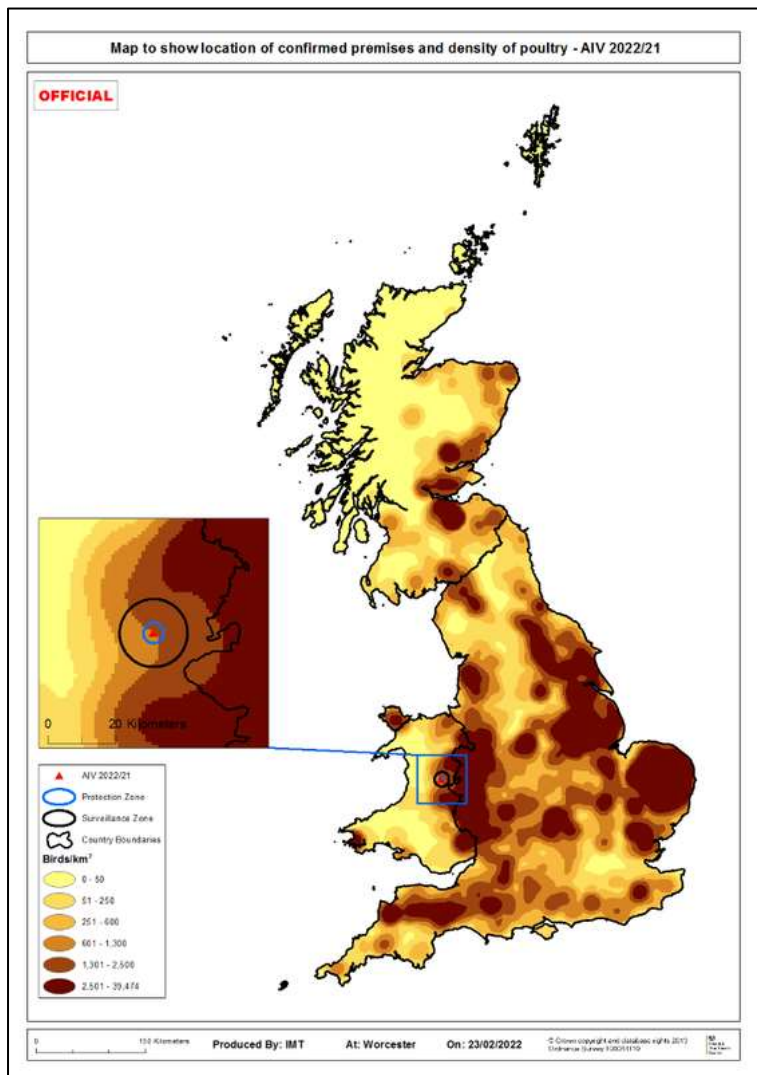


Overview of biosecurity

The biosecurity was assessed as poor. The farm entrance had a gate with a footbath with disinfectant but there were no disinfection points for vehicles and no other biosecurity points. Farm staff and vehicles moved daily between the different premises but there was no dedicated PPE for farm staff or visitors and no visitors record book. Hedges surrounded the perimeter of the farm.

Map with location in Great Britain and poultry density

Figure 304: Location of IP and poultry density



Overview of the surrounding area

The IP was in a medium poultry density area.

Ornithological assessment:

Desktop assessment: A combined assessment was conducted for the three linked IPs AIV 2022/21, AIV 2022/22 & AIV 2022/24. For AIV 2022/21, this concluded that bridge species were not considered to support a likely source of infection pressure, with no obvious source of infection pressure either from wildfowl or from other bird species.

Local intelligence: The farm was in hilly ground but there were no ponds or watercourses. The farmer reported no wild birds observed but wild pheasants had been seen running around in neighbouring fields.

Clinical picture

18/02/2022 – clinical signs started in a group of 2,000 pheasants that had been gathered for breeding and had moved onto the premises the previous week from a shooting estate in Herefordshire. The birds became lethargic with slight tremors, ruffled feathers and died within 1-2 hours. 550 birds in the affected group died over 48 hours.

20/02/2022 – suspicion of notifiable avian disease was reported. At the APHA investigation the same day, the birds were lethargic, recumbent, hunched with ruffled feathers, some had nervous signs (torticollis) and green diarrhoea. Several birds were observed to be dying and samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk:	13/02/2022 to 15/02/2022
Likely:	02/02/2022 to 12/02/2022
Precautionary:	30/01/2022 to 01/02/2022

Spread tracings window:

High-risk:	14/02/2022 to 20/02/2022
Likely:	03/02/2022 to 13/02/2022
Precautionary:	31/01/2022 to 02/02/2022

Most likely date of infection: 15/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 305: Source and spread timeline for AIV 2022/21

Source Tracing Window	Spread Tracing Window	Date	
Day 17		30/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		31/01/22	Start of precautionary spread tracing window (source + 24h).
Day 15		01/02/22	
Day 14		02/02/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	03/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	04/02/22	
Day 11	Day 3	05/02/22	
Day 10	Day 4	06/02/22	
Day 9	Day 5	07/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 8	Day 6	08/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 7	Day 7	09/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 6	Day 8	10/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 5	Day 9	11/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 4	Day 10	12/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 3	Day 11	13/02/22	Between 7th and 14th February - 5000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22) Start of high risk source tracing window (-3d).
Day 2	Day 12	14/02/22	Between 7th and 14th February - 5000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22) Start of high risk spread tracing window (source +24h)
Day 1	Day 13	15/02/22	Most likely infection date for this outbreak. (Rationale: affected birds date of arrival to the premises) 2000 birds moved from Ledbury to Newtown (AIV2022/21)
	Day 14	16/02/22	400 of the 2000 birds moved to Welshpool (AIV2022/22). Precautionary onset of clinical signs.
	Day 15	17/02/22	530 birds moved from Ledbury to Newtown (AIV2022/21). 3 dead birds
	Day 16	18/02/22	530 birds (see 17/2/2022) moved from Newton (AIV2022/21) to Welshpool (AIV2022/22). 9 dead birds
	Day 17	19/02/22	33 dead birds
	Day 18	20/02/22	Notification of suspicion of disease to APHA. PVS attended in the morning. APHA investigation and sampling (DPR 2022/046). Restrictions served.
	Day 19	21/02/22	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV2022-21
	Day 20	22/02/22	
	Day 21	23/02/22	
	Day 22	24/02/22	Culling completed.
	Day 23	25/02/22	
	Day 24	26/02/22	Preliminary C&D completed
	Day 25	27/02/22	
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

25 premises with poultry holding between 1-70,000 birds (4 premises with 50 or more birds)

SZ (3-10 km)

83 premises with poultry holding between 1-80,000 birds (26 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the live movement of pheasants, the workers, and the PVS.

At the time of confirmation of this IP, the other premises that had received pheasants from AIV 2022/21 from the same source in Herefordshire was also a report case and was confirmed as AIV 2022/22.

Pheasants had moved onto the IP from three premises within the high-risk window. These were from a shooting estate and from outwintering rearing premises. Immediate tracing visits were raised for these three potential source premises. The shooting estate had been depopulated but subsequently confirmed as an infected premises (AIV 2022/24), as epidemiological assessment concluded that it was highly likely to have been the source of AIV 2022/21 and AIV 2022/22 via the movement of infected birds.

The two other rearing premises had no poultry left on them but were subjected to biosecurity visits. The likelihood of residual infection was assessed as very low.

In addition, one other breeding premises part of the same company was visited. No signs of notifiable disease were observed and the overall risk was assessed as very low with no further action required.

The other tracings (including the transport and equipment associated with the movement of live birds) were investigated and assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was the movement of pheasants coming from the shooting estate in Herefordshire confirmed as AIV 2022/24.

Assessment and evidence base for the likely source

Pheasants had been placed from three different source premises over a period of two weeks. Clinical signs were seen only on the pheasants that had been sourced from the shooting estate.

The support for this assessment was in the timing of the first clinical signs at the destination premises, the laboratory and clinical evidence of infection prior to the move, the absence of evidence of infection in the two other source premises and the ornithological assessment that the potential for infected wild bird contact was much lower at the destination premises compared to that at shooting estate premise.

Spread investigations: Assessment of potential and likelihood of spread

There was high likelihood (low uncertainty) that HPAI H5N1 infection was spread from the IP onto AIV 2022/22.

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

All other potential spread pathways were assessed as low or very low likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/22, Near Welshpool, Montgomeryshire, Powys, Wales

Description of the premises

Overview of the premises and the wider business

This was a pheasant breeding premises which was part of a large gamebird commercial business that included a hatchery, game farms and shoots. The game farms consisted of rearing farms, overwintering fields and breeding farms.

The IP was linked to AIV 2022/21, located 15 miles away. AIV 2022/21 and this premises were under the same ownership and received birds from the same source premises, albeit for AIV 2022/22 these came indirectly via AIV 2022/21.

Species and number of each present

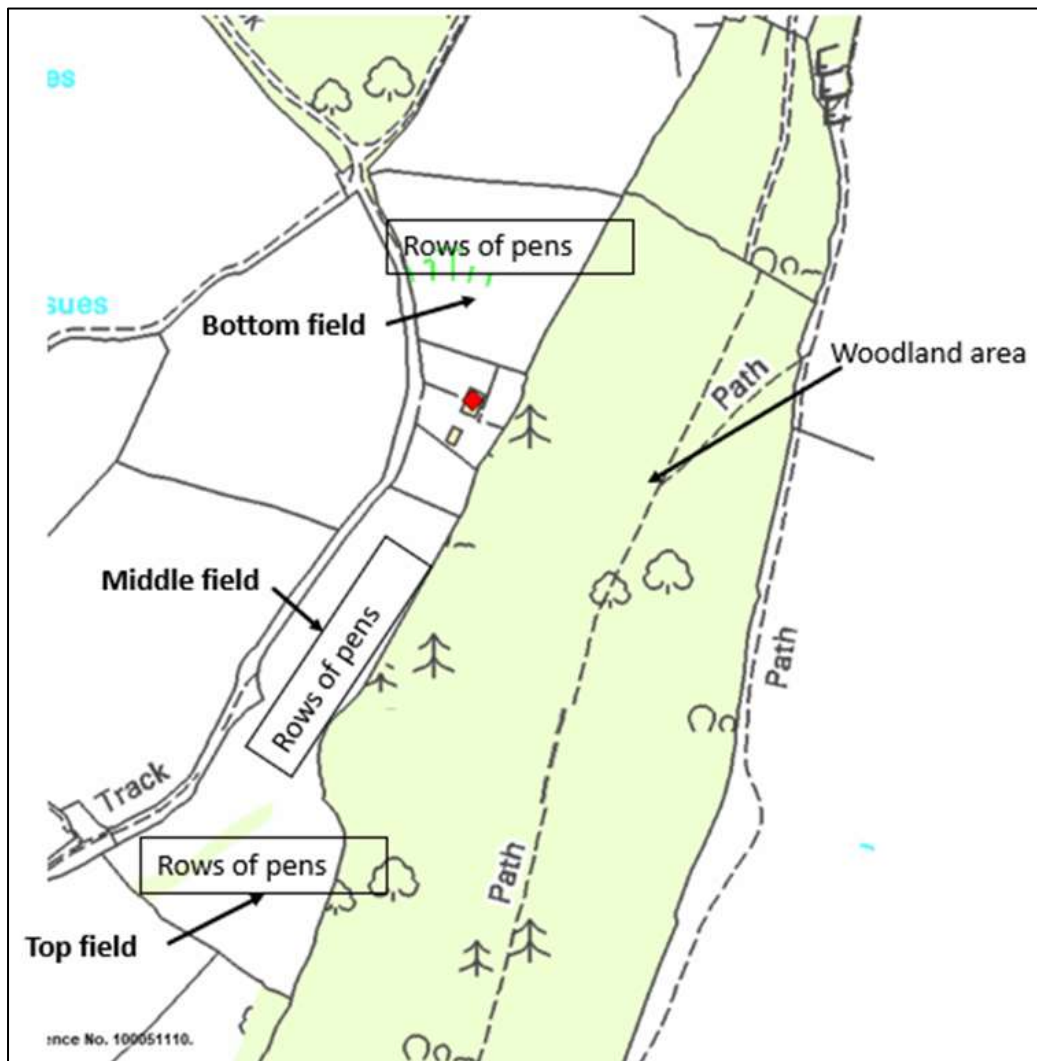
5,500 breeding pheasants. Birds were eight-month-old and in the pre-laying period.

Description of the housing

Birds were kept in three fields in 500 pens with 10 females and one male in each pen. All pens were netted (birds were confined but contact with wild birds was possible) and had water dispensers (borehole), feeders (pre-breeding pellets) and nesting boxes.

Plan of the infected premises

Figure 306: Plan of AIV 2022/22



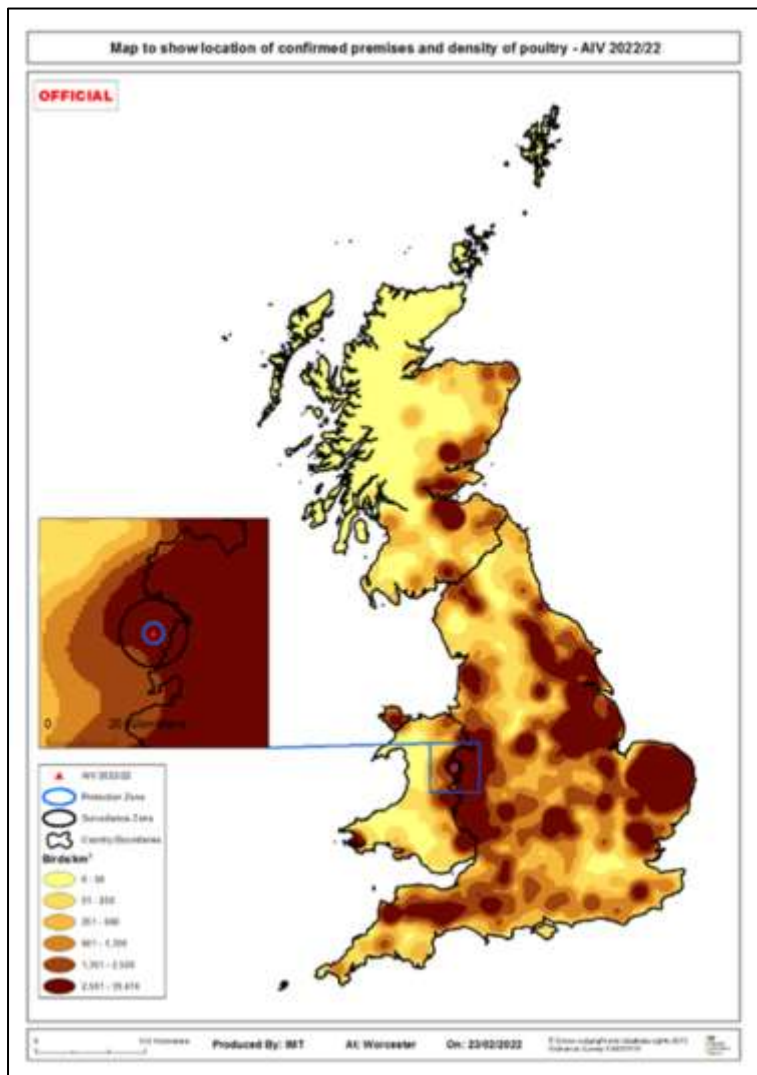
Overview of biosecurity

The biosecurity was assessed as poor. There was a disinfectant footbath at the entrance to the field but there were no disinfection points for vehicles and no other biosecurity points. Farm staff and vehicles moved daily between the different premises but there was no dedicated PPE for farm staff or visitors and no visitors record book. Feed and water for the birds were not covered.

There was a public footpath going through the yard of the premises approximately 20 metres from the birds.

Map with location in Great Britain and poultry density

Figure 307: Location of IP and poultry density



Overview of the surrounding area

The IP was in a high poultry density area.

Ornithological assessment:

Desktop assessment: A combined assessment was conducted for the three linked IPs AIV 2022/21, AIV 2022/22 & AIV 2022/24. For AIV 2022/22, this concluded that bridge species were not considered to support a likely source of infection pressure and there was no obvious source of infection pressure either from wildfowl or from other bird species.

Local intelligence: The farm was in hilly ground with no ponds nearby but close to the river Severn. Sick wild pheasants were seen by APHA staff in the surrounding woods.

Clinical picture

19/02/2022 – there was a sudden increase in mortality in a group of pheasants that had been moved onto the premises the previous week from a shooting estate in Herefordshire. These birds were part of the same batch of birds that had been delivered to another report case (AIV 2022/21) under the same ownership.

20/02/2022 – suspicion of notifiable avian disease was reported. At the APHA investigation the same day, the birds showed neurological signs (torticollis, recumbency, discharge from nostrils, swelling of the eye lids), and some presence of diarrhoea. Mortality had increased and samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk:	14/02/2022 to 16/02/2022
Likely:	03/02/2022 to 13/02/2022
Precautionary:	30/01/2022 to 02/02/2022

Spread tracings window:

High-risk:	15/02/2022 to 20/02/2022
Likely:	04/02/2022 to 14/02/2022
Precautionary:	31/01/2022 to 03/02/2022

Most likely date of infection: 16/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 308: Source and spread timeline for AIV 2022/22

Source Tracing Window	Spread Tracing Window	Date	
Day 18		30/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		31/01/22	Start of precautionary spread tracing window (source + 24h).
Day 16		01/02/22	
Day 15		02/02/22	
Day 14		03/02/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	04/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	05/02/22	
Day 11	Day 3	06/02/22	
Day 10	Day 4	07/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 9	Day 5	08/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 8	Day 6	09/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 7	Day 7	10/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 6	Day 8	11/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 5	Day 9	12/02/22	Between 7th and 14th February - 9000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22)
Day 4	Day 10	13/02/22	these 4000 moved to Welshpool (AIV2022/22)
Day 3	Day 11	14/02/22	Between 7th and 14th February - 5000 birds moved from outwintering premises to Newton (AIV2022/21) and of these 4000 moved to Welshpool (AIV2022/22). Start of high risk source tracing window (source -3d)
Day 2	Day 12	15/02/22	2000 birds moved from Ledbury to Newtown (AIV2022/21) Start of high risk spread tracing window (source +24h)
Day 1	Day 13	16/02/22	400 birds moved from Newtown (AIV2022/21) to Welshpool (AIV2022/22) . Most likely infection date for this outbreak. (Rationale: affected birds date of arrival to the premises) 2 dead birds
	Day 14	17/02/22	Precautionary onset of clinical signs
	Day 15	18/02/22	530 birds (see 17/2/2022) moved from Newton (AIV2022/21) to Welshpool (AIV2022/22). 13 dead birds
	Day 16	19/02/22	36 dead birds
	Day 17	20/02/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/47). Restrictions served.
	Day 18	21/02/22	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV2022- 22.
	Day 19	22/02/22	
	Day 20	23/02/22	Culling completed.
	Day 21	24/02/22	Preliminary C&D completed
	Day 22	25/02/22	
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

44 premises with poultry holding between 1-5,000 birds (5 premises with 50 or more birds)

SZ (3-10 km)

83 premises with poultry holding between 1-324,720 birds (27 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

On the same day of confirmation of this IP, the premises from where the birds had been moved was confirmed as AIV 2022/21.

In conjunction with AIV 2022/21, tracings were started for the live movement of pheasants, the workers and the PVS.

Pheasants had been sourced from three premises within the high-risk window. These were from a shooting estate and two outwintering rearing premises. Immediate tracing visits were raised for these three potential source premises. The shooting estate had been depopulated but later confirmed as an infected premises (AIV 2022/24), as epidemiological assessment concluded that it was highly likely to have been the source of infection for AIV 2022/21 and this premises via the movement of infected birds.

The two other rearing premises had no poultry left on them but were subjected to biosecurity visits. The likelihood of residual infection was assessed as very low.

In addition, one other breeding premises part of the same company was visited. No signs of notifiable disease were seen and the overall risk was assessed as very low with no further action required.

The other tracings (including the transport and equipment associated with the movement of live birds) were investigated and assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was the movement of pheasants from AIV 2022/21. These had had been sourced from the shooting estate in Herefordshire, later confirmed as AIV 2022/24.

Assessment and evidence base for the likely source

Pheasants had been placed from three different source premises over a period of two weeks. Clinical signs were seen only on the pheasants that had been sourced from the shooting estate.

The support for this assessment was in the timing of the first clinical signs at the destination premises, the laboratory and clinical evidence of infection prior to the move, the absence of evidence of infection in the two other source premises and the ornithological assessment that the potential for infected wild bird contact was much lower at the destination premises compared to that at shooting estate premise.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

All other potential spread pathways were assessed as low or very low likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/23, Near Blaydon, Gateshead, Tyne and Wear, England

Description of the premises

Overview of the premises and the wider business

This was a smallholder hobbyist flock with a total of 102 birds kept for showing. Surplus eggs were usually sold as table eggs at the farmgate but during the time preceding the report case, eggs had been sold or given directly to specific recipients.

Species and number of each present

68 chickens, 29 ducks and five geese.

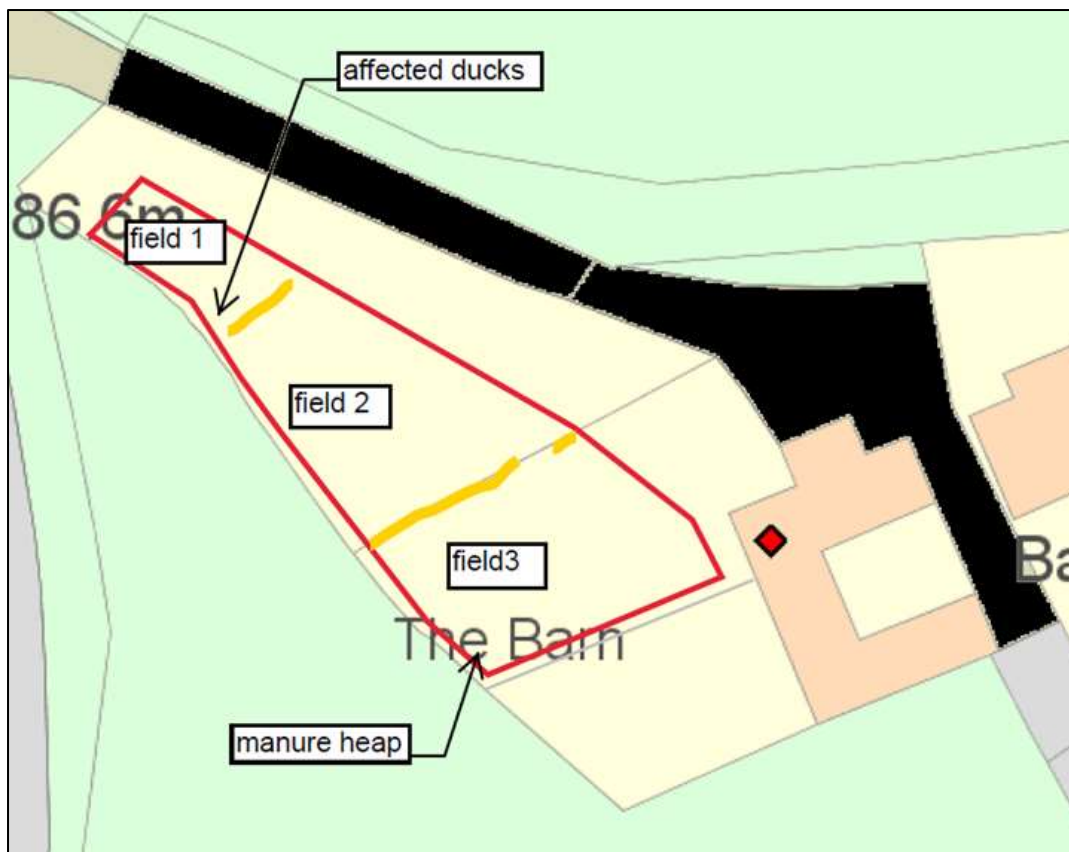
Description of the housing

The birds were housed across different enclosures in 3 fields as shown in Figure 1.

Each enclosure had a coop and run netted at the sides and top. The geese run was not netted at the top but there were bird scarers and deterrents above this enclosure. Feed and water were provided in the runs and the netting allowed indirect and direct contact with wild birds.

Plan of the infected premises

Figure 309: Plan of AIV 2022/23



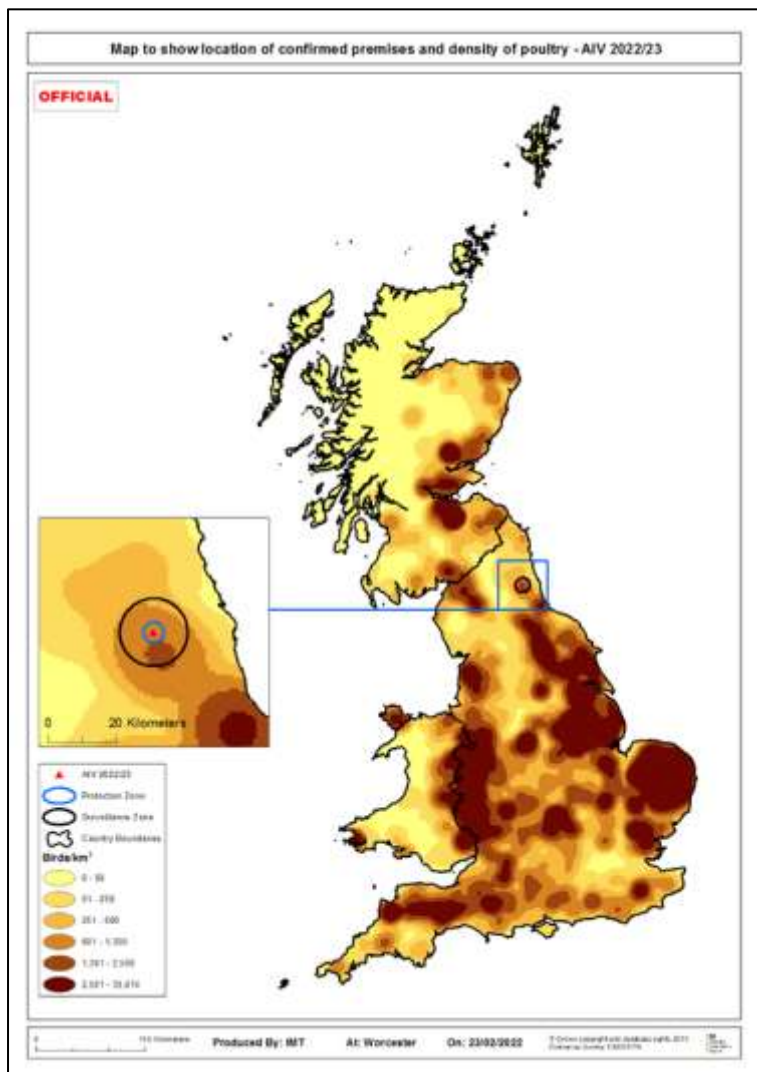
Overview of biosecurity

Biosecurity standards on the IP were found to be poor. There were no ponds or streams on the IP but wild birds were seen during the veterinary investigation and vermin were reported in the past.

There was a public footpath through the site and walkers and their dogs occasionally entered the garden but they did not enter the bird area.

Map with location in Great Britain and poultry density

Figure 310: Location of IP and poultry density



Overview of the surrounding area

The surrounding area was mainly arable fields with some woodland areas and not far from the suburbs of a large city. There were no large poultry premises in the immediate vicinity, but two neighbours also had chickens.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The site was very muddy. Crows were seen almost every day and birds of prey had been seen flying overhead.

Clinical picture

19/2/22 – One duck in Field 1 was unwell, lethargic, moribund, and unresponsive. There had been no production changes; egg drop, shell-less eggs, deformed or discoloured eggs were not observed.

20/2/22 – Another duck in the same group was found dead. Suspicion of notifiable avian disease was reported.

21/02/2022 – Six other ducks in the same group were unwell, lethargic, moribund, and unresponsive, and one had blood at the mouth and nares. Other clinical signs observed were neurological signs, photophobia, circling, torticollis, conjunctivitis, and green diarrhoea. The chickens on site showed no clinical signs.

Timeline

Tracings windows

Source tracings window:

High-risk:	15/02/2022 to 17/02/2022
Likely:	04/02/2022 to 14/02/2022
Precautionary:	30/01/2022 to 03/02/2022

Spread tracings window:

High-risk:	16/02/2022 to 20/02/2022
Likely:	05/02/2022 to 15/02/2022
Precautionary:	31/01/2022 to 04/02/2022

Most likely date of infection: 15/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 311: Source and spread timeline for AIV 2022/23

Source Tracing Window	Spread Tracing Window	Date	
		27/01/22	
		28/01/22	
		29/01/22	
Day 19		30/01/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		31/01/22	Start of precautionary spread tracing window (source + 24h).
Day 17		01/02/22	
Day 16		02/02/22	
Day 15		03/02/22	
Day 14		04/02/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	05/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	06/02/22	
Day 11	Day 3	07/02/22	
Day 10	Day 4	08/02/22	
Day 9	Day 5	09/02/22	
Day 8	Day 6	10/02/22	
Day 7	Day 7	11/02/22	
Day 6	Day 8	12/02/22	
Day 5	Day 9	13/02/22	
Day 4	Day 10	14/02/22	
Day 3	Day 11	15/02/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	16/02/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	17/02/22	
	Day 14	18/02/22	Precautionary onset of clinical signs.
	Day 15	19/02/22	1 duck found to be moribund
	Day 16	20/02/22	Another duck found dead (died overnight) Notification of suspicion of disease to APHA. Verbal Restrictions served.
		21/02/22	APHA investigation and sampling. Hard copies of restrictions served (DPR 2022/045).
		22/02/22	
		23/02/22	HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2022 23.
		24/02/22	VFEI Investigation. Culling Comenced; Culling completed; Preliminary C&D completed
		25/02/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window . Increasing intensity of colour reflects increased possibility of source for IP on these date
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

74 premises with poultry holding between 1-188 birds (23 premises with 50 or more birds)

SZ (3-10 km)

319 premises with poultry holding between 1-285,000 birds (47 premises with 50 or more birds)

Investigations on the infected premises

Source investigations:

Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Biosecurity was poor.

Direct and indirect contact with wild birds was possible throughout all enclosures.

Feeders and drinkers were outside and accessible to wild birds and the geese enclosure was not netted on top.

Spread investigations: Assessment of potential and likelihood of spread

There were no movements of birds off the IP during the high-risk tracing windows.

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2022/24, Near Ledbury, North Herefordshire, Herefordshire, England

Description of the premises

Overview of the premises and the wider business

This premises, supplying breeding pheasants, was risk assessed as a dangerous contact to AIV 2022/21 and AIV 2022/22 because epidemiological assessment concluded that it was highly likely as a source after supplying infected birds before almost total depopulation. It was subsequently confirmed as an infected premises.

Species and number of each present

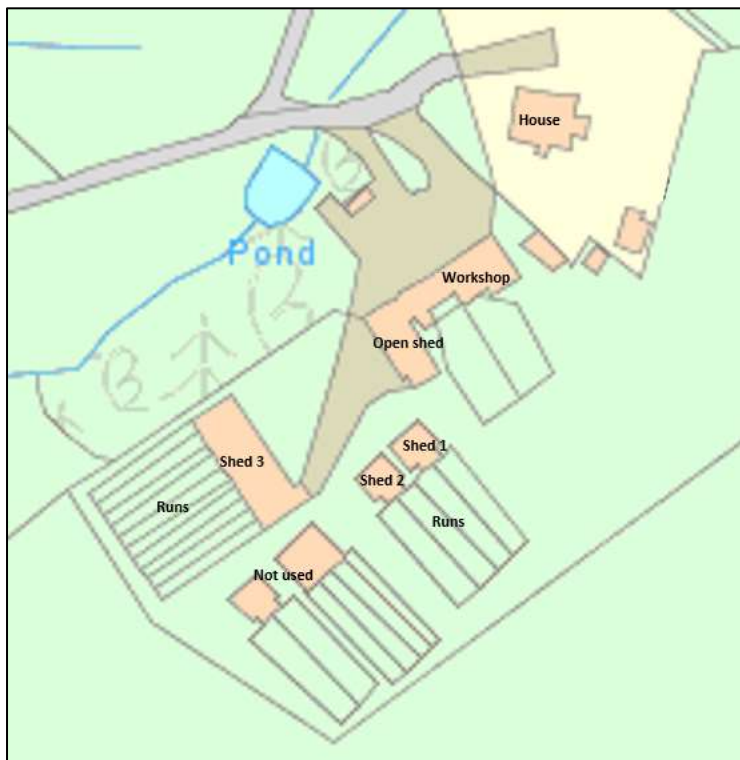
Four feral chickens and 16 caged pheasants remained after depopulation of 2,600 pheasants on 15/02 and 17/02/2022. Pheasants had been re-captured in January 2022 after release in August 2021.

Description of the housing

There were three sheds of wooden construction with corrugated tin roofs. Sheds 1 and 2 were each divided into two pens with compressed soil floors. Shed 3 was much larger than the other sheds, divided into 10 partitions, with a concrete floor and foam insulated roof. All pens in each shed had outdoor runs constructed with poultry meshed fences and overhead netting. Each pen stocked about 200 pheasants.

Plan of the infected premises

Figure 312: Plan of AIV 2022/24

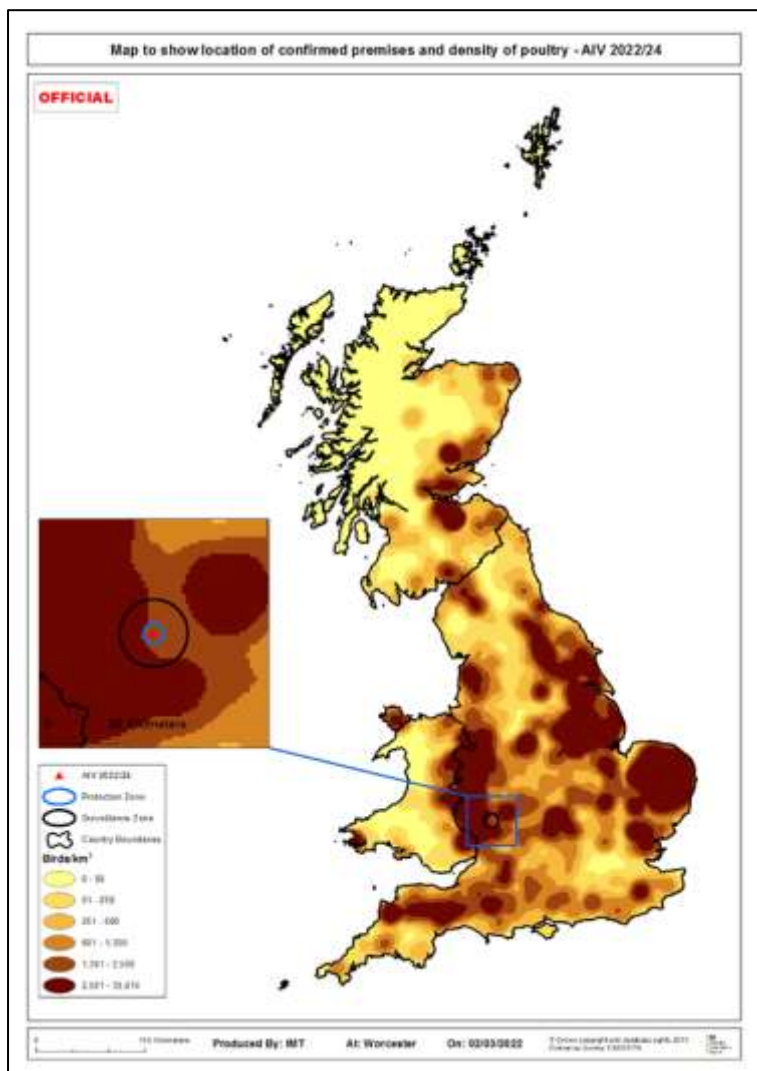


Overview of biosecurity

At the time of the investigation, no poultry were present in the main buildings and cleansing and disinfection of the empty buildings was underway. Netting and fencing would have reduced the likelihood but not prevented close contact with wild birds which were reported as being mostly pigeons and crows. Wild birds roosting on overhead netting could have defecated into pens. It was reported that there had not been a problem with vermin.

Map with location in Great Britain and poultry density

Figure 313: Location of IP and poultry density



Overview of the surrounding area

The infected premises was a small part of an estate that included tenant farmers, forestry, property letting and several Sites of Scientific Special Interest (SSSIs).

Ornithological assessment:

Desktop assessment: The estate in which the premises was located contained a mix of woodland, parkland pasture and rough grazing as well as a number of waterbodies, representing a large area of relatively natural vegetation and presumably limited disturbance. Ornithological assessment concluded that a large lake nearby was likely to maintain a moderate aggregation of resident wildfowl and would have been large enough to resist freezing at 80 m ASL. A string of ponds on the estate would permit wildfowl using them to mix intimately with pheasants if maintained at significant density. The surrounding estate was therefore considered a potential source of infection close to the infected premises.

Local intelligence: Pigeons and crows, both potential bridge species, were frequently seen on the infected premises.

Clinical picture

13/02/2022 – six pheasants died in shed 2.

14/02/2022 – a further 18 in the same shed died. The keeper attributed these to adverse weather conditions. No further deaths were recorded and planned movement of the birds to what became AIV 2022/21 proceeded on 15 and 17/02/2022.

The carcasses were later exhumed from onsite burial and from tissues of the two carcasses tested, Influenza A (M gene), N1 and highly pathogenic H5 Influenza A virus RNA was detected by PCR.

The remaining poultry (16 pheasants and four chickens) continued to show no signs until culled.

19/2/22 – clinical signs were first noticed at the destination premises which became AIV 2022/21.

Timeline

Tracings windows

Source tracings window:

High-risk:	09/02/2022 to 11/02/2022
Likely:	29/01/2022 to 08/02/2022
Precautionary:	01/01/2022 to 08/02/2022

Spread tracings window:

High-risk:	10/02/2022 to 22/02/2022
Likely:	30/01/2022 to 09/02/2022
Precautionary:	02/02/2022 to 09/02/2022

Most likely date of infection: 09/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 314: Source and spread timeline for AIV 2022/24

Source Tracing Window	Spread Tracing Window	Date	
Day 15		28/01/22	
Day 14		29/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	30/01/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	31/01/22	
Day 11	Day 3	01/02/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA - in this case source tracing visit).
Day 10	Day 4	02/02/22	Start of precautionary spread tracing window (source + 24h).
Day 9	Day 5	03/02/22	
Day 8	Day 6	04/02/22	
Day 7	Day 7	05/02/22	
Day 6	Day 8	06/02/22	
Day 5	Day 9	07/02/22	
Day 4	Day 10	08/02/22	
Day 3	Day 11	09/02/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	10/02/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	11/02/22	
	Day 14	12/02/22	Precautionary onset of clinical signs.
	Day 15	13/02/22	Shed 2: 6 deaths and others reluctant to move (attributed by keeper as a reaction to storms)
	Day 16	14/02/22	Shed 2: 18 deaths and no signs in rest of birds
	Day 17	15/02/22	700 cocks & 1300 hens moved to Newtown (AIV2022-21) - for breeding
	Day 18	16/02/22	
	Day 19	17/02/22	300 cocks and 300 hens moved to Newtown (AIV2022-21) - for breeding
	Day 20	18/02/22	
	Day 21	19/02/22	
	Day 22	20/02/22	
	Day 23	21/02/22	
	Day 24	22/02/22	Tracing source visit for AIV 2022-21 & 22. DPR 2022-53. Restrictions served. Proxy for notification.
	Day 25	23/02/22	
	Day 26	24/02/22	
	Day 27	25/02/22	HPAI H5N1 confirmed by CVO and given case reference AIV 2022-24 based on high likelihood that HPAI H5N1 infection had existed on the premises in the last 56 days.
	Day 28	26/02/22	
	Day 29	27/02/22	Carcases cremated. Preliminary C&D completed.
	Day 30	28/02/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

20 premises with poultry holding between 1-210 birds (1 premises with 50 or more birds)

SZ (3-10 km)

128 premises with poultry holding between 1-162,220 birds (16 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

A straw delivery, movement of feed within the estate, farm workers, and consignments of breeding pheasants off the premises including associated bird transport crates, vehicles and personnel were investigated.

Tracings were initiated for IP workers and the contractor who supplied equipment, personnel and transport for the two movements of pheasants to AIV 2022/21.

These tracings were investigated and assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct and indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Straw bedding was delivered from a local farm on 04/02/2022 and stored in an open sided barn where it could have become contaminated by infected wild birds. It was used only in shed 2 to counteract the effect of flooding adjacent to the house which had spilled into the building. The flood water and the straw bedding both represented risk pathways for entry of virus into the affected building.

The evidence base for the source hypothesis was the conclusions from an ornithological assessment, and lack of likely alternative risk pathways compared to the numerous opportunities for on-site contact (direct/indirect) with infected wild birds whilst pheasants were outside in runs, through flood water ingress, and via possible contaminated bedding.

Spread investigations: Assessment of potential and likelihood of spread

Spread to AIV 2022/21 and from there to AIV 2022/22 WAS caused by movement of infected pheasants from this premises was considered very high likelihood. This was supported by the timing of first clinical signs at destination premises, laboratory and clinical evidence of infection prior to the move, and ornithological assessment conclusion that the potential for infected wild bird contact was much lower at the destination premises compared to that at this premises.

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/25, Near Elmswell, Mid Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a mixed species backyard flock kept on the owner's residential property.

Species and number of each present

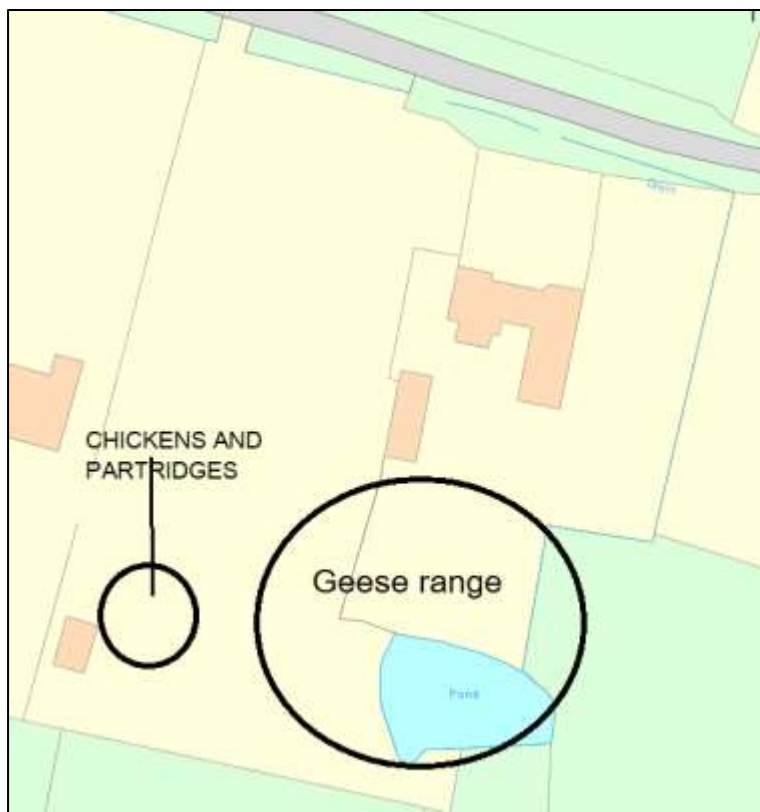
30 chickens, 10 partridges and 6 geese.

Description of the housing

The geese had free-range of the premises including access to a large pond. The chickens were kept in a wire mesh enclosure covered with netting rendering it wild bird proof. However, they were released to range freely for up to two hours a day. The partridges were kept in pairs in four pens and a polytunnel.

Plan of the infected premises

Figure 315: Plan of AIV 2022/25

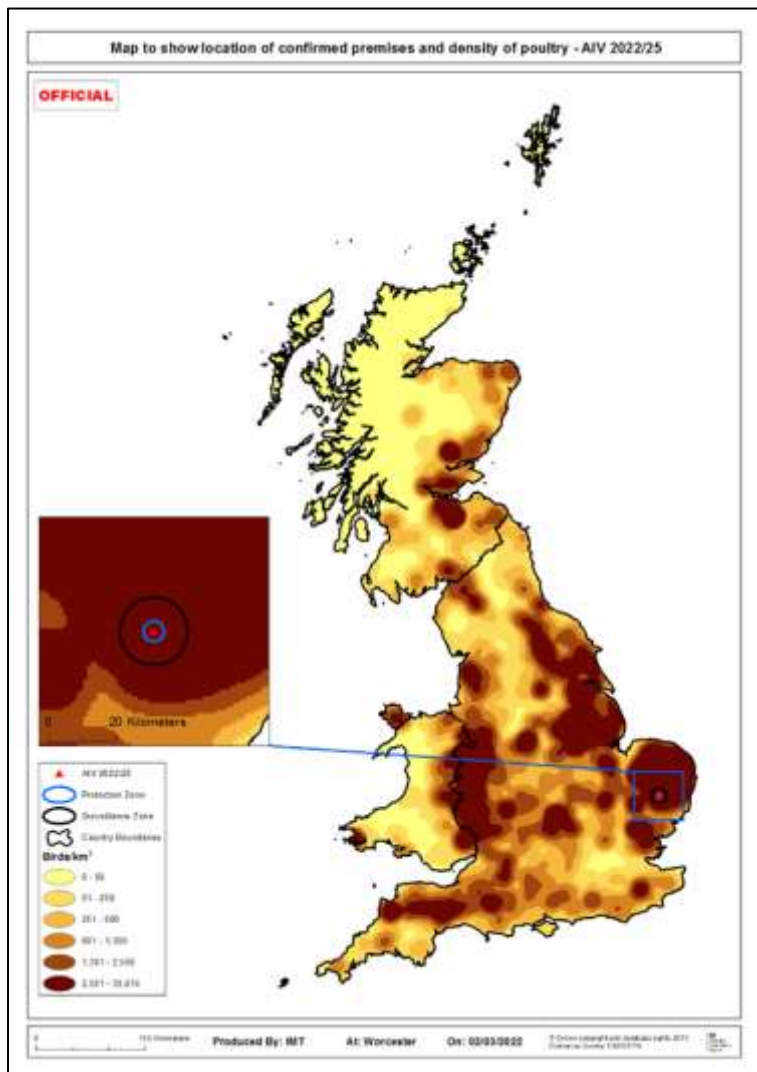


Overview of biosecurity

No biosecurity measures were followed. Some foot dips were present, but with non-Defra approved disinfectant and staff were not seen to use these. Footwear was not changed.

Map with location in Great Britain and poultry density

Figure 316: Location of IP and poultry density



Overview of the surrounding area

The premises was in an area of high poultry density area. There was a neighbour with three chickens a few metres away but there was no direct contact between the birds.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Wild birds (moorhens and wild ducks) were seen on the premises especially near the 2 ponds.

Clinical picture

21/02/2022 – One goose was seen to have a head tremor following being quiet and off its food for the previous week. There were no other signs suspicious of NAD.

22/02/2022 – The goose was euthanised by the private vet on welfare grounds. Egg peritonitis was suspected.

24/02/2022 – Two geese died overnight and one goose showed neurological signs and diarrhoea. Suspicion of avian notifiable disease was reported.

25/02/2022 – APHA investigation during which samples were taken.

26/02/2022 – H5N1 HPAI confirmed by the CVO. Chickens and partridges remained clinically unaffected

Timeline

Tracings windows

Source tracings window:

High-risk:	11/02/2022 to 13/02/2022
Likely:	31/01/2022 to 10/02/2022
Precautionary:	Within likely source window due to late notification of suspicion of disease.

Spread tracings window:

High-risk:	12/2/2022 to 24/02/2022
Likely:	01/02/2022 to 11/02/2022
Precautionary:	Within likely spread window due to late notification of suspicion of disease.

Most likely date of infection: 11/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 317: Source and spread timeline for AIV 2022/25

Source Tracing Window	Spread Tracing Window	Date	
Day 21		24/01/22	
Day 20		25/01/22	
Day 19		26/01/22	
Day 18		27/01/22	
Day 17		28/01/22	
Day 16		29/01/22	
Day 15		30/01/22	
Day 14		31/01/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	01/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	02/02/22	
Day 11	Day 3	03/02/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 10	Day 4	04/02/22	Start of precautionary spread tracing window (source + 24h).
Day 9	Day 5	05/02/22	
Day 8	Day 6	06/02/22	
Day 7	Day 7	07/02/22	
Day 6	Day 8	08/02/22	
Day 5	Day 9	09/02/22	
Day 4	Day 10	10/02/22	
Day 3	Day 11	11/02/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	12/02/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	13/02/22	
	Day 14	14/02/22	Precautionary onset of clinical signs.
	Day 15	15/02/22	
	Day 16	16/02/22	
	Day 17	17/02/22	
	Day 18	18/02/22	
	Day 19	19/02/22	
	Day 20	20/02/22	
	Day 21	21/02/22	Owner reported to APHA one goose been ill for a week with reduced appetite.
	Day 22	22/02/22	Goose euthanased by PVS
	Day 23	23/02/22	
	Day 24	24/02/22	Notification of suspicion of disease to APHA. 2 more geese died & one unwell. (DPR 2022/051). Restriction served.
	Day 25	25/02/22	APHA investigation and sampling.
	Day 26	26/02/22	CVO confirmed H5N1 HPAI .
	Day 27	27/02/22	Culling completed (31 chickens, 10 partridges and one goose - one already died)
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these		

Surveillance activity

PZ (0-3 km)

73 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-50,000 birds.

0 premises holding both pigs and poultry.

22 premises holding both pigs and poultry.

SZ (3-10 km)

347 premises with poultry were reported to be within 10 km of the IP holding between 1-367,500 birds.

Investigations on the infected premises

Overview of tracing activities

Two tracings were generated for this case. One was a telephone tracing for a pest controller who visited in the high-risk window. The second was to the private vet who euthanised a sick bird at the practice. As the vet also kept chickens, these were visited as a tracing. Both lines of enquiry were assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There was a large pond with wild ducks and moorhens in the geese enclosure in which they were freely ranging. The chickens were allowed to range for 2 hours a day and wild birds had been seen in the partridge enclosures. There was evidence of high rodent activity and no biosecurity measures were taken.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

Spread tracing investigations (pest control visit and movement of carcasses to the private veterinary surgeon) were assessed as low likelihood of spread and closed with no further action other than the visit to birds belonging to the vet.

Remaining uncertainty

No remaining uncertainty

AIV 2022/26, Near Redgrave, Mid Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a commercial duck-fattening unit and part of a large integrated poultry company. It received day-old ducklings and reared them for five to six weeks until slaughter. The affected flock was placed on farm in late January 2022 and an all-in all-out flock placement system was operated. The premises was contiguous to the company's main slaughterhouse.

Species and number of each present

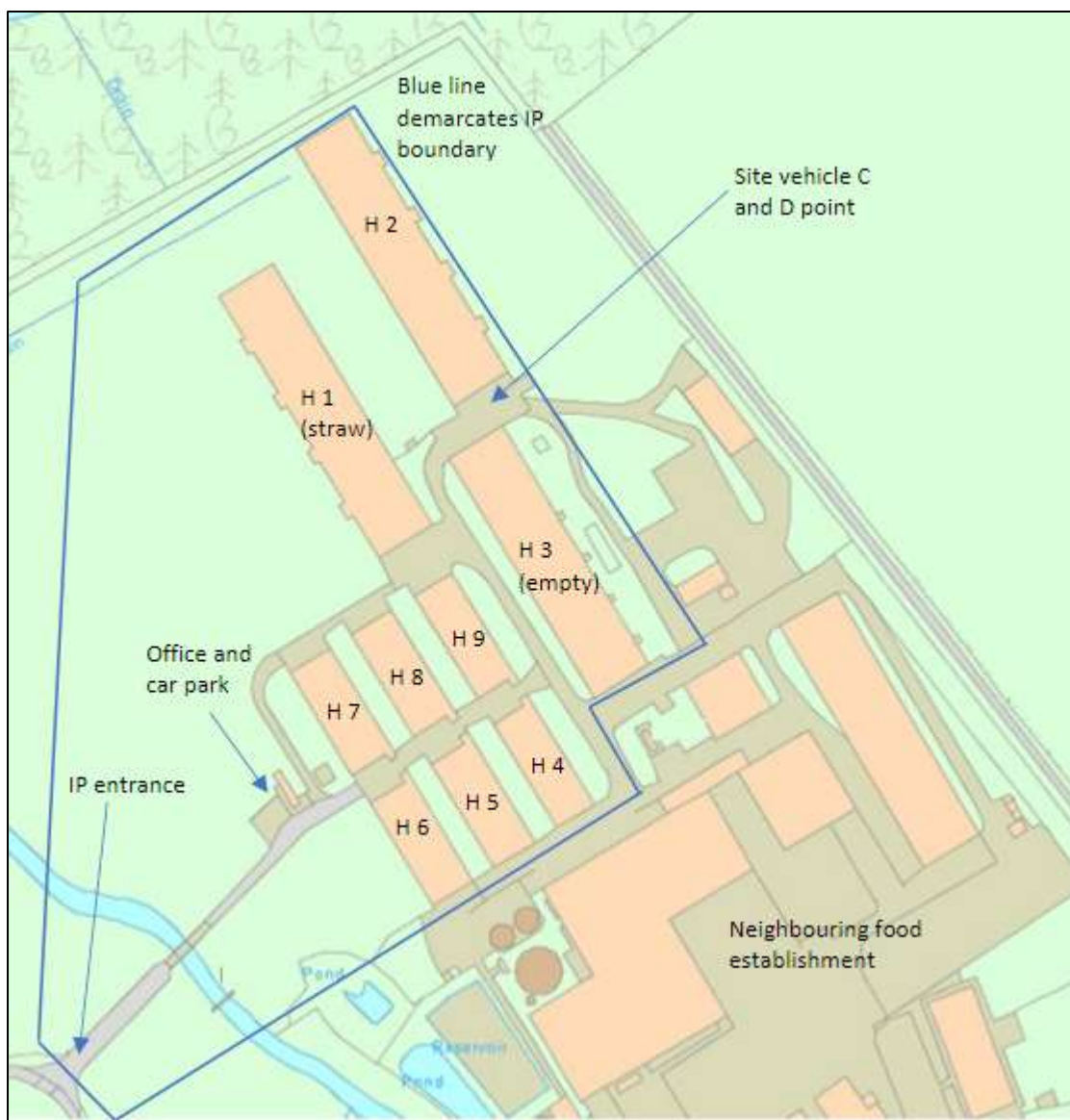
There were approximately 39,000 ducks at the time of investigation spread across seven houses.

Description of the housing

There were nine sheds on site, but only seven contained ducks at the time of the outbreak. Houses 4 – 9 had a double-door/airlock access route and were all of the same construction, concrete dwarf wall with solid plywood and corrugated steel walls. All were artificially ventilated with inlets on the roof and outlets on the sides. House 2 had a concrete wall of approximately 1 m and then space-boarding to the roof. The inside of the space-boarding was covered in mesh, but a large hole approximately 3 metres by 1 metre was apparent in the boarding at the APHA investigation due to recent storm damage. House 2 was naturally ventilated with air coming in through the sides and out unnetted roof vents.

Plan of the infected premises

Figure 318: Plan of AIV 2022/26



Overview of biosecurity

Cars were parked at the office and staff and visitors had to change into site-specific fabric reusable overalls and wellington boots. The gate was closed at the end of the entranceway. However, separation from the contiguous slaughterhouse was variable and comprised mainly of temporary Heras fencing. There was therefore the risk of staff and equipment moving freely between sites.

Foot-dips were present by the exterior door of all houses. Houses 4-9 had a lobby with a physical wooden hygiene barrier that separated the dirty lobby from the clean bird area. There were house-specific wellingtons, disposable overalls and hand sanitiser. House 2 had no lobby and the house's dedicated footwear was stored in an adjacent shed. The exterior door effectively opened directly into the bird area.

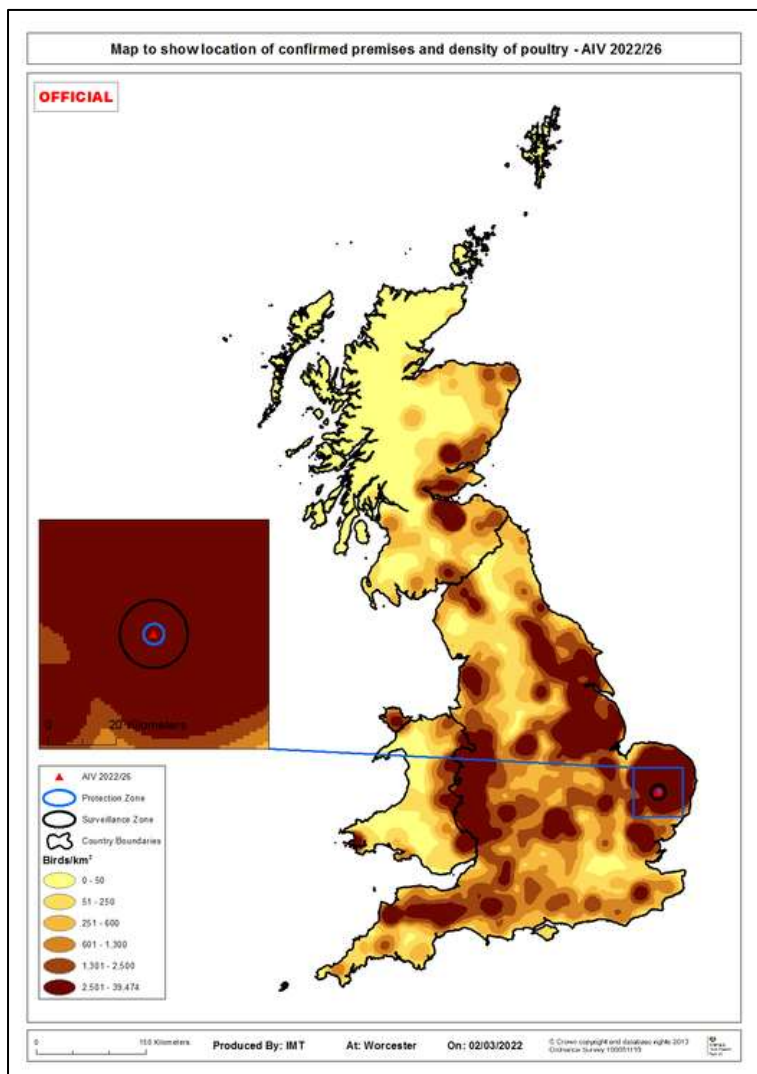
On-site vehicles were cleaned and disinfected outside the door to house 2 and then stored in house 3.

ABP was stored in locked steel bins that were in good condition and not in close proximity to the houses but the ABP collection lorry had to enter the main site to empty them.

Straw bedding was unwrapped and stored in house 1, which was the same construction as house 2, namely space boarding. Two feral cats were observed in here at the APHA investigation and wild bird access was possible. Bedding in house 2 was placed by driving a tractor and straw chopper through the bird area. Bedding in houses 4-9 was spread by hand.

Map with location in Great Britain and poultry density

Figure 319: Location of IP and poultry density



Overview of the surrounding area

There was one unpopulated poultry farm approximately 100 m from the border of the IP, which reflected the high density of poultry in the area. To the north and east was woodland and arable land. A large lagoon was located approximately 1 km from the IP to the northwest.

Ornithological assessment:

Desktop assessment: The rural and lowland IP was set within a mixed agricultural landscape typical of inland settings, close to the headwaters of the Little Ouse and Waveney rivers. The river valley landscape and close-by water bodies seemed favourable to waterbirds. Wildfowl would have been common although numbers were uncertain. Wildfowl were considered unlikely to approach this IP given its proximity to built-up areas. Bridge species were however, likely to have been common and presented a more plausible route of infection than from wildfowl. Wild passerines, Woodpigeon and Starlings may have contributed to infection pressure due to the likelihood of wild bird ingress into the buildings.

Local intelligence: Wild birds (mainly crows and pheasants) had been seen on the IP by members of staff. Wild geese were flying over the farm at the time of the epidemiological investigation.

Clinical picture

26/02/2022 – ducks in house 2 showed neurological signs including twisted necks and circling.

27/02/2022 – six dead birds and 44 clinically affected were culled in house 2.

28/02/2022 – the clinical picture worsened with 19 birds dying and 223 culled. They also had green diarrhoea. Post-mortem examination by the private veterinarian, revealed enlarged and congested spleen and liver.

03/03/2022 – disease had spread across the unit with 1.5% affected in house 4, 9.5% in house 5, 19% in house 6, 22% in house 7, 24% in house 9 and 58% in house 2. It is worth noting that house 2 (where disease initially started) had a large hole in the wall and no biosecurity lobby.

Timeline

Tracings windows

Source tracings window:

High-risk:	23/02/2022 to 25/02/2022
Likely:	12/02/2022 to 22/02/2022
Precautionary:	07/02/2022 to 11/02/2022

Spread tracings window:

High-risk:	24/02/2022 to 28/02/2022
Likely:	12/02/2022 to 23/02/2022
Precautionary:	08/02/2022 to 12/02/2022

Most likely date of infection: 23/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 320: Source and spread timeline for AIV 2022/26

Source Tracing Window	Spread Tracing Window	Date	
Day 19		07/02/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		08/02/22	Start of precautionary spread tracing window (source + 24h).
Day 17		09/02/22	
Day 16		10/02/22	
Day 15		11/02/22	
Day 14		12/02/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	13/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	14/02/22	
Day 11	Day 3	15/02/22	
Day 10	Day 4	16/02/22	
Day 9	Day 5	17/02/22	
Day 8	Day 6	18/02/22	
Day 7	Day 7	19/02/22	
Day 6	Day 8	20/02/22	
Day 5	Day 9	21/02/22	
Day 4	Day 10	22/02/22	
Day 3	Day 11	23/02/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	24/02/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	25/02/22	
	Day 14	26/02/22	Precautionary onset of clinical signs.
	Day 15	27/02/22	
	Day 16	28/02/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/054). Restrictions served.
	Day 17	01/03/22	Avian Influenza H5N1 confirmed by CVO with case reference AIV2022-26.
	Day 18	02/03/22	
	Day 19	03/03/22	Culling started
	Day 20	04/03/22	
	Day 21	05/03/22	
	Day 22	06/03/22	Culling completed
	Day 23	07/03/22	Preliminary C & D applied
	Day 24	08/03/22	Preliminary C & D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

91 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-175,000 birds.

0 premises holding both pigs and poultry.

31 premises holding both pigs and poultry.

SZ (3-10 km)

287 premises with poultry were reported to be within 10 km of the IP holding between 1-265,000 birds.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were generated for the private vet who reported this case, feed deliveries, muck moving off to another farm and the movements of catching gangs

and lorries transporting ducks to slaughter. These enquiries resulted in tracing visits to two premises visited immediately prior to this IP by the catching gangs and another visit to the farm receiving the muck.

Source investigations:

Hypothesis for the source

The most likely source identified was direct/indirect wild birds

Assessment and evidence base for the likely source

House 2 was where virus first entered the premises and where biosecurity was poorest. There were multiple opportunities for wild birds to enter directly. There was also opportunity for indirect contact via the bedding-up process and poor wellington-boot biosecurity.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty

AIV 2022/27, Near Collieston, Aberdeenshire, Scotland

Description of the premises

Overview of the premises and the wider business

This was a non-commercial flock on the owner's property. The poultry were kept as pets and eggs were used for personal consumption.

Species and number of each present

10 chickens, three ducks.

Description of the housing

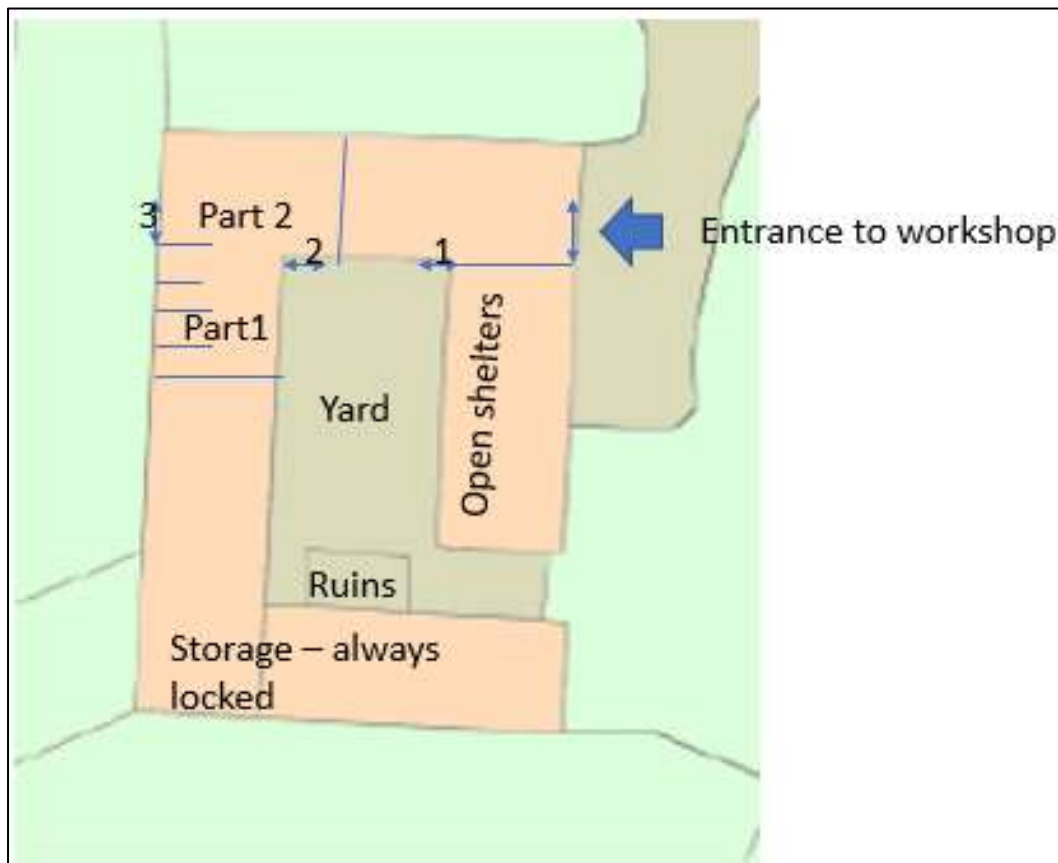
The poultry shed was inside an old building made of stone walls with a wooden roof with small glass windows. The poultry area was divided into 2 parts. One with smaller wood and mesh compartments and one holding a plastic feeder and drinker.

The entrance to the poultry accommodation was through a workshop where the feed was also stored. The door of this was open during the day with a wild bird feeder encouraging wild birds into the building.

The birds had access to the uncovered yard during the day.

Plan of the infected premises

Figure 321: Plan of AIV 2022/27



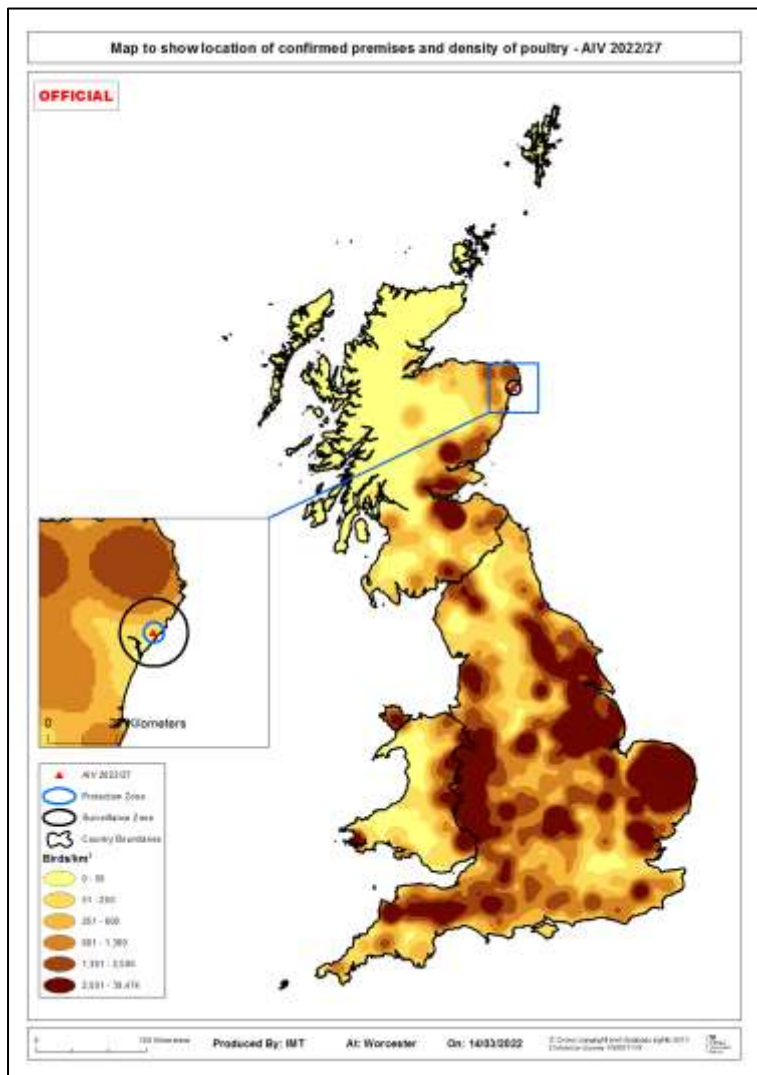
Overview of biosecurity

The biosecurity was very poor. There were no disinfection procedures points for staff or vehicles and no records were kept. The poultry shed had not been cleaned during the past year.

Wild birds entered the workshop and the yard which the chickens and ducks had access to during the day. Birds were also fed vegetable kitchen waste.

Map with location in Great Britain and poultry density

Figure 322: Location of IP and poultry density



Overview of the surrounding area

The IP was surrounded by farmland, with no known poultry or captive birds in immediately neighbouring premises.

The IP was approximately 5 miles west of AIV 2022/11 (confirmed on 22/01/2022) however there were no epidemiological links identified between the two.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Many kinds of wild birds (geese, ducks, seagulls, wild pigeons) were seen in this area during the inspection. The bird feeder attracted wild birds and pigeons and seagulls were seen regularly by the owner. Wild birds had open access to yard where poultry had daily access.

The IP was approximately 1 km from the coastline and 3 km from a National Nature Reserve home to a rich variety of wildlife and particularly renowned for its birds.

Clinical picture

02/03/2022 – Clinical signs of lethargy were seen in one chicken.

03/03/2022 – The sick chicken died overnight.

04/03/2022 to 07/03/2022 – The rest of the chickens became depressed and apathic. Some had redness and swelling around the eyes and torticollis. No respiratory signs or diarrhoea were seen. All the chickens had died by 07/03/2022. The three ducks were not affected.

08/03/2022 – The owner reported suspicion of Avian notifiable disease.

09/03/2022 – APHA investigation and samples were taken.

11/03/2022 – H5N1 HPAI was confirmed by the CVO.

Timeline

Tracings windows

Source tracings window:

High-risk:	27/02/2022 to 01/03/2022
Likely:	16/02/2022 to 26/02/2022
Precautionary:	15/02/2022 to 15/02/2022

Spread tracings window:

High-risk:	28/02/2022 to 08/03/2022
Likely:	17/02/2022 to 27/02/2022
Precautionary:	16/02/2022 to 16/02/2022

Most likely date of infection: 27/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 323: Source and spread timeline for AIV 2022/27

Source Tracing Window	Spread Tracing Window	Date	
Day 16		14/02/22	
Day 15		15/02/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 14		16/02/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs). Start of precautionary spread tracing window (source + 24h).
Day 13	Day 1	17/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	18/02/22	
Day 11	Day 3	19/02/22	
Day 10	Day 4	20/02/22	
Day 9	Day 5	21/02/22	
Day 8	Day 6	22/02/22	
Day 7	Day 7	23/02/22	
Day 6	Day 8	24/02/22	
Day 5	Day 9	25/02/22	
Day 4	Day 10	26/02/22	
Day 3	Day 11	27/02/22	Most likely infection date for this outbreak. Start of high risk source tracing window (-3d).
Day 2	Day 12	28/02/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	01/03/22	
	Day 14	02/03/22	Precautionary onset of clinical signs. Farmer noticed one hen looking unwell
	Day 15	03/03/22	First hen found dead
	Day 16	04/03/22	
	Day 17	05/03/22	
	Day 18	06/03/22	
	Day 19	07/03/22	
	Day 20	08/03/22	Suspicion of disease reported to APHA, Restrictions served
	Day 21	09/03/22	APHA veterinary investigation
	Day 22	10/03/22	
	Day 23	11/03/22	HPAI H5N1 confirmed by CVO. Culling completed and preliminary C&D completed
	Day 24	12/03/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

13 premises with poultry holding between 2-85 birds (2 premises with 50 or more birds).

SZ (3-10 km)

12 premises with poultry holding between 2-99 birds (2 premises with 50 or more birds).

Investigations on the infected premises

Overview of tracing activities

No tracings identified for this IP.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

There were no biosecurity measures in place and wild birds entered the workshop and the yard which the chickens and ducks had access to during the day. There was no vermin control and there had been several positive wild bird cases of disease nearby.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/28, Near Redgrave, Mid Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a commercial fattening duck unit and part of a company of three duck premises. The farm was a contractor to a large integrated poultry production company. Ducks were placed as day-old-ducklings and fattened until ready for slaughter (about 35 days). Species and number of each present

Approximately 40,000 meat ducks across four houses.

Description of the housing

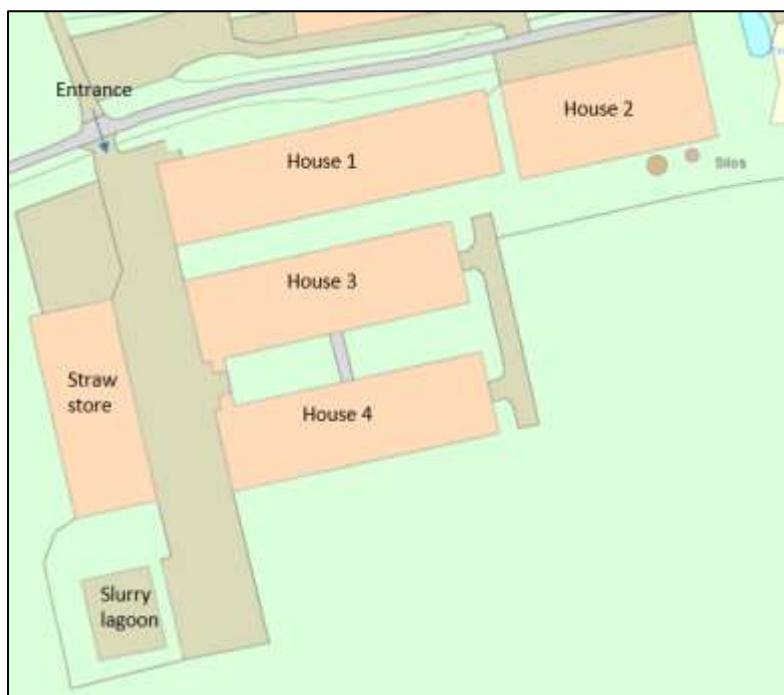
Houses 1, 3, and 4 were between five and twelve years old and made of corrugated iron with plastic side panels on a steel frame with one metre high concrete side walls. They had a roller door at each end.

House 2 was much older and comprised a metal frame with corrugated iron to approximately 2.5 m then space boarding to the roof (at least another 2.5 m).

House 1 had forced ventilation, with gable end fans. House 2 relied on natural ventilation via the space boarding. Houses 3 and 4 had open vents where the concrete wall met the corrugated iron. The ventilation openings were not covered and neither were the openings at the apex of the roof.

Plan of the infected premises

Figure 324: Plan of AIV 2022/28



Overview of biosecurity

There was no effective biosecure outer-shell to the IP. The entrance from the road was open with and no vehicle C and D point. There was no clear demarcation of a boundary fence or wall.

Wild birds had easy access to Houses 2-4, indeed a pigeon was spotted in House 3 during the APHA investigation. In addition to the unmeshed vents, roller doors were left open for extra ventilation, both allowing wild bird ingress.

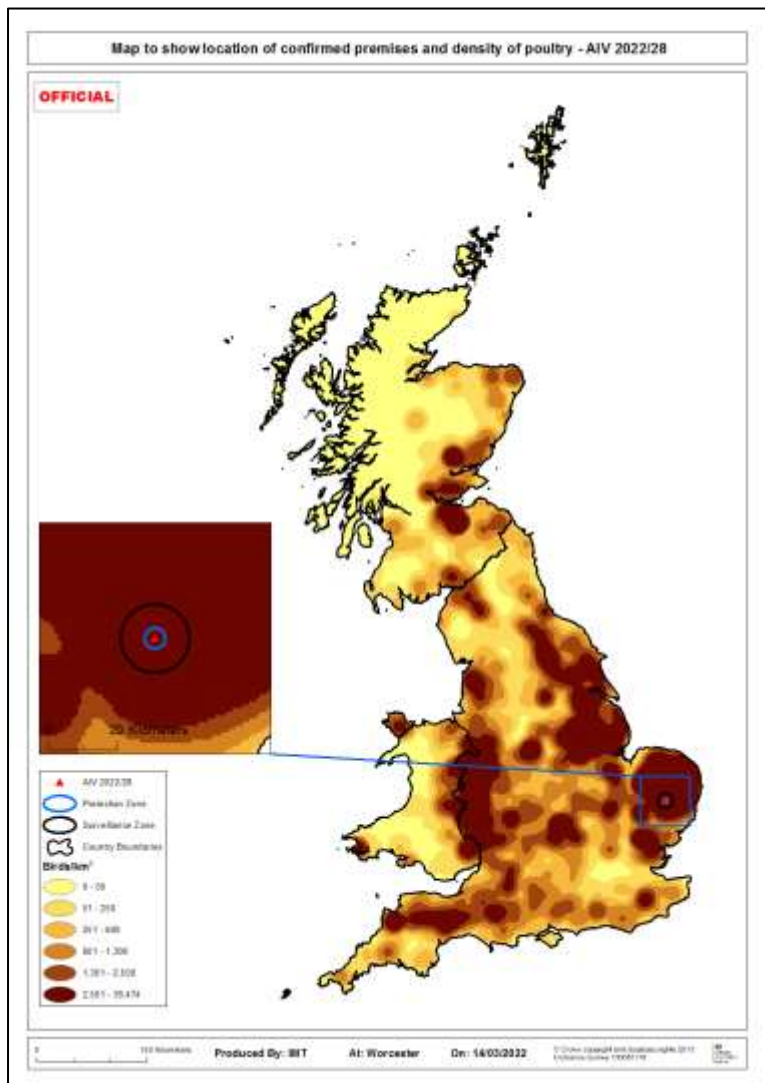
Ducks were brooded in Houses 1 and 3 until day 20 (20th Feb 2022) and half were then walked across the yard to houses 2 and 4. While this was unlikely to have been the source of infection it was an indication of poor biosecurity.

Like other duck premises investigated, the bedding up process presented a risk. A tractor and straw-chopper were driven through each shed and the yard between sheds with no C and D. The straw was stored unwrapped in an open-sided barn.

Houses 1, 3 and 4 had a double-door airlock access route through a lobby and foot dips were present at the external entrances of each house as well as in the lobby. House 2 had no such system.

Map with location in Great Britain and poultry density

Figure 325: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density. There were two poultry units within 500 m and the IP was within three surveillance zones of other IPs (2022/25, 26 and 29).

There was a small pond at the end of House 2 and another pond across the road towards a woodland area.

Ornithological assessment

Desktop assessment: The rural and lowland IP was set within a mixed agricultural landscape typical of inland settings, close to the headwaters of the Little Ouse and Waveney rivers. The river valley landscape and close-by water bodies seemed favourable to waterbirds. Wildfowl would have been common although numbers were uncertain. Wildfowl were considered unlikely to approach this IP given its proximity to built-up areas. Bridge species were likely to have been common and

presented a more plausible route of infection IP than from wildfowl. Wild passerines, Woodpigeon and Starlings may have contributed to infection pressure due to the likelihood of wild bird ingress into the buildings.

Local intelligence: Pigeons were abundant.

Clinical picture

07/03/2022 – depopulation to slaughter was planned so the private veterinary surgeon took samples for surveillance purposes from house 1 and house 2. They sampled House 3 on 08/03/2022 and House 4 on 09/03/2022. Non-negative results were received for House 3 so suspicion of notifiable avian disease was reported. No clinical signs were noted at sampling or during the APHA investigation on 10/03/2022.

11/03/2022 – mortality was reported to be increasing in House 4 (12 dead ducks), four dead ducks in House 3 and water consumption had decreased in both houses.

12/03/2022 – 20% of birds in House 4 were presenting with nervous signs, with a reported mortality of 98 ducks. In house 3, 3% were presenting nervous signs with a mortality of 14 ducks. Analysis of the production data 21 days prior to disease confirmation showed no increase in mortality. Samples taken at the APHA investigation were PCR positive for HPAI, and no seroconversion was detected.

Timeline

Tracings windows

Source tracings window:

High-risk:	07/03/2022 to 07/03/2022*
Likely:	24/02/2022 to 06/03/2022
Precautionary:	17/02/2022 to 23/02/2022

*See timeline for explanation

Spread tracings window:

High-risk:	08/03/2022 to 10/03/2022
Likely:	25/02/2022 to 07/03/2022
Precautionary:	18/02/2022 to 24/02/2022

Most likely date of infection: 07/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 326: Source and spread timeline for AIV 2022/28

Source Tracing Window	Spread Tracing Window	Date	
Day 19		17/02/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		18/02/22	Start of precautionary spread tracing window (source + 24h).
Day 17		19/02/22	
Day 16		20/02/22	
Day 15		21/02/22	
Day 14		22/02/22	
Day 13		23/02/22	
Day 12		24/02/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 11	Day 1	25/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 10	Day 2	26/02/22	
Day 9	Day 3	27/02/22	
Day 8	Day 4	28/02/22	
Day 7	Day 5	01/03/22	
Day 6	Day 6	02/03/22	
Day 5	Day 7	03/03/22	
Day 4	Day 8	04/03/22	
Day 3	Day 9	05/03/22	
Day 2	Day 10	06/03/22	
Day 1	Day 11	07/03/22	Most likely infection date for this outbreak. Beginning and end high-risk source window, based on consultation with Disease Consultant who is confident that disease infected birds on this date.
	Day 12	08/03/22	Swabs taken by PVS in House 3 Start of high-risk spread window
	Day 13	09/03/22	Swabs taken by PVS in House 4
	Day 14	10/03/22	Notification of non-negative sample. APHA investigation and sampling (DPR 2022/062). Restrictions served.
	Day 15	11/03/22	Clinical signs observed
	Day 16	12/03/22	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2022-28.
	Day 17	13/03/22	Culling commenced
	Day 18	14/03/22	Culling completed. Preliminary C & D applied.
	Day 19	15/03/22	Preliminary C & D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

52 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-115,046 birds.

0 premises holding both pigs and poultry.

25 premises holding both pigs and poultry.

SZ (3-10 km)

426 premises with poultry were reported to be within 10 km of the IP holding between 1-347,958 birds.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings from this IP included feed deliveries from two different suppliers, two different catching gangs and the associated lorries taking ducks to slaughter, two workers who also worked at two other poultry farms, ABP collections and the private

vet who visited the IP and went on to visit another bird premises. Three tracing visits were generated by the movements of the private vet and two workers. All tracings were assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect or direct contact with wild birds.

Assessment and evidence base for the likely source

Although the unit had some biosecurity (foot dips), the bedding-up process and ventilation presented a number of possible pathways. The potential for spread from other farms was investigated and no credible pathway found.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/29, Near Market Weston, West Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a small commercial duck, chicken and seasonal goose fattening unit. The keeper was the only person who looked after the birds and purchased birds as day-old chicks from hatcheries or as young chicks from markets. Some small-scale slaughtering took place on the premises for supply to local butchers.

Species and number of each present

There were approximately 700 meat ducks and 50-60 Ross-type broilers. There were also three pet layer chickens of approximately 4 years of age.

Description of the housing

The keeper lived in a house on the premises. There were two driveways to the premises; one was for farm vehicles and the other for private vehicles. There was a public footpath located on the north-western and northern boundaries.

The housing was a series of converted barns. Ventilation was natural with various holes in walls and un-meshed windows to allow air flow. There had been no apparent cleaning and disinfecting of the sheds for some time. Some of the ducks had been moved between sheds before signs of disease were seen. The bird areas also contained old equipment.

Plan of the infected premises

Figure 327: Plan of AIV 2022/29



Overview of biosecurity

Biosecurity overall was poor. The boundaries of the property consisted of a mixture of hedges and fencing with no biosecure outer shell. There was a knapsack sprayer for disinfection of vehicles entering via the farm track.

Within the site, biosecurity was poor. Foot dips were present but uncovered and there was uncertainty about whether the dilution rate was adequate. There was no change of footwear or overalls between houses.

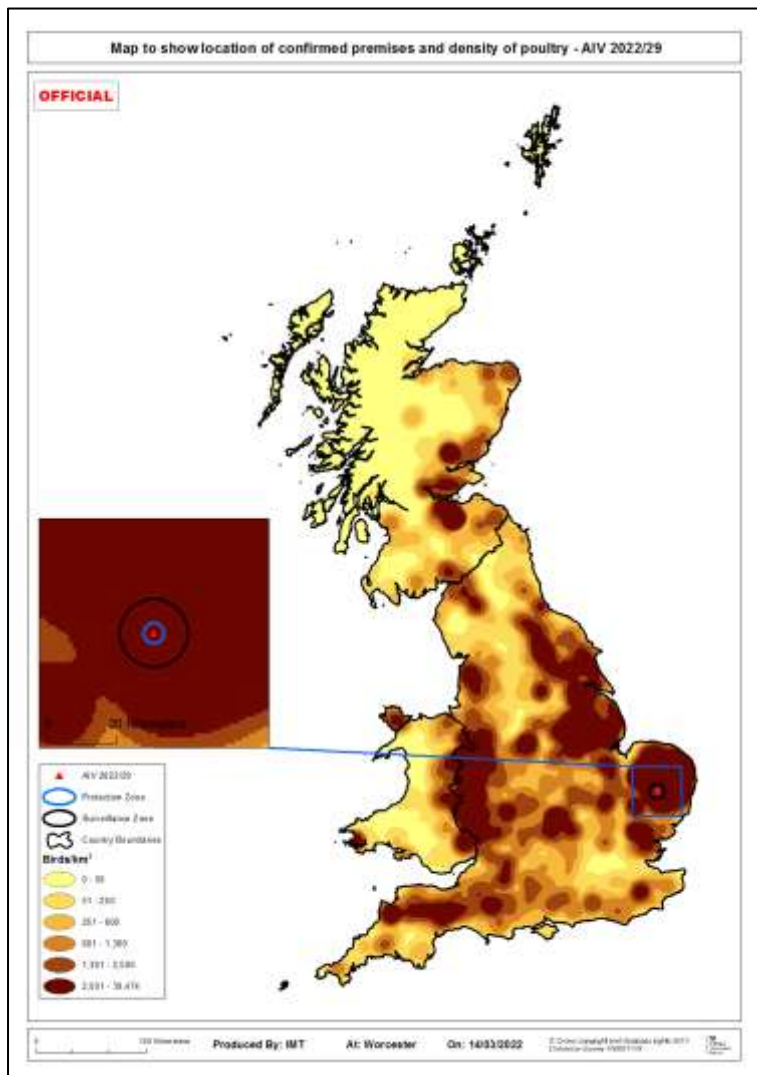
There was more animal by-product (ABP) on the IP than would be expected due to the on-farm slaughtering. The storage of this was deemed less than optimal.

Straw was locally sourced and stored unwrapped in an open-sided barn.

Feed was securely contained within a silo that was birdproof; feed was bagged direct from the silo and moved to the birds. Feed and water troughs were not covered and easily accessible by wild birds.

Map with location in Great Britain and poultry density

Figure 328: Location of IP and poultry density



Overview of the surrounding area

The premises was in a high-density poultry-keeping area in Suffolk, and within the surveillance zones of AIV 2022/26, AIV 2022/25 and AI 2022/28. There were no ponds or rivers on the property but there was a dry dike.

Ornithological assessment:

Desktop assessment: The rural and lowland IP was set within a mixed agricultural landscape typical of inland settings, close to the headwaters of the Little Ouse and Waveney rivers. The river valley landscape and close-by water bodies seemed favourable to waterbirds. Wildfowl would have been common although numbers were uncertain. Wildfowl were considered unlikely to have approached the premises given its proximity to built-up areas. Bridge species were likely to have been common and presented a more plausible route of infection than from wildfowl. Wild

passerines, Woodpigeon and Starlings may have contributed to infection pressure due to the likelihood of wild bird ingress into the buildings.

Local intelligence: Recent harvesting of contiguous fields led to an increased sightings of wild birds on the IP, mainly pigeons and geese. Anecdotally, the population of gulls had increased in the area recently.

Clinical picture

The keeper kept no records, so a definitive clinical picture was difficult to construct.

08/03/2022 – the keeper noted the 3-week-old ducks showing lethargy and food & water consumption was reduced. There had also been a few mortalities but the keeper thought that a predator had been responsible.

10/03/2022 – a higher than expected mortality (10%) was seen, particularly in the three-week-old ducks. Birds aged five weeks appeared lethargic and had neurological signs with some reduction in food and water intake. Birds aged seven weeks showed no signs and were eating and drinking normally.

11/3/2022 – mortality was again 10% in three-week-old and disease was spreading to the five-week-old ducks. The chickens displayed no clinical signs.

11/03/2022 – at the APHA investigation, 80-90% of the three-week-old ducks appeared lethargic with tremors and seizure-like activity, torticollis, ataxia, conjunctivitis, circling, green diarrhoea, dyspnoea and low body temperature (36.1 °C).

Based on seroconversion detected in the ducks at sampling on 11/03/2022, viral incursion was suspected to have been 10-14 days prior to sampling.

Timeline

Tracings windows

Source tracings window:

High-risk:	25/02/2022 to 01/03/2022
Likely:	22/02/2022 to 24/02/2022
Precautionary:	17/02/2022 to 21/02/2022

Spread tracings window:

High-risk:	26/02/2022 to 10/03/2022
Likely:	23/02/2022 to 25/02/2022
Precautionary:	18/02/2022 to 22/02/2022

Most likely date of infection: 25/02/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 329: Source and spread timeline for AIV 2022/29

Source Tracing Window	Spread Tracing Window	Date	
Day 13		17/02/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 12		18/02/22	Start of precautionary spread tracing window (source + 24h).
Day 11		19/02/22	
Day 10		20/02/22	
Day 9		21/02/22	
Day 8		22/02/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 7	Day 1	23/02/22	Start of likely spread tracing window (source tracing window +24h).
Day 6	Day 2	24/02/22	
Day 5	Day 3	25/02/22	Most likely infection date for this outbreak* . Beginning high-risk source window
Day 4	Day 4	26/02/22	Start of high-risk spread window
Day 3	Day 5	27/02/22	
Day 2	Day 6	28/02/22	
Day 1	Day 7	01/03/22	End of high-risk source window. Based on serology results, infection most likely to be 10-14 days prior to APHA sampling. This is day 10
	Day 8	02/03/22	
	Day 9	03/03/22	
	Day 10	04/03/22	
	Day 11	05/03/22	
	Day 12	06/03/22	
	Day 13	07/03/22	
	Day 14	08/03/22	First clinical signs recorded by owner
	Day 15	09/03/22	
	Day 16	10/03/22	Notification of suspicion of disease to APHA. Restrictions served.
	Day 17	11/03/22	
	Day 18	12/03/22	Avian Influenza H5N1 confirmed based on PCR and serology results with case reference AIV2022-29.
	Day 19	13/03/22	
	Day 20	14/03/22	Culling commenced and completed
	Day 21	15/03/22	Preliminary C & D applied
	Day 22	16/03/22	Preliminary C & D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

* The premises had two epidemiological groups:

A: Three and five-week-old ducks of which most were PCR positive. Six of 20 showed an antibody titre consistent with infection 7-8 days from date of sampling.

B: Seven-week old ducks 6/20 PCR positive and 17/20 showed a high antibody titre consistent with recovery. This high titre meant that the most likely infection date in this group was 10-14 days prior to sampling. As a result, 25th February is the beginning of the high-risk source window.

Surveillance activity

PZ (0-3 km)

86 premises with poultry were reported to be within 3 km of the IP holding between 1-175,000 birds.

0 premises holding both pigs and poultry.

SZ (3-10 km)

268 premises with poultry are reported to be within 10 km of the IP holding between 1-265,000 birds

29 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

The only tracings identified in the high-risk tracing windows for this premises was the movement of poultry meat from the premises to several retail outlets (butcher's shops). The relevant authority was notified of these movements, no further actions were required, and the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The housing on this IP was in poor condition and would have been attractive to wild birds for nesting and feed. There were few mitigations to this risk. Wild birds were abundant in the local area and in the absence of any other credible pathway, this presented the most likely hypothesis.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: risk not higher than the background risk.

All other potential spread pathways were assessed as low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/30, Near Beith, North Ayrshire, Scotland

Description of the premises

Overview of the premises and the wider business

This was a charity wildlife rescue centre run by volunteers. There were about 150 animals on site. Injured and sick animals were collected by volunteers (or dropped off at the centre by the public). The animals were treated as necessary and then released back to the wild.

Species and number of each present

82 mixed species of birds (including feral pigeons, wood pigeons, moorhens, swans, owls, and buzzards).

The rest were mammals including badgers, otters, fox, seals and small mammals (mainly hedgehogs).

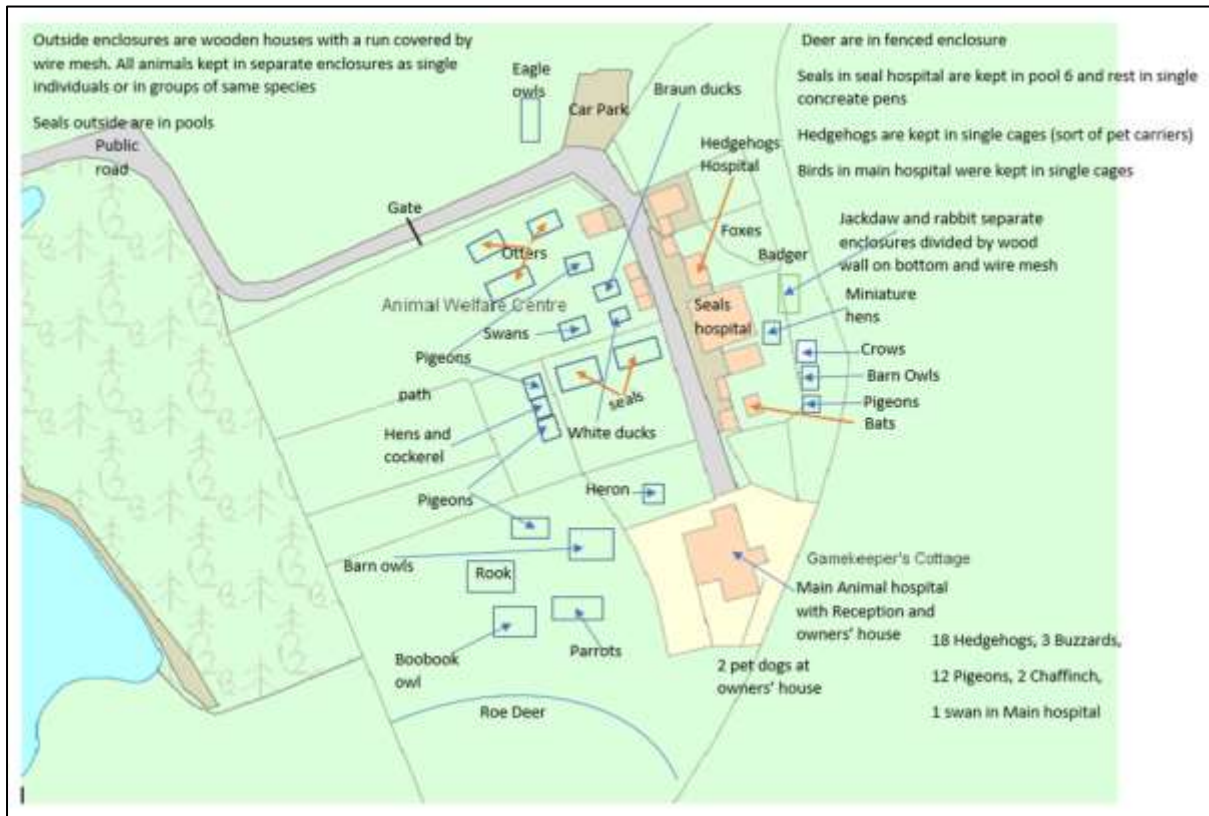
Description of the housing

There were three hospital units. The main hospital had a reception area where birds of different species were kept together with hedgehogs. Each bird was in an individual cage but all shared the same air space. There was a separate hedgehog hospital and a 'swan' hospital which was occupied entirely by seals.

There were many small enclosures outside with small wooden houses and runs for different species. Enclosures were in wooded area. Swans and seals had access to small pools.

Plan of the infected premises

Figure 330: Plan of AIV 2022/30

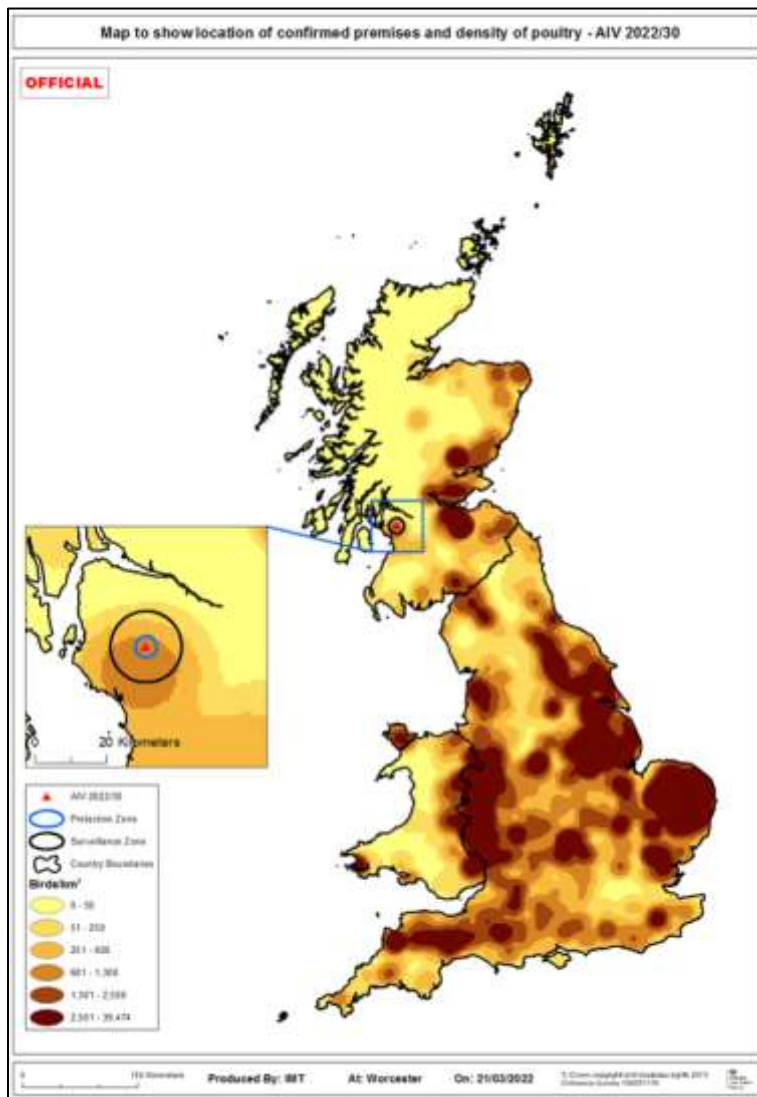


Overview of biosecurity

There were no structured biosecurity measures on site

Map with location in Great Britain and poultry density

Figure 331: Location of IP and poultry density



Overview of the surrounding area

The premises were in a rural livestock farming and approximately 10 miles from the coast, close to a large pond and surrounded by woods. It was also south and east of four large water bodies: Lochwinnoch, Barr Loch, Kilbirnie Loch and Barcraigs reservoir. There were more freshwater lakes to the east.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The surrounding land was attractive to waterfowl and numerous bridging species such as corvids and gulls. Passerines were also plentiful.

Clinical picture

24/02/2022 or 25/02/2022 – An injured swan was collected from a park in Glasgow and admitted to the hospital centre.

27/02/2022 – The swan was seen to have breathing difficulties.

05/03/2022 – The swan was examined by a private vet during their routine site visit. It was euthanised and reported to the DEFRA dead wild bird surveillance line.

07/03/2022 – The swan carcass collected. The swan never left the main hospital.

17/03/2022 – HPAI H5N1 was confirmed in the swan and reported to APHA.

No other deaths or sick animals had been seen since 07/03/2022.

21/03/2022 – All birds on site were culled and preliminary C&D was completed. No sampling was conducted at the cull.

Timeline

Tracings windows

Source tracings window:

High-risk:	24/2/2022 to 26/2/2022
Likely:	13/2/2022 to 23/2/2022
Precautionary:	Within HR source window due to late reporting of disease suspicion

Spread tracings window:

High-risk:	14/2/2022 to 23/2/2022
Likely:	25/2/2022 to 17/3/2022
Precautionary:	Within HR spread window due to late reporting of disease suspicion

Most likely date of infection: 24/2/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 332: Source and spread timeline for AIV 2022/30

Source Tracing Window	Spread Tracing Window	Date	
Day 14		13/02/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	14/02/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	15/02/21	
Day 11	Day 3	16/02/21	
Day 10	Day 4	17/02/21	
Day 9	Day 5	18/02/21	
Day 8	Day 6	19/02/21	
Day 7	Day 7	20/02/21	
Day 6	Day 8	21/02/21	
Day 5	Day 9	22/02/21	
Day 4	Day 10	23/02/21	
Day 3	Day 11	24/02/21	Swan collected from Glasgow park due to injury. Start of high risk source tracing window (-3d). Most likely infection date for this outbreak. Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 2	Day 12	25/02/21	Start of high risk spread tracing window (source +24h). Start of precautionary spread tracing window (source +24h).
Day 1	Day 13	26/02/21	
	Day 14	27/02/21	Precautionary onset of clinical signs. Swan developed respiratory problems
	Day 15	28/02/21	
	Day 16	01/03/21	
	Day 17	02/03/21	
	Day 18	03/03/21	
	Day 19	04/03/21	
	Day 20	05/03/21	PVS visit and swan euthanased. Carcase reported for sampling via wild bird submission route.
	Day 21	06/03/21	
	Day 22	07/03/21	Swan collected by DEFRA wildbird help line
	Day 23	08/03/21	
	Day 24	09/03/21	
	Day 25	10/03/21	
	Day 26	11/03/21	
	Day 27	12/03/21	
	Day 28	13/03/21	
	Day 29	14/03/21	
	Day 30	15/03/21	
	Day 31	16/03/21	Non negative results received. Notification of suspicion of disease to APHA. Verbal restrictions
	Day 32	17/03/21	APHA investigation (DPR 2022/067). Restrictions served in writing.
	Day 33	18/03/21	Avian Influenza HPAI H5Nx confirmed by CVO based on PCR results from samples submitted from the swan that was euthanased on 7/3/2022 with case reference AIV2022/30.
	Day 34	19/03/21	
	Day 35	20/03/21	
	Day 36	21/03/21	Culling complete. Preliminary C&D complete
	Day 37	22/03/21	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

31 premises with poultry holding between 2-31,722 birds (4 premises with 50 or more birds)

SZ (3-10 km)

56 premises with poultry holding between 1-122,000 birds (13 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations included staff (volunteers), private veterinary surgeon, feed delivery and vehicles

Source investigations:

All source tracings investigations (staff, feed delivery and vehicles) were assessed as low likelihood of introduction of infection and closed with no further action.

Hypothesis for the source

The most likely source identified was direct introduction of infected wild birds.

Assessment and evidence base for the likely source

The injured swan showed clinical signs 2-3 days after entry to the site and was confirmed as HPAI H5N1 positive. The swan didn't leave the hospital and there was no indication of infection in the wider site.

Spread investigations: Assessment of potential and likelihood of spread

All spread tracings investigations (staff, private veterinary surgeon, feed delivery and vehicles) were assessed as low likelihood of spread and closed with no further action.

Remaining uncertainty

Indirect transmission from infected wild birds was also considered as a possible source due to the lack of biosecurity on site.

AIV 2022/31, Near Strichen, Aberdeenshire, Scotland

Description of the premises

Overview of the premises and the wider business

This was a commercial egg laying premises. It was part of a wider egg production business with poultry units at five other sites.

The IP was located approximately 1.3 miles away from the main business premises

The IP reared its own pullets on site, which were usually permanently housed. Although laying hens were usually kept as free range, all hens had been housed since November 2021 when the Housing Order was put in place.

Species and number of each present

100,000 chickens (laying hens).

Description of the housing

There were 3 houses on the site: a house with 56,000 caged rearing pullets (affected group), and 2 houses (each split in 2 sections) with 44,000 free range egg laying hens in total. There was also an egg packing shed

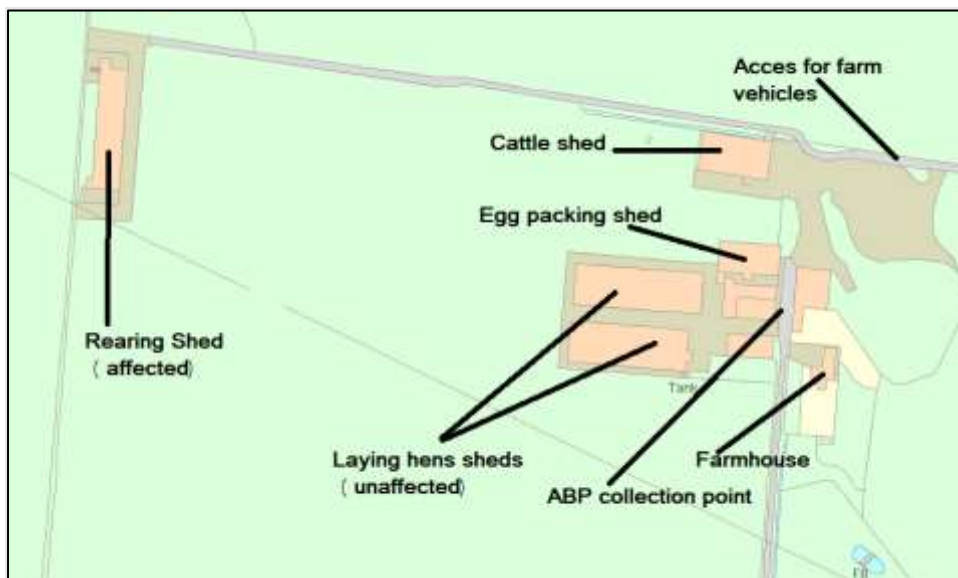
The egg laying housing accommodation was 284 meters from the rearing house at their nearest points. Links between the pullets and the hens on the IP were very limited and sufficiently good mitigation existed to consider them separate epidemiological groups. However, potential risk pathways existed (the ventilation system of the pullet shed was forced and air was expelled towards the closest point to the laying sheds and the usual wind direction could take material from the pullet shed to the layer flocks).

The rearing shed was a modern building constructed approximately 10 years ago and contains five lines of back-to-back cages arranged in four tiers. Fresh air was drawn through the shed by the action of extractor fans at one end drawing fresh air from vents at the other end, supplemented by roof fans. The affected pens were on the upper layer of cages to the south of the building within 6 feet of the roof air inlets indicating the possible ingress of virus via the air handling/ventilation system.

There was also a cattle shed and a farmhouse.

Plan of the infected premises

Figure 333: Plan of AIV 2022/31



Overview of biosecurity

Biosecurity standards were good in general. Visitors signed in and out in the visitors' entry book. Footwear was changed inside and outside the sheds. Footbaths were available at every entry and exit and were used by staff. There were warning signs at the entrance prohibiting access and a good state of cleanliness and maintenance.

Two people were responsible for looking after the birds. Each company site had its own dedicated manager and staff. Overall production across the sites was managed by the Production Manager.

The rearing site was managed by the company production manager who also visited the laying sheds on site once per week after showering on, using shed specific PPE and following biosecurity procedures.

The layers were managed by a separate member of staff and at the time of culling had normal production parameters and no clinical signs of disease demonstrating effectiveness of their biosecurity procedures.

Feed for all the company units was milled and mixed at the main business premises before being delivered. Feed delivery vehicles were cleansed and disinfected there. Feed deliveries to the layer sheds and rearing sheds in the IP were done on separate days. Feed was carried into the building by means of an auger system from two large, covered hoppers located outside the shed.

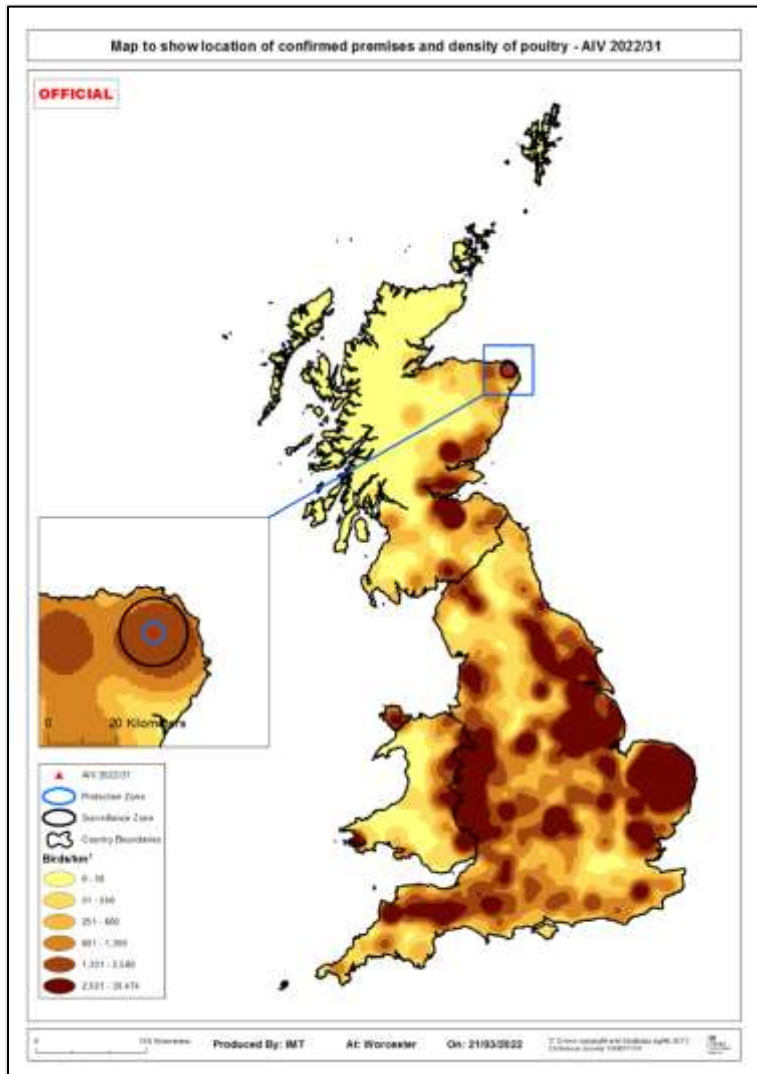
Water was pumped from the main farm steading to the rearing shed and stored in a covered water tank. The water was a combination of mains and borehole source.

Dead birds from both the rearing shed and the layers sheds were taken to the main site for collection by the local deadstock collector.

Vermin control was in place by an external contractor with visits every six weeks.

Map with location in Great Britain and poultry density

Figure 334: Location of IP and poultry density



Overview of the surrounding area

The IP was in a medium poultry density area.

Ornithological assessment:

Desktop assessment: An ornithological expert assessment was completed and concluded that wild birds were a possible source of infection for this premises. The IP was not set close to any substantial waterbodies. The abundance of gulls and corvids in this landscape was uncertain. The landscape hosted features that both types of bridge species would have found attractive. They could be considered as an infection pathway onto the IP as they were likely to have exploited the farm site but seem unlikely to produce significant infection pressure.

Local intelligence: No additional information.

Clinical picture

09/03/2022 – increasing mortality was seen in the pullets. The PVS investigated and suspected bacterial septicaemia. Samples were taken with positive results for *E. coli* and *Pasteurella*. Treatment was started on 12/03/2022 and mortality was seen to decrease slightly. The PVS carried out a PME with non-specific findings but included a congested carcase.

17/03/2022 – mortality had remained high but stable since 13/03/2023 and suspicion of notifiable avian disease was reported. At the APHA investigation the same day, the only clinical signs observed were lethargy and mortality. Samples were taken. The laying hens appeared clinically normal.

Timeline

Tracings windows

Source tracings window:

High-risk:	06/03/2022 to 08/03/2022
Likely:	23/02/2022 to 05/03/2022
Precautionary:	Within “likely” window as reporting of suspicion of disease was delayed due to concurrent bacterial disease presence on farm

Spread tracings window:

High-risk:	07/03/2022 to 17/03/2022
Likely:	24/02/2022 to 06/03/2022
Precautionary:	Within “likely” window as reporting of suspicion of disease was delayed due to concurrent bacterial disease presence on farm

Most likely date of infection: 06/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 335: Source and spread timeline for AIV 2022/31

Source Tracing Window	Spread Tracing Window	Date	
Day 17		08/11/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		09/11/21	Start of precautionary spread tracing window (source + 24h).
Day 15		10/11/21	
Day 14		11/11/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/11/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/11/21	
Day 11	Day 3	14/11/21	
Day 10	Day 4	15/11/21	
Day 9	Day 5	16/11/21	
Day 8	Day 6	17/11/21	
Day 7	Day 7	18/11/21	
Day 6	Day 8	19/11/21	
Day 5	Day 9	20/11/21	
Day 4	Day 10	21/11/21	
Day 3	Day 11	22/11/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/11/21	Start of high risk spread tracing window (source +24h). Birds housed from 17:00.
Day 1	Day 13	24/11/21	
	Day 14	25/11/21	Precautionary onset of clinical signs based on production records.
	Day 15	26/11/21	
	Day 16	27/11/21	
	Day 17	28/11/21	
	Day 18	29/11/21	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2021/83). Restrictions served.
Day 19		30/11/21	HPAI H5N1 confirmed on PCR results (AIV 2021/31).
Day 20		01/12/21	
Day 21		02/12/21	
Day 22		03/12/21	Culling commenced.
Day 23		04/12/21	Culling completed.
Day 24		05/12/21	Preliminary C&D completed.
Day 25		06/12/21	Preliminary C&D effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

21 premises with poultry holding between 2-180,623 birds (9 premises with 50 or more birds)

SZ (3-10 km)

60 premises with poultry holding between 1-205,000 birds (12 premises with 50 or more birds)

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for egg collections, feed deliveries, carcasses to the private vets for post-mortem examination including the delivery vehicle/driver, a manager and movement of manure off the premises within the high-risk tracing

windows. The manure was restricted for 42 days at the new location. Tracings visits were completed in relation to the egg packing centre, the ABP collection premises and a poultry premises associated with the manager. Outcome of the visits and all other tracings were of very low risk assessments, no further actions were required, and all the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds (via the ventilation system), assessed as highly likely with medium uncertainty

Assessment and evidence base for the likely source

Air inlets were meshed to prevent ingress, but contamination could have entered via this route. Disease distribution in the affected group was consistent with entry of virus via roof air inlets.

All other potential source pathways were assessed as low or lower likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other potential spread pathways were assessed as very low or lower likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/32, Near Woodbridge, East Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

The infected premises (IP) was a commercial indoor duck fattening unit, owned by a large integrated poultry company. In addition to 12 duck houses, the site also included a barn for straw bedding, and a small office. This company also owned a hatchery and two slaughterhouses. One of the slaughterhouses was situated adjacent to the IP but only operated during the Christmas season. There was also a cutting plant, which operated all year round, and the company's head office adjacent to the IP.

Ducks arrived as day old ducklings from the company's hatchery and remained until they reached slaughter weight at approximately 35 – 44 days old. They were then taken to the company-owned slaughterhouse.

Species and number of each present

There were a total of 12 houses. Day old ducklings were initially placed in houses 1-5 which were used as brooder houses. A total of 96,516 ducklings had been placed. Once they were two weeks old, they were divided up so that houses 6-9, 11 and 12 were populated (house 10 is used for straw storage). There were between 5000 and 15,000 ducks in each house at that stage. At the time of the report case, there were approximately 82,400 31-38 day old ducks on the site. House 7 had been depopulated two days prior to the report case investigation.

Description of the housing

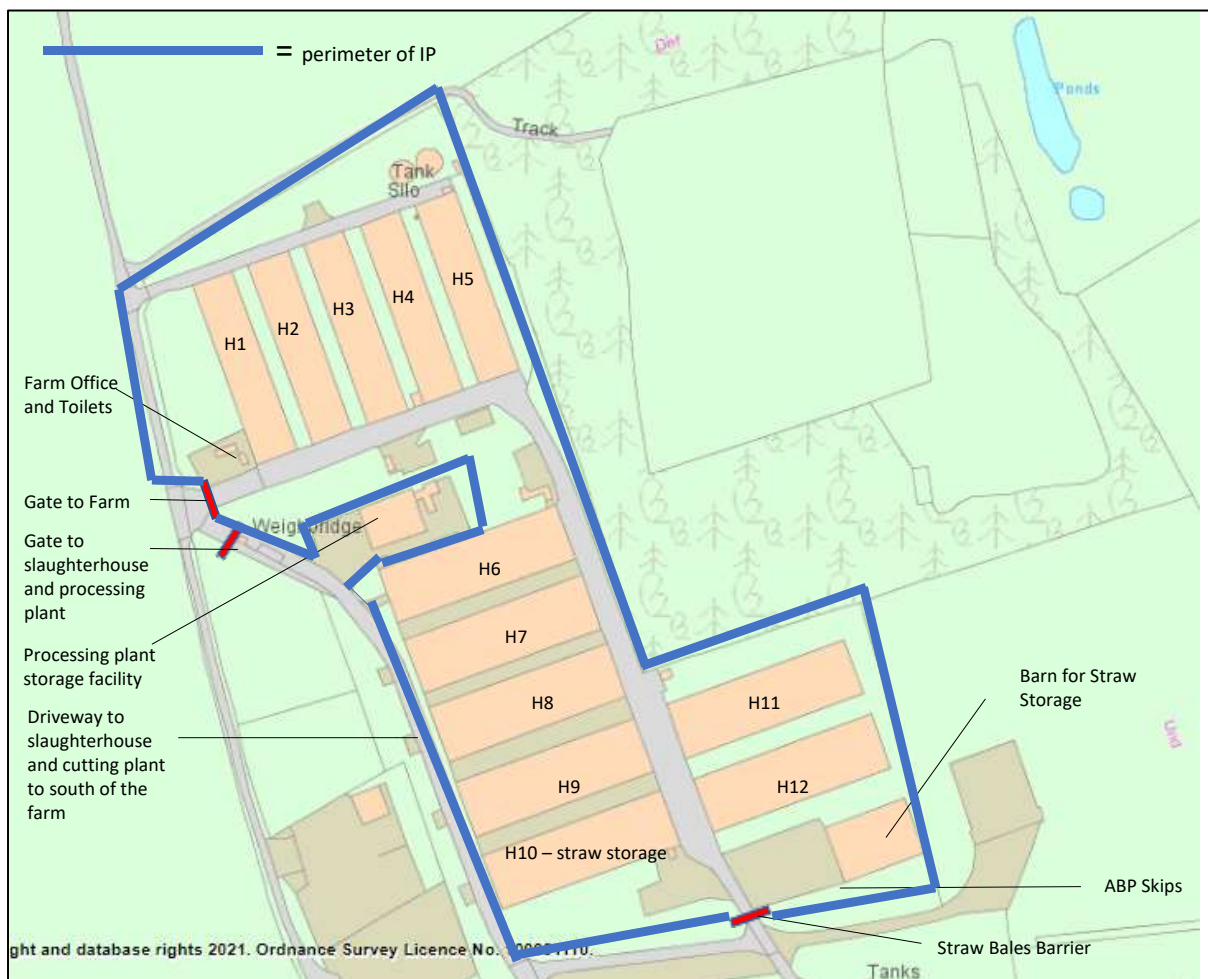
The houses were all over 21 years old. Houses 1-5 were smaller and older than houses 6-12.

Houses 1-5 had breeze block walls clad with wood panels. Internally, the walls were covered with asbestos sheeting. These houses had a lobby prior to accessing the bird areas. There was a reverse flow ventilation system with air intake from inlets in the roof and extractor fans in the side walls.

Houses 6-12 had breeze block walls, clad with galvanised metal sheeting. The interior surface of the walls is covered with plywood panels. There was no lobby area; access to the bird area was directly from the outside. There was a tunnel ventilation system with inlet vents at one end of the house and eight extractor fans at the other end of the house.

Plan of the infected premises

Figure 336: Plan of AIV 2022/32



Overview of biosecurity

There were biosecurity inadequacies in various routine management procedures on this farm.

PERSONNEL: All permanent staff had three pairs of overalls and a pair of wellington boots which were kept on the site. This same clothing and footwear were worn inside all the bird areas and for the outside areas. There was also a temporary member of staff (primarily a member of a catching gang) who was wearing a disposable overall and his own wellingtons. Outside all houses, there were two foot dips, one of which was lidded. Staff were required to use the unlidded one to clean their wellingtons and then the other one to disinfect. Those with no lid were all found to be heavily contaminated. There were no instructions for achieving the correct concentration of disinfectant and there was doubt around compliance with the use of the foot dips. Houses 1-5 had a lobby with a step-over barrier and another bucket of disinfectant which was also heavily contaminated. Wellingtons were not changed prior to entry to bird areas. Houses 6-12 had no lobby area so no further procedures were taken prior

to entering the bird areas. Gloves were not worn and although there were hand sanitiser dispensers in place, some were empty.

HOUSING: Some of the houses were found to have defects which could have allowed vermin to enter. There was moss on the roofs which could have attracted wild birds but they would not have been able to enter the house except when the doors were open for the addition of bedding.

DELIVERY VEHICLES: The entrance gate to the site was locked. Once through the gate, vehicles such as feed wagons progressed to a cleansing and disinfection point. There was a high-pressure hose that was connected to a Dosatron which administered disinfectant. Drivers did not change clothing or boots. A boot dip was available next to the wheel wash but this was heavily contaminated. Hatchery wagons were fitted with an automatic wheel washing system.

FEED: Feed was commercially supplied and blown into bins on the site. The area around these was clean and tidy; no spillages were observed.

BEDDING: Straw sourced from local fields was used as bedding. Some of it was stored in an open barn and some was stored in house 10. The open barn could be readily accessed by wild birds and vermin. Straw from house 10 was used during the winter months and in theory, this should have been protected from wild birds however, the main doors were often left open and a pigeon was seen inside. Additional straw was added to the houses daily. Straw was loaded onto the straw chopper and then taken into the houses with a tractor. Wheels were disinfected prior to entering however the tractor may then have moved over further concrete areas before entering the houses.

WATER: Predominantly borehole supply with mains as a backup. It was stored in two large tanks.

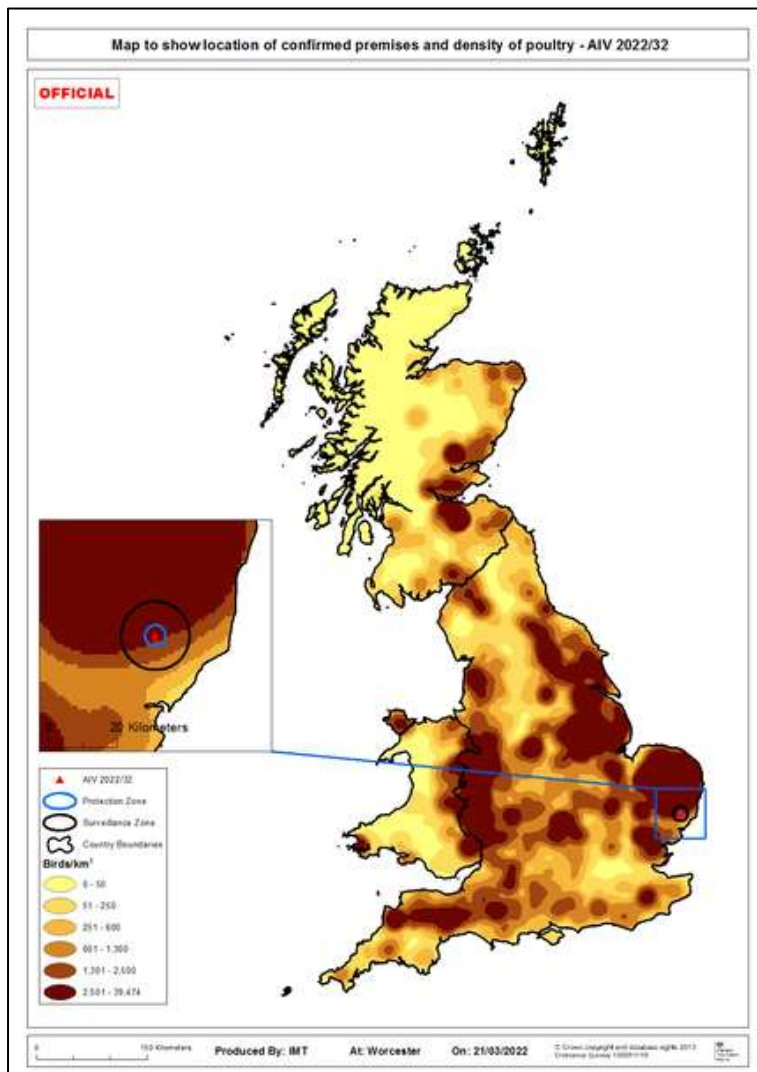
ABP: Dead birds were stored in metal skips next to the straw barn. One of them was found to be open.

VERMIN: Pest control was carried out by a contractor. Recent reports noted evidence of rodent activity. There were gaps in some of the houses which could have allowed rodents to enter and some of the large doors did not close well enough to seal the buildings.

OTHER: Wastewater went into a water treatment plant with open lagoons. This may have been attractive to wild birds. There were some areas of woodland adjacent to the site which provided habitat for pheasants. These came onto the farm site regularly.

Map with location in Great Britain and poultry density

Figure 337: Location of IP and poultry density



Overview of the surrounding area

The site was in an area of high poultry density but there were no adjacent commercial poultry units. It was about 10 miles from the coast and surrounded by arable ground and some woodland areas. A small section of an estuary was approximately three miles away but otherwise there were no large waterbodies in the vicinity.

Ornithological assessment:

Desktop assessment: Waterbodies within three miles were generally small and assumed to be unattractive waterbirds and unlikely to support aggregations of any species. There was a small stretch of estuary which was a significant area for waterbirds but the majority of this was too far away to be important in this case. Wildfowl were likely abundant in the wider landscape but there were unlikely to be dense aggregations close enough to have provided an infection pressure for this IP.

Furthermore, they were unlikely to have used operational surfaces on the IP. Waders and other waterbirds were also likely to be abundant but again, there were unlikely to be any aggregations close to the IP. Bridge species such as gulls and corvids were common to abundant in the landscape. These groups were likely to have produced the most significant infection pathways as it was only these species that were thought likely to travel regularly from the closest likely source of infection. Wild passerines and Woodpigeon might have supported indirect infection pathways from sources of infection; however the likely absence of these sources close to the IP suggests that these pathways were particularly unlikely.

Local intelligence: Pheasants regularly came onto the site and groups of pigeons were seen flying around the farm. A pigeon was seen inside house 10.

Clinical picture

17/3/2022 – there were 12 deaths in house 11

18/3/2022 – there were 13 deaths in house 11. Some ducks were showing neurological signs. The farm contacted their private vet on 19/3/2022 and APHA was subsequently notified. APHA investigated on the same day. By the afternoon, there had been 229 deaths in house 11. Approximately 5% of the ducks were displaying neurological signs including incoordination, paralysis, recumbency, swollen heads and head tremors. Some birds also had green diarrhoea. There was also an overall decrease in water consumption in house 11. Following submission of samples, post-mortem carried out at Weybridge showed that ducks had splenomegaly and hydropericardium.

20/3/2022 – several more houses showed an increase in mortality.

21/3/22 – all houses except house 1 had elevated mortality and ducks displaying clinical signs.

Regarding the 12 deaths recorded on 17/3/2022, this was the first day that the number of deaths exceeded recent normal fluctuations. It was possible that some of these birds may have become affected overnight and it was also noted that there had been a particularly high number of culls on 16/3/2022. Therefore, a precautionary approach was taken and the onset of clinical signs was set for 16/3/2022.

Timeline

Tracings windows

Source tracings window:

High-risk:	13/03/2022 to 15/03/2022
Likely:	02/03/2022 to 12/03/2022
Precautionary:	26/02/2022 to 01/03/2022

Spread tracings window:

High-risk:	14/03/2022 to 19/03/2022
Likely:	03/03/2022 to 13/03/2022
Precautionary:	27/02/2022 to 02/03/2022

Most likely date of infection: 13/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 338: Source and spread timeline for AIV 2022/32

Source Tracing Window	Spread Tracing Window	Date	
		24/02/22	
		25/02/22	
Day 18		26/02/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		27/02/22	Start of precautionary spread tracing window (source + 24h).
Day 16		28/02/22	
Day 15		01/03/22	
Day 14		02/03/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	03/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	04/03/22	
Day 11	Day 3	05/03/22	
Day 10	Day 4	06/03/22	
Day 9	Day 5	07/03/22	
Day 8	Day 6	08/03/22	
Day 7	Day 7	09/03/22	
Day 6	Day 8	10/03/22	
Day 5	Day 9	11/03/22	
Day 4	Day 10	12/03/22	
Day 3	Day 11	13/03/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	14/03/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	15/03/22	
	Day 14	16/03/22	Sudden increase in culls above recent fluctuations. Precautionary onset of clinical signs.
	Day 15	17/03/22	Increase in mortalities above recent normal fluctuations (10 birds found dead). Rising mortality over next 4 days
	Day 16	18/03/22	
	Day 17	19/03/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/70). Restrictions served.
		20/03/22	HPAI H5N1 confirmed by CVO based on PCR results with case reference AIV2022/32.
		21/03/22	
		22/03/22	Culling commenced
		23/03/22	
		24/03/22	
		25/03/22	
		26/03/22	Culling completed
		27/03/22	Preliminary C&D completed
		28/03/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

51 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-14,000 birds.

0 premises holding both pigs and poultry.

26 premises holding both pigs and poultry.

SZ (3-10 km)

241 premises with poultry were reported to be within 10 km of the IP holding between 1-139,000 birds.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were raised for feed deliveries, a roof maintenance man, two visitors and two drivers of lorries taking birds to slaughter. All were deemed very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds. This was attributed a high likelihood with low uncertainty.

Assessment and evidence base for the likely source

Tracings investigations had not identified any likely lateral transmission pathways onto this unit. All pathways assessed were negligible, very low or low likelihood. However, there were aspects of routine management of the unit and biosecurity inadequacies that would have increased the likelihood of indirect contact with wild birds. These included (i) storage of straw bedding in barns that could be accessed by wild birds (ii) daily addition of straw bedding involving taking a tractor, trailer and straw chopper into the houses (iii) presence of vermin and the potential for them to have entered the houses (iv) absence of protocols for making up the correct concentration of disinfectant of boot dips (v) heavy contamination of boot dips (vi) clothing and footwear not dedicated to bird areas.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

Tracings investigations have shown that all other potential spread pathways were negligible or very low likelihood with low uncertainty.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/33, Near Woodbridge, East Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

The Infected Premises (IP) was an intensive indoor parent breeder duck unit part of a large integrated poultry production company.

Ducks were approximately 37 weeks old and arrived on site at approximately 18 weeks old to stay on the laying unit until the end of their production life. No birds had been brought onto the premises since 07/10/2021.

The farm was in the vicinity of a hatchery also part of same company, which was the only destination of the eggs from the IP. This hatchery was AI-designated. APHA inspected the hatchery on 26/3/2022 and found it to be operating satisfactorily withing AI designation conditions and adequately separated from the farm.

Species and number of each present

Ducks, just under 14000 distributed in 4 houses (as per numbers at time of placement):

House 1: 3,631

House 2: 3,631

House 3: 3,631

House 4: 3,634

Description of the housing

Bird accommodation in 4 houses of similar construction, relatively well maintained.

The boundaries of the farm were mainly hedges and woodland. On the day of the visit a wild rabbit, a deer and a pheasant were seen in the woodland before the hatchery. The perimeter was not fenced except for an area that separated the farm from the hatchery.

The main entrance and first half of the driveway was shared between the farm and the hatchery and had a C&D point that consisted of an automatic wheel sprayer before the main gate. Disinfectant used at this point was Viroshield®. This led to the fence separating the hatchery from the farm, with an access farm gate. A knapsack sprayer was also available at this point to disinfect vehicles

The area around the poultry houses was concreted in some areas but not on the sides of the houses

The four houses were of very similar dimensions, insulated and with controlled ventilation. Concrete brick base walls with wooden exterior panels and plywood panels on the internal walls. The bird area had an open plan, with no pens or separation; the birds shared a common airspace. The doors were kept locked.

Though the houses are relatively old (over 30 years or more) they were found in a good state of maintenance, no major damages in their structure. It was reported that work on the roof of House 3 had been recently carried out on the 04/03 (outside the risk window) due to damage caused by the recent adverse weather conditions.

The houses had an automatic mechanical ventilation system, the crossflow ventilation system, with air intake from inlets in the roof and extract fans on the side walls. The automatic fans had plastic covers on the outside and grills covering on the inner side. Found in good repair and cleanliness. It was possible but unlikely for the contaminated material to have entered the bird area through the fans. The inlet was a ceiling opening, that could be manually adjusted. It was possible that contaminated material could have entered through the small gap in the inlet.

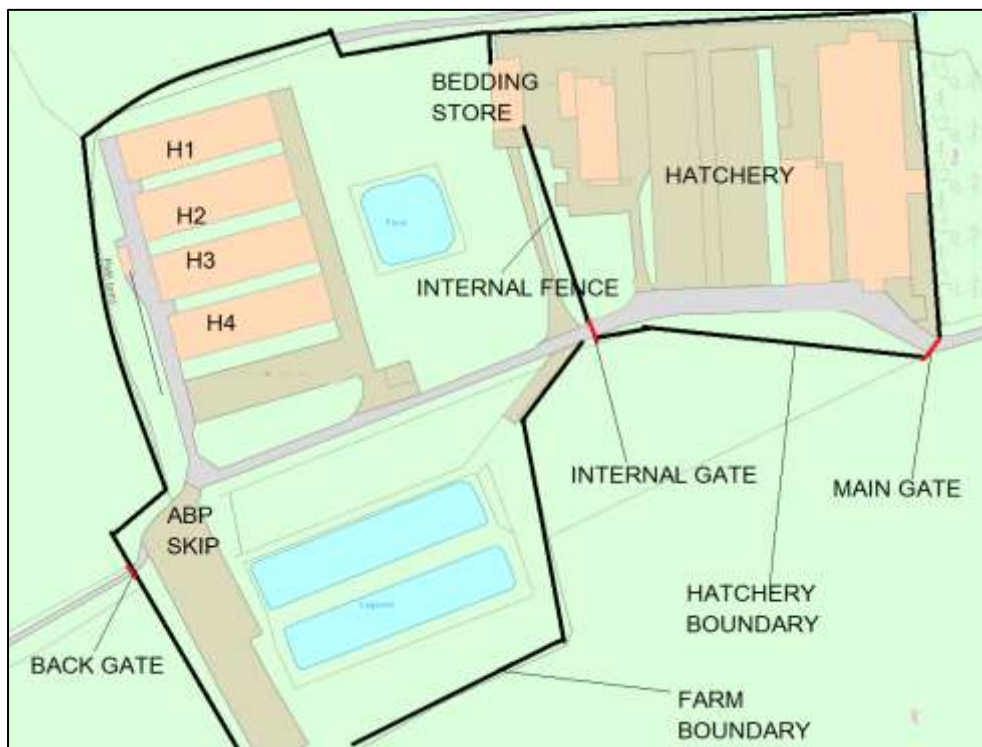
Bedding store: Only half of the barn was used to store straw, the rest was used by the hatchery. The two were separated by a metal wall. The barn found to be in a good repair state, no holes, and no vermin activity at the time of the inspection.

The farm also contained:

1. an office,
2. a new changing/welfare unit (where the staff change into farm clothes and boots; very recently constructed, with ongoing work by company engineers),
3. a parking close to the changing unit,
4. an egg store unit

Plan of the infected premises

Figure 339: Plan of AIV 2022/33



Overview of biosecurity

Biosecurity was relatively good:

Good vehicle C&D point at entrance and boot dips outside each house. Each house had a lobby biosecurity area before entering the bird area where the staff changed into designated boots for that house. Visitors, and contractors received boot coverings. The PVS that visited the IP during the high-risk window confirmed that she used dedicated clothing and boots provided at the IP. Hand sanitizers present in each house were found functional.

Dedicated changing rooms with clothing and boots dedicated for each house.

The egg store with egg chilling unit had a covered foot dip at the entrance.

The farm was generally clean and well maintained and at the time of the visit, staff appeared to be compliant with use of biosecurity facilities, however some key risk factors identified were:

A high frequency of some operations increasing the risk of indirect introduction of disease into the poultry housing: 1- bedding (tractor enters housing daily); 2- egg collection (manual daily); 3- Sampling and inspection for egg movement licensing

Farm lagoons within IP, surrounding woodland, and moss in roofs. These contributed to wild bird presence outside bird houses and likely contamination of area outside poultry housing

Egg operations: Eggs were collected manually every morning on carbon trays that were then placed on the monorail inside the house. One of the workers stayed inside the house while the rest of the workers changed from the house boots into the boots they used in the yard. The person inside the house handed the trays with eggs to the people in the lobby and they placed the trays onto the farm trolley. The farm trolley was then moved to the egg store where the eggs were placed in a designated space for each house. The farm staff selected and placed the eggs on the hatchery trolleys. The only exception to this process was that, due to the close proximity, the eggs from house 3 were moved directly from the lobby into the egg store. The carbon trays were designated for one house and returned to that house.

There were four covered feed bins. No feed spillage was seen at the time of the investigation. Feed provided by a single company with the last recorded delivery on 21/03 (within HR source and spread window). The wheels of the lorry were disinfected at the main gate.

A muck pit was used to store the bedding (removed at the end of the production or when the houses were partially mucked every 4-6 months). Last partially mucking was on 04/03 (outside risk window).

A water tank collected the water from a borehole and the water sent to the houses through underground pipes.

The wastewater from the farm and from the hatchery was drained through a pumping system into the lagoon system.

The houses were bedded daily (replenishment, particularly near drinkers) with straw, one half of the house every other day. The bales of straw were moved with a JCB loader to the concreted area in front of the houses and then into the trailer attached to the tractor unit, and the straw chopper. The tractor entered the houses after disinfection of the wheels with Viroshield® by the inbuilt disinfectant system. At the end of the day the tractor and trailer were stored in house 1 or house 4.

Staff included: An area-manager, a deputy area manager, a farm manager/fieldman on site dedicated to this farm only and who had not visited any other farm, 6 full time workers and 3 workers that attended the farm only on weekends and one agency worker.

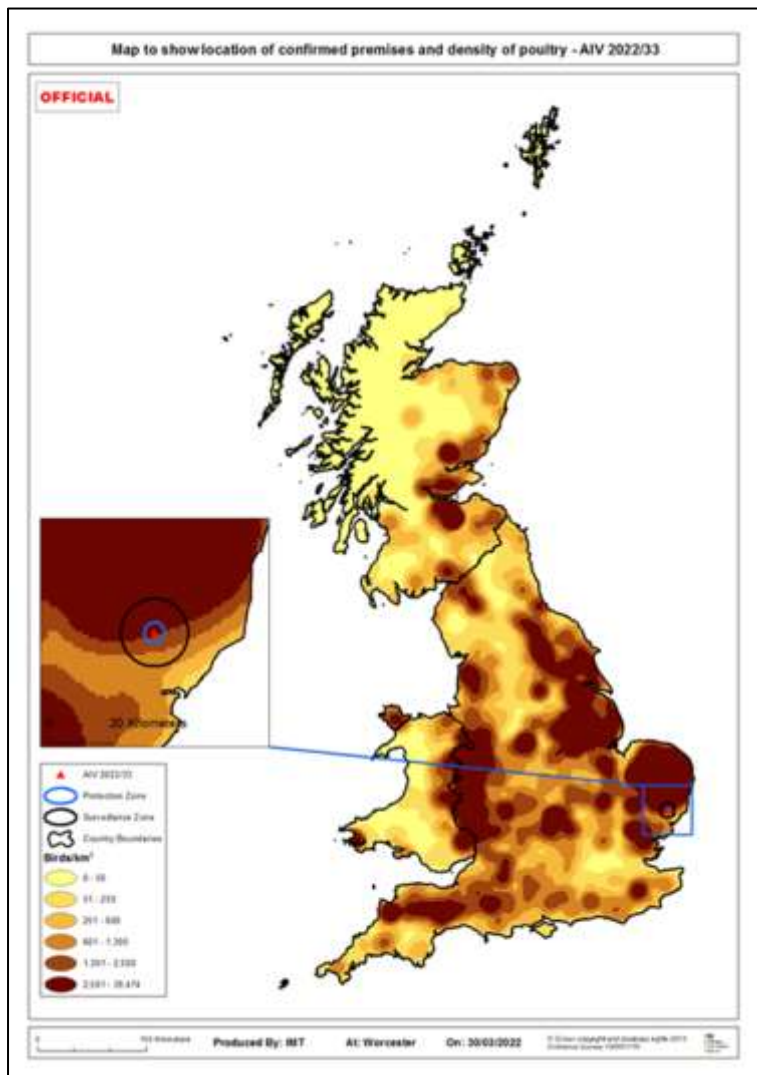
The policy on site was that the staff kept no birds at home or work on other poultry premises.

The eggs were fumigated inside the egg store at 2% for 3 minutes. Egg collections took place every Monday, Wednesday, and Friday but since falling into the SZ the egg collection was reduced to Wednesdays and Fridays. The lorry brought empty egg trolleys and trays into the egg store and collected the full egg trolleys. The driver carried out this loading. Each lorry had an inbuilt wheel sprayer and was dedicated for the collection of eggs from the farms. The lorry only collected eggs from a farm that were unloaded at the hatchery before further collections at subsequent farms. Egg trolleys and trays were not dedicated for a particular farm but were disinfected at the hatchery before their next use.

The pest control program was covered by an external contractor with quarterly visits or more often if necessary. The last visit was on the 02/02/2022 and confirmed some rodent activity on farm. One small mouse was seen in house 2 at the time of the visit.

Map with location in Great Britain and poultry density

Figure 340: Location of IP and poultry density



Overview of the surrounding area

The farm was in an area of high poultry density.

Several IPs had recently been identified nearby, including a number of backyard flocks and also some farms from the IP's parent company. However, no relevant epidemiological links between the IP any of these premises had been identified.

The IP was about 5 km east of a river and 7 km west another river. The premises was surrounded by arable land and some woodland.

Ornithological assessment:

Desktop assessment: There was no ornithological expert assessment commissioned for AIV 2022/33 as the conclusions of the ornithological expert assessment completed for AIV 2022/32 applied. This indicated that wild birds posed a possible source of infection pressure for this IP.

Local intelligence: Wild ducks were seen at the lagoons. Other wild birds seen were pigeons, gamebirds (that sometimes enter the farmyard) and small birds (sparrows)

Clinical picture

24/3/2022. Suspicion of NAD reported by APHA Weybridge following report of a positive PCR result from samples taken on 23/03/2022 from a consignment of layer ducks as part of the pre-movement licence condition for hatching eggs. All four houses were tested (60:60) with House 3 returning a strong positive result in one sample pool. No clinical signs were observed at the time of sampling.

The veterinary investigation reported that mortality in all four houses was very low and no clinical signs of disease were observed. However, water consumption in House 3 appeared to be down by 25% and the bird temperatures were slightly higher in this house than others.

25/3/2022. The CVO decided to Slaughter on Suspicion and samples were collected during culling.

The precautionary onset of first clinical signs was estimated to be 23/03/2022 (one day before the observation of mild clinical signs which were a 2% reduction in egg production in house 3).

Timeline

Tracings windows

Source tracings window:

High-risk:	20/03/2022 to 22/03/2022
Likely:	09/03/2022 to 19/03/2022
Precautionary:	03/03/2022 to 08/03/2022

Spread tracings window:

High-risk:	21/03/2022 to 24/03/2022
Likely:	10/03/2022 to 20/03/2022
Precautionary:	04/03/2022 to 09/03/2022

Most likely date of infection (Start of high-risk source tracing window):
20/3/2022

Timeline chart

Figure 341: Source and spread timeline for AIV 2022/33

Source Tracing Window	Spread Tracing Window	Date	
Day 21		02/03/22	
Day 20		03/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA - in this case source tracing visit).
Day 19		04/03/22	Start of precautionary spread tracing window (source + 24h).
Day 18		05/03/22	
Day 17		06/03/22	
Day 16		07/03/22	
Day 15		08/03/22	
Day 14		09/03/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	10/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	11/03/22	
Day 11	Day 3	12/03/22	
Day 10	Day 4	13/03/22	
Day 9	Day 5	14/03/22	
Day 8	Day 6	15/03/22	
Day 7	Day 7	16/03/22	
Day 6	Day 8	17/03/22	
Day 5	Day 9	18/03/22	
Day 4	Day 10	19/03/22	
Day 3	Day 11	20/03/22	Start of high risk source tracing window. Most likely infection date (72 hours prior to first signs)
Day 2	Day 12	21/03/22	Start of high risk spread tracing window.
Day 1	Day 13	22/03/22	
	Day 14	23/03/22	Swabs taken by PVS. Start of high risk spread tracing window (source +24h). Precautionary onset of c/signs
	Day 15	24/03/22	Non-negative swab result from house 3. 2% reduction in egg production in house 3. Restrictions placed. APHA investigation.
Day 16		25/03/22	CVO decided to slaughter on suspicion SOS AIV 2022/06
Day 17		26/03/22	Culling commenced. Sampling at culling
Day 18		27/03/22	Culling completed. CVO confirms HPAI H5N1 based on lab results (AIV 2022/33).
Day 19		28/03/22	
Day 20		29/03/22	
Day 21		30/03/22	
Day 22		31/03/22	Preliminary C&D completed
Day 23		01/04/22	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

40 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-14,000 birds.

0 premises holding both pigs and poultry.

23 premises holding both pigs and poultry.

SZ (3-10 km)

306 premises with poultry were reported to be within 10 km of the IP holding between 1-109,000 birds.

Investigations on the infected premises

Overview of tracing activities

There were no movements of live birds on or off the premises during the risk window

There was no collection of eggs during source high-risk window.

An egg movement from the IP to the designated hatchery took place on 23/03/2022 (within the high-risk spread window). All eggs were isolated and destroyed.

Visits by the private veterinary surgeon on 21 and 23/03/2022 were investigated, assessed as low risk and closed, although they did generate a visit to another farm visited immediately before the IP on 21/03/2022.

Telephone tracings were generated and closed for two maintenance men who visited the IP on 24/03/2022.

Feed delivery on 21/03.2022 was investigated and assessed as low risk and the tracing closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds

Assessment and evidence base for the likely source

Several features were likely to attract wild birds to the IP (wastewater lagoons, woodland, roof moss). Wild birds were spotted on the IP – ducks, pheasants, other small birds, likely to contaminate of areas outside the poultry housing

The high frequency of bedding operations, with tractors entering the houses daily. Auto C&D system for the wheels were unlikely to be 100% effective in mitigating the risk of indirect disease transmission. Also unwrapped bales were left on concrete outside houses before bedding and could have become contaminated.

The high frequency of egg collection, sampling and inspection operations. Biosecurity was likely to provide significant mitigation for the risk of indirect disease transmission, but unlikely to be 100% effective.

Other potential pathways for indirect transmission through ventilation system or via rodents (known presence on farm, although reportedly low activity) could not be ruled out.

Other source tracings were investigated, assessed as low risk and closed. Also, several IPs had recently been identified within the IP's parent company but no links to this IP were identified during the investigation

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife risk was assessed as medium, not higher than the background risk.

The outcome of all other investigations and assessment of potential and likelihood of spread was very low or negligible likelihood, with low uncertainty.

Remaining uncertainty

While uncertainty in the most likely source is low (indirect transmission from infected wild birds), there is uncertainty on the actual infection pathway, as described above.

AIV 2022/34, Near Stowmarket, Mid Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a small non-commercial backyard flock on a 100-acre arable farm. Eggs were used for home consumption or hatching.

Species and number of each present

Six ducks, 14 chickens and two guinea fowl.

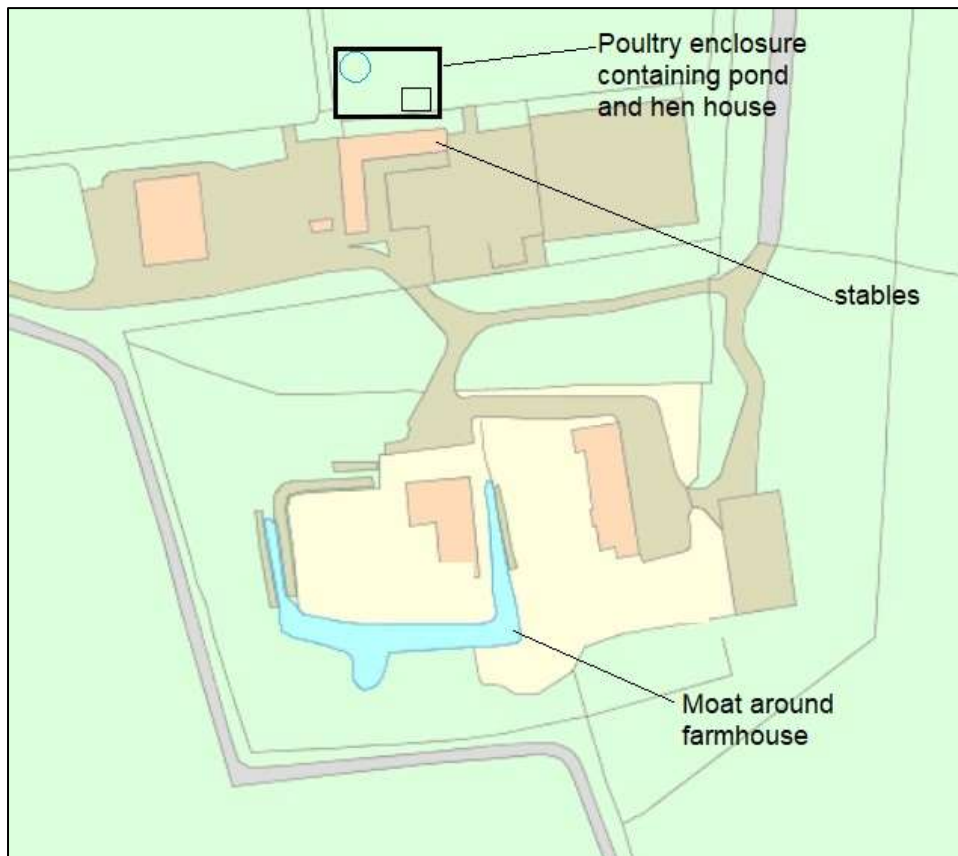
Two ponies.

Description of the housing

The birds were housed overnight and had automatic daily access to an uncovered run containing a pond. No biosecurity measures were in place. Vermin were a common problem and local pest control was in place.

Plan of the infected premises

Figure 342: Plan of AIV 2022/34

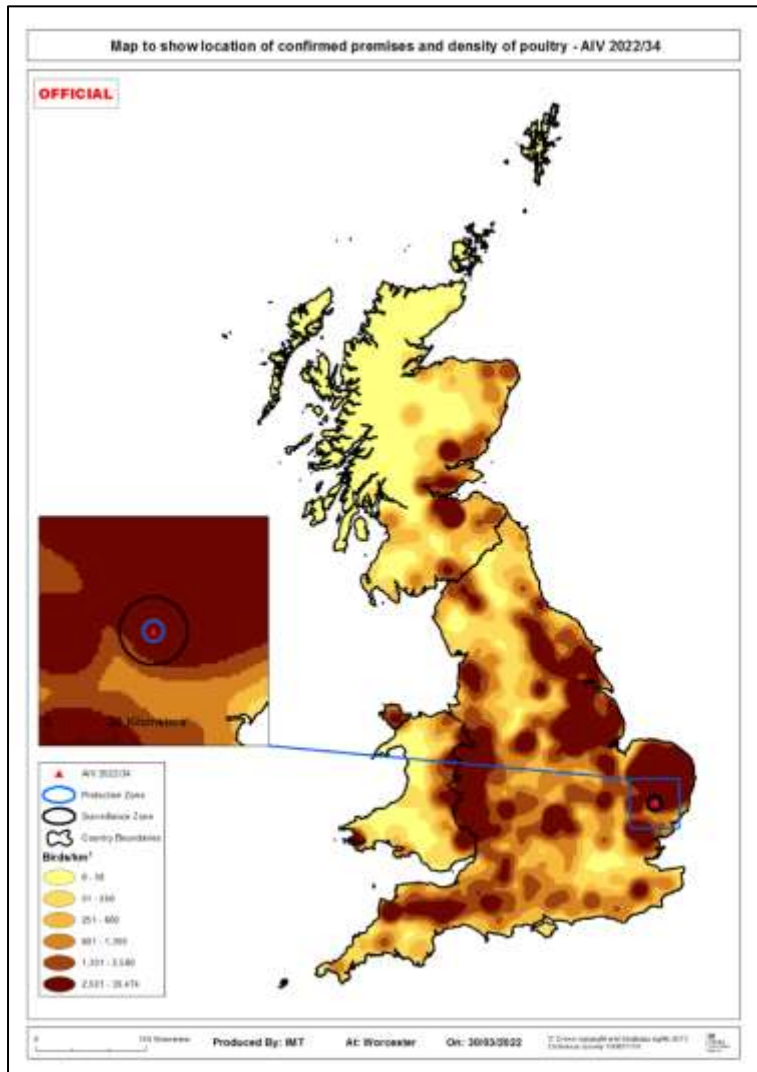


Overview of biosecurity

The farmhouse was surrounded by a moat which attracted moorhen and wild ducks. No biosecurity measures were in place.

Map with location in Great Britain and poultry density

Figure 343: Location of IP and poultry density



Overview of the surrounding area

There were no other large commercial poultry premises in the immediate locality but there was a large moat/pond on the premises where wild ducks were intermittently present.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The premises was approximately 1 km outside of the Surveillance Zone for AIV 2022/25. There were no other large commercial poultry premises in the

immediate locality but there was a large moat/pond on the premises where wild ducks were intermittently present.

Clinical picture

26/03/2022 – One chicken and one guineafowl were found dead. No other clinical signs

27/03/2022 – A second chicken was found dead. Suspicion of avian notifiable disease was reported and verbal restrictions were served.

At APHA investigation some chickens showed leg and wing weakness, diarrhoea, dyspnoea and discolouration of combs and wattles. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk:	22/03/2022 to 24/03/2022
Likely:	11/03/2022 to 21/03/2022
Precautionary:	06/03/2022 to 10/03/2022

Spread tracings window:

High-risk:	23/03/2022 to 27/03/2022
Likely:	12/03/2022 to 22/03/2022
Precautionary:	07/03/2022 to 11/03/2022

Most likely date of infection: 22/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 344: Source and spread timeline for AIV 2022/34

Source Tracing Window	Spread Tracing Window	Date	
Day 21		04/03/22	
Day 20		05/03/22	
Day 19		06/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		07/03/22	Start of precautionary spread tracing window (source + 24h).
Day 17		08/03/22	
Day 16		09/03/22	
Day 15		10/03/22	
Day 14		11/03/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/03/22	
Day 11	Day 3	14/03/22	
Day 10	Day 4	15/03/22	
Day 9	Day 5	16/03/22	
Day 8	Day 6	17/03/22	
Day 7	Day 7	18/03/22	
Day 6	Day 8	19/03/22	
Day 5	Day 9	20/03/22	
Day 4	Day 10	21/03/22	
Day 3	Day 11	22/03/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/03/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	24/03/22	Pest control visit
	Day 14	25/03/22	Precautionary onset of clinical signs.
	Day 15	26/03/22	One guinea fowl and one chicken died overnight.
	Day 16	27/03/22	Notification of further chicken death overnight - restrictions served. APHA investigation and sampling (DPR 2022/074).
	Day 17	28/03/22	Influenza A (M gene), N1 and highly pathogenic H5 Influenza A virus RNA was detected by PCR. After consideration of these results and clinical picture, the UK CVO has confirmed HPAI H5N1.
	Day 18	29/03/22	Culling
	Day 19	30/03/22	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

53 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-122,200 birds.

0 premises holding both pigs and poultry.

24 premises holding both pigs and poultry.

SZ (3-10 km)

202 premises with poultry were reported to be within 10 km of the IP holding between 1-155,000 birds.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The farmhouse was surrounded by a moat which attracted moorhen and wild ducks.

The kept birds had daily access to an open run with no biosecurity measures in place.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/35, Near Woodbridge, East Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a small non-commercial flock producing eggs for personal consumption only.

Species and number of each present

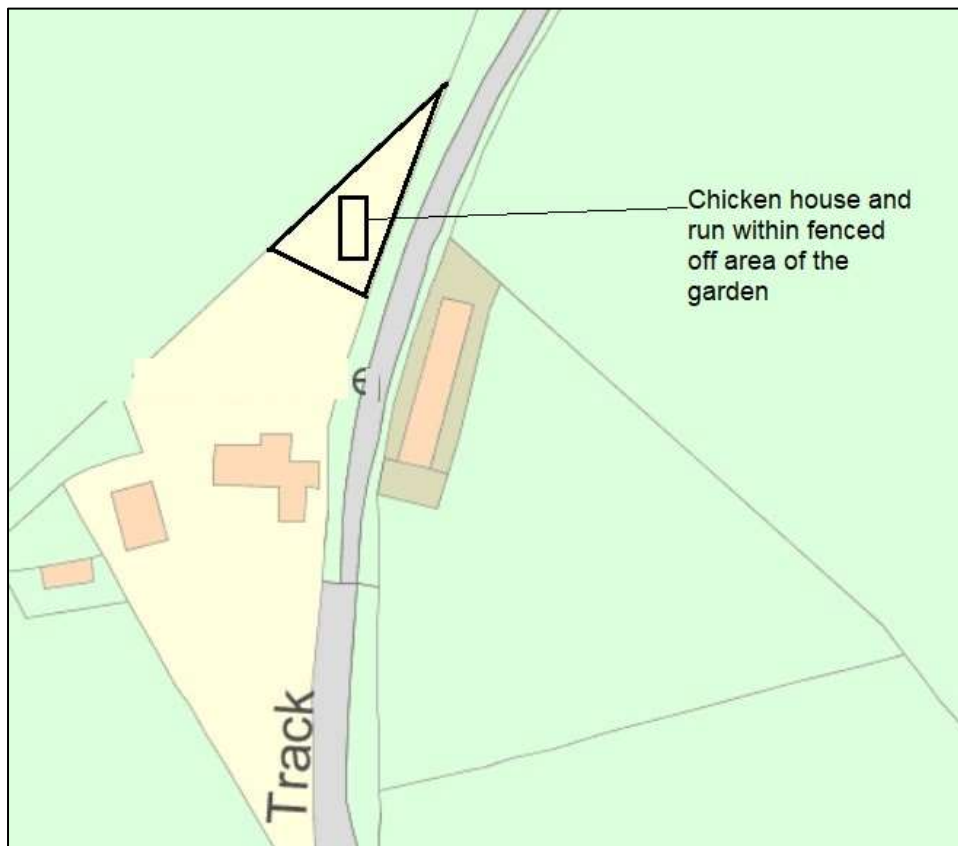
Five chickens, one horse

Description of the housing

A wooden coop and mesh enclosure with a polythene cover over the roof.

Plan of the infected premises

Figure 345: Plan of AIV 2022/35

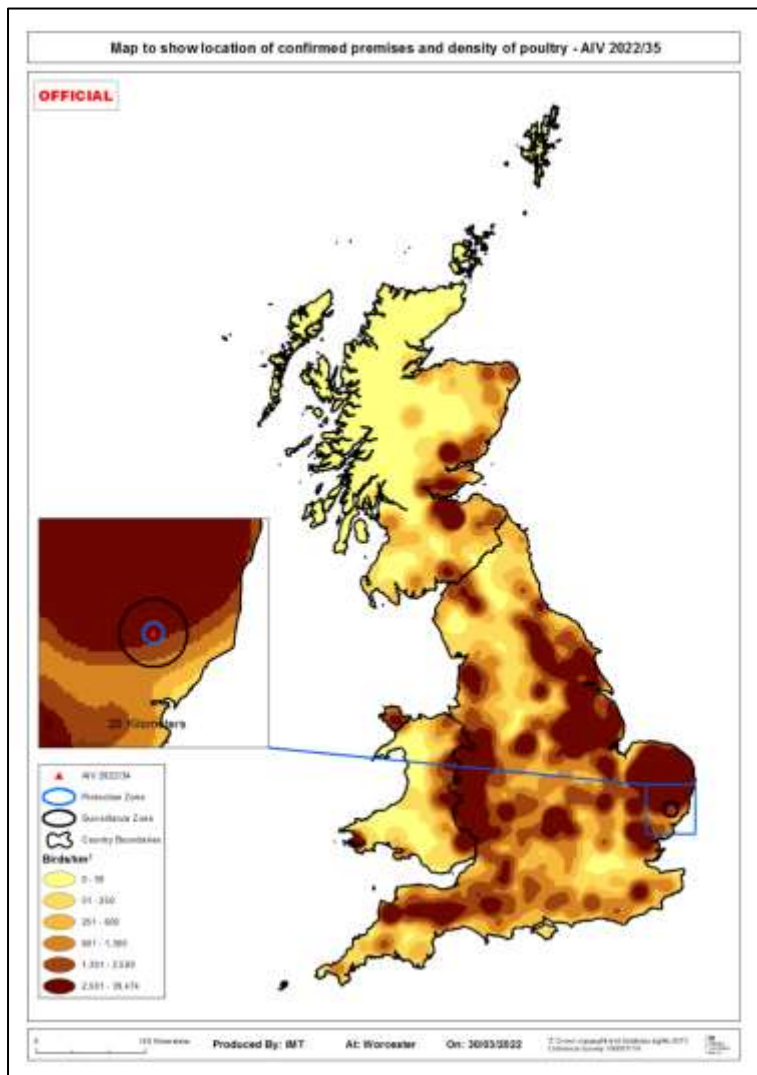


Overview of biosecurity

Biosecurity was poor with no dedicated clothing/footwear/approved disinfectant foot dips used. The mesh gauge was too large to prevent access by small wild birds and there were holes and gaps in the polythene potentially allowing contamination of the run with wild bird feathers/faeces. A mouse infestation was also present.

Map with location in Great Britain and poultry density

Figure 346: Location of IP and poultry density



Overview of the surrounding area

The property was in a quiet rural area with IPs within a few miles.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: No unusual numbers of wild birds were noted in the area.

Clinical picture

24/03/2022 – Some chickens had ruffled feathers and were laying soft shelled eggs.

27/03/22 – One chicken was found dead and another was lethargic and died later that day.

28/03/22 – Another chicken was found dead and one of the remaining two birds was lethargic. Suspicion of avian notifiable disease was reported and an APHA investigation was carried out. Samples were taken.

Timeline

Tracings windows

Source tracings window:

High-risk: 21/03/2022 to 23/03/2022
 Likely: 10/03/2022 to 20/03/2022
 Precautionary: 07/03/2022 to 09/03/2022

Spread tracings window:

High-risk: 22/03/2022 to 28/03/2022
 Likely: 11/03/2022 to 21/03/2022
 Precautionary: 08/03/2022 to 10/03/2022

Most likely date of infection: 21/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 347: Source and spread timeline for AIV 2022/35

Source Tracing Window	Spread Tracing Window	Date	
Day 17		07/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		08/03/22	Start of precautionary spread tracing window (source + 24h).
Day 15		09/03/22	
Day 14		10/03/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	11/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	12/03/22	
Day 11	Day 3	13/03/22	
Day 10	Day 4	14/03/22	
Day 9	Day 5	15/03/22	
Day 8	Day 6	16/03/22	
Day 7	Day 7	17/03/22	
Day 6	Day 8	18/03/22	
Day 5	Day 9	19/03/22	
Day 4	Day 10	20/03/22	
Day 3	Day 11	21/03/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	22/03/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	23/03/22	
	Day 14	24/03/22	Precautionary onset of clinical signs - soft shelled eggs laid.
	Day 15	25/03/22	
	Day 16	26/03/22	
	Day 17	27/03/22	1 hen found dead in the morning, 1 died in afternoon.
	Day 18	28/03/22	1 found dead in morning, one of remaining 2 lethargic. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/76). Restrictions served.
	Day 19	29/03/22	
	Day 20	30/03/22	HPAI H5N1 confirmed based on PCR results with case reference AIV 2022/35. Cull completed. Preliminary C&D completed.
	Day 21	31/03/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

37 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-82,400 birds.

10 premises holding both pigs and poultry.

31 premises holding both pigs and poultry.

SZ/RZ (3-10 km)

144 premises with poultry are reported to be within 10 km of the IP holding between 1-188,200 birds.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There was poor biosecurity and access to the run by wild birds was possible. No tracings at all during the tracing windows.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/36, Near Newton St Cyres, Mid Devon, Devon, England

Description of the premises

Overview of the premises and the wider business

The IP was a poultry and waterfowl breeding centre, which sold birds to the public. There was a variety of birds and mammals. There were three full-time workers at the time of the outbreak. It was a standalone business.

Species and number of each present

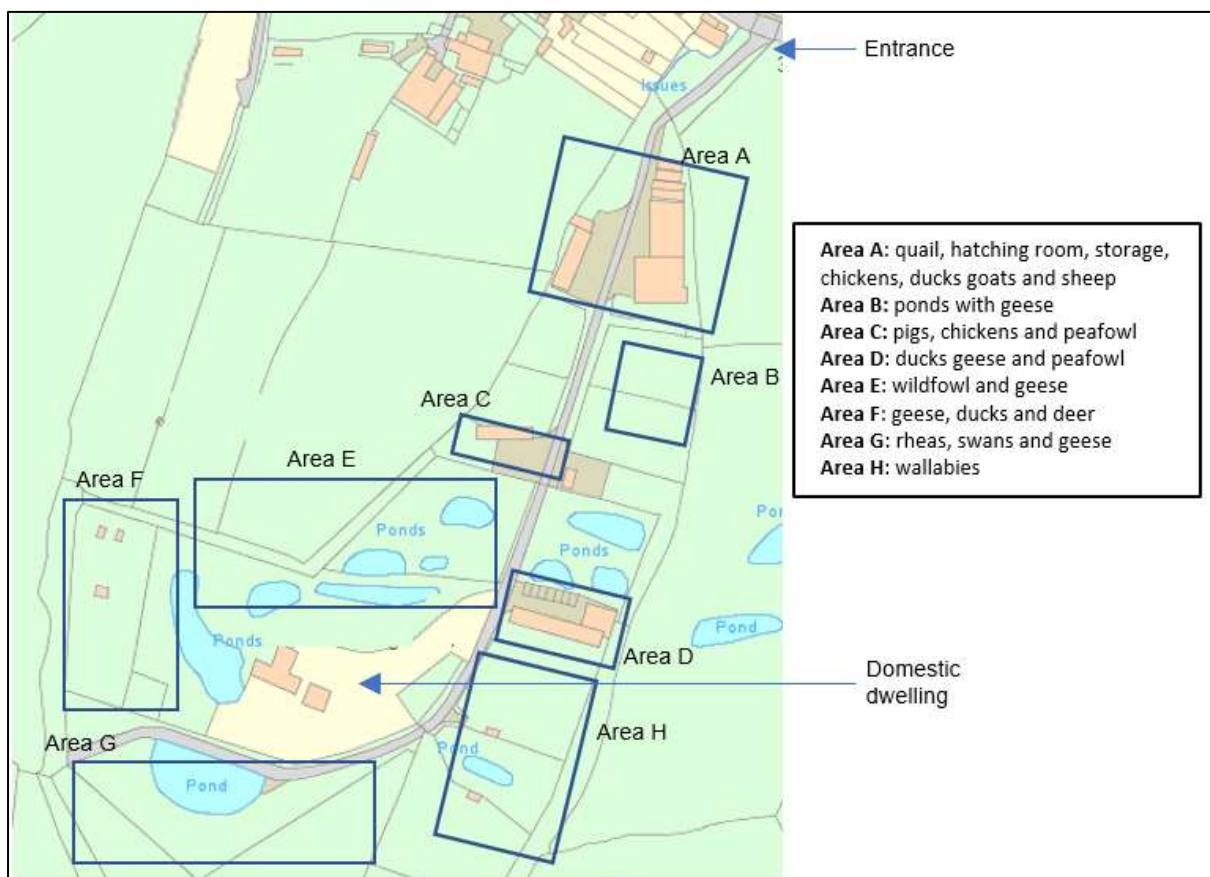
There were approximately 210 ornamental ducks of various breeds, 110 chickens of various breeds, 78 geese of various species, 15,000 quail of various breeds, 15 peafowl and eight rheas.

Description of the housing

Ducks and geese were kept in a variety of wired hutches and open-fronted barns. Some were kept on un-netted ponds. Likewise the chickens were kept in hutches or open-fronted barns. The quail were kept inside in a wildlife-proof building with natural ventilation.

Plan of the infected premises

Figure 348: Plan of AIV 2022/36



Overview of biosecurity

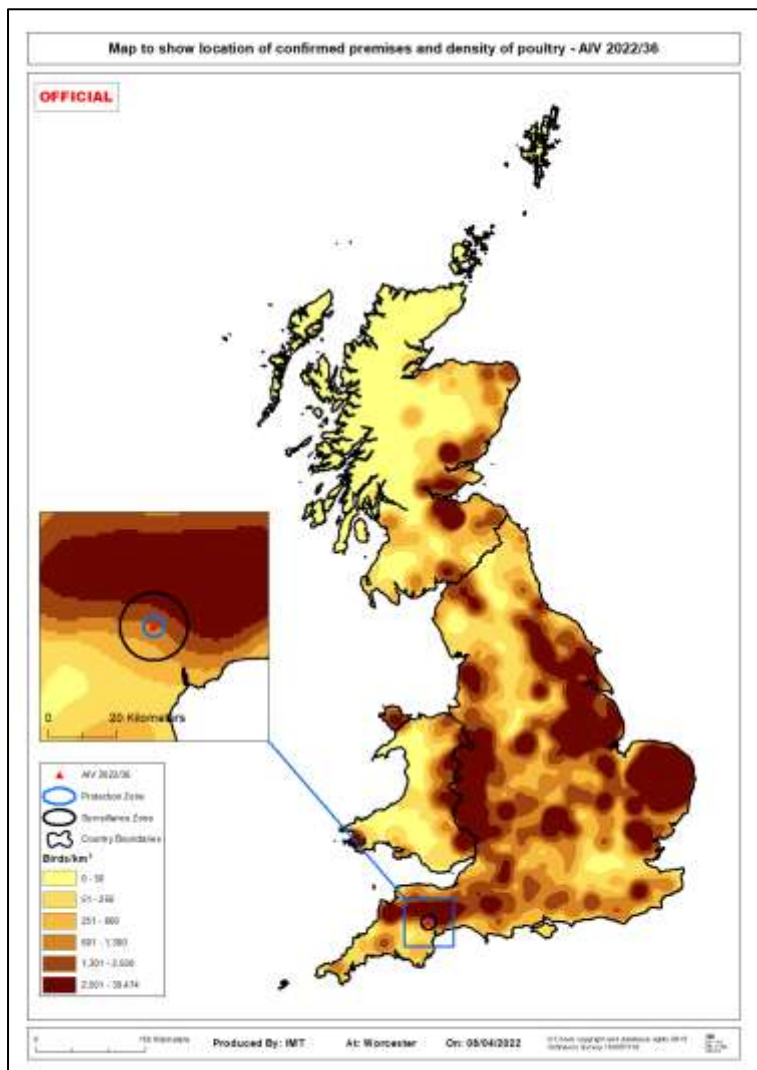
Biosecurity was poor. There was no vehicle C and D point, not any requirement for visitors or staff to wear site-specific clothing and footwear. Several uncovered foot dips were scattered around the IP, but most likely to be ineffective.

The only group of animals that were kept in wild bird proof accommodation were the quails. No clinical signs were detected in them.

Water for some pens was pumped from the unnetted pond, where wild birds were known to mingle with domesticated ducks. This water may well have been contaminated and virus then moved to the pens.

Map with location in Great Britain and poultry density

Figure 349: Location of IP and poultry density



Overview of the surrounding area

The IP was situated in a rural area next to a small village. There were no contiguous livestock. It was in an area of medium poultry density.

Ornithological assessment:

Desktop assessment: In this mixed agricultural landscape, features of the site may have promoted infection pathways from wild bird species. Wildfowl and waders were thought to be no more than common in the neighbourhood of the IP. Gulls and corvids were likely to have been abundant, with both groups of bridge species likely to produce the most significant infection pathways. Gulls may have commuted between the IP and the substantial source of infection at a distant estuary site. Wild passerines and Woodpigeon might have supported many substantial infection pathways from sources of infection, though the likely absence of sources close to IP suggests pathways from these to have been unlikely and their contribution to infection pressure low.

Local intelligence: There were ponds on the property with wild bird activity present. The keeper estimated around 50 wild birds are common at any one time. Geese were regularly seen flying overhead. Starlings were regularly seen. No pigeons, crows or pheasants were observed at the time of the investigation but were reported to be visiting.

Clinical picture

01/04/2022 – increased mortality was recorded in the duck houses in areas D and F.

03/03/2022 – 50% of the birds in the worst affected house were found dead, with up to 30% in others in those areas. Most of the birds expressed neurological symptoms prior to death.

06/04/2022 – at the APHA investigation several birds in these areas were showing signs diarrhoea, pyrexia and corneal oedema. Samples were taken and serological analysis demonstrated moderate antibody titres in the first affected house in area D. Duck serology gave similar reactive titres against all three antigens tested. The titres suggested introduction of infection 14-21 days prior to sampling.

Timeline

Tracings windows

Source tracings window:

High-risk:	15/03/2022 to 22/03/2022
Likely:	14/03/2022 to 14/03/2022
Precautionary:	Precautionary within likely source window due to late reporting of disease suspicion

Spread tracings window:

High-risk:	16/03/2022 to 04/04/2022
Likely:	15/03/2022 to 15/03/2022
Precautionary:	Precautionary within likely source window due to late reporting of disease suspicion

Most likely date of infection: 15/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 350: Source and spread timeline for AIV 2022/36

Source Tracing Window	Spread Tracing Window	Date	
Day 17		14/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		15/03/22	Start of precautionary spread tracing window (source + 24h). Start of high-risk source tracing window (-3d). Earliest infection date based on antibody titre.
Day 15	Day 1	16/03/22	Start of high-risk spread tracing window.
Day 14	Day 2	17/03/22	
Day 13	Day 3	18/03/22	
Day 12	Day 4	19/03/22	
Day 11	Day 5	20/03/22	
Day 10	Day 6	21/03/22	
Day 9	Day 7	22/03/22	End of high-risk source window. Latest infection date based on antibody titre from sampling.
Day 8	Day 8	23/03/22	
Day 7	Day 9	24/03/22	
Day 6	Day 10	25/03/22	
Day 5	Day 11	26/03/22	
Day 4	Day 12	27/03/22	
Day 3	Day 13	28/03/22	
Day 2	Day 14	29/03/22	
Day 1	Day 15	30/03/22	
	Day 16	31/03/22	Precautionary onset of clinical signs: birds died overnight 31st-1st
	Day 17	01/04/22	
	Day 18	02/04/22	
	Day 19	03/04/22	
	Day 20	04/04/22	Notification of suspicion of disease to APHA at 9pm. Restrictions served.
	Day 21	05/04/22	APHA investigation and sampling (DPR 2022/80).
	Day 22	06/04/22	Avian Influenza H5N1 confirmed by CVO with case reference AIV2022-36.
	Day 23	07/04/22	Culling commenced.
	Day 24	08/04/22	Culling completed.
		~	
	Day 31	15/04/22	Preliminary C & D applied.
	Day 32	16/04/22	Preliminary C & D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

52 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-43 birds.

0 premises holding both pigs and poultry.

14 premises holding both pigs and poultry.

SZ (3-10 km)

265 premises with poultry were reported to be within 10 km of the IP holding between 1-36,647 birds

Investigations on the infected premises

Overview of tracing activities

In total, this incident generated 54 live bird spread tracing visits, one live bird source tracing visit, one pig purchaser visit and 49 visits to purchasers of hatching eggs. Telephone tracings were raised for feed deliveries and these resulted in a further two visits to contact premises.

Two IPs were identified from birds purchased from this site prior to actioning the tracings. These were AIVs 2022-38 and 39. They were reported to APHA on 05/04/22 prior to confirmation of disease on this premises on 06/04/22. No further infected premises were identified at the subsequent tracing visits.

Although the live bird purchases were to the local area, many of the hatching eggs were purchased on-line and posted to all countries of the United Kingdom – England, Scotland, Wales and Northern Ireland. This resulted in a large amount of coordination within APHA and with DAERA.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Considering the poor biosecurity, lack of wild bird proof housing and usage of pond water in houses, a wild bird source was highly likely. There were few mitigations put in place to reduce the likelihood of infection except in the quail house.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

Two IPs were identified from birds purchased from this site prior to actioning the tracings. These were AIVs 2022-38 and 39. They were reported to APHA on 05/04/22 prior to confirmation of disease on this premises on 06/04/22. No further infected premises were identified at the subsequent tracing visits.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/37 Near Ely, East Cambridgeshire, Cambridgeshire, England

Description of the premises

Overview of the premises and the wider business

The infected premises was a commercial indoor duck fattening unit, owned by a large integrated poultry company. In addition to three duck houses, the site also included a barn for straw bedding and an office. This company also owned a hatchery and two slaughterhouses.

Ducks arrived as day old ducklings from the company's hatchery and remained until they were approximately 49 days old. They were then taken to the company-owned slaughterhouse.

Species and number of each present

A total of 39,669 ducklings had been placed across three houses. House 1 had 13,000, house 2 had 13,334 and house 3 had 13,335. At the time of the report case, the birds were 23-24 days old. House 1 had 11,900 ducks, house 2 had 13,034 and house 3 had 13,175.

Description of the housing

The three houses were all of the same construction. They had breeze block walls, clad with wood and metal roofs. Inside, the walls and roof were lined with plywood panels which were covered with plastic liners for additional insulation. Each house had a lobby prior to entering the bird area. There was a natural ventilation system with roof vents and side inlets which were covered with wire mesh.

Plan of the infected premises

Figure 351: Plan of AIV 2022/37



Overview of biosecurity

There were biosecurity inadequacies in various routine management procedures on this farm.

PERSONNEL: There were site specific overalls and wellingtons for members of staff, however the same ones were worn in all bird areas and also outside. Boot dips were present outside each house. Once inside, the lobby had a wooden hygiene barrier to separate clean and dirty areas. The barrier was moveable and water could seep underneath, thus reducing its efficacy. There was a further foot dip prior to entering the bird areas and plastic over boots were available.

HOUSING: Houses were adequately maintained and it would not have been possible for wild birds to enter except when the doors were open for the addition of bedding.

DELIVERY VEHICLES: The entrance gate to the site was closed and there was a hose with a Dosatron® attached for disinfecting wheels of oncoming vehicles. However, the entrance area was poorly maintained, allowing puddles to develop. This was likely to have reduced the efficacy of cleansing and disinfection procedures.

FEED: Feed was commercially supplied and blown into bins on a concrete area outside the houses.

BEDDING: Straw bedding was used. It was delivered by a contractor and stored in an open sided barn which could be easily accessed by wild birds and vermin. Additional straw was added to the houses daily. Straw was loaded onto the trailer and straw chopper and then taken into the houses with a tractor. The machinery was cleansed and disinfected after use. There was potential for the wheels to have become contaminated before entering the houses.

WATER: This was by mains supply and was stored in a large tank which was well sealed and therefore could not have been contaminated by wild birds.

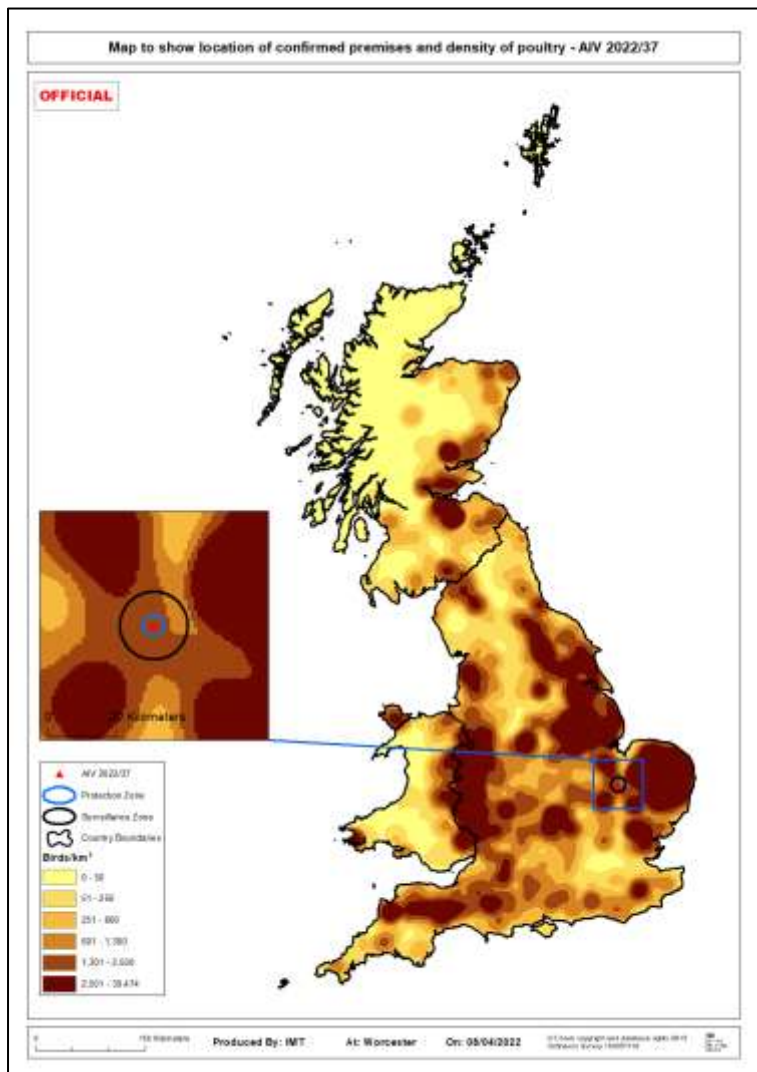
ABP: Dead bird were stored in metal skips outside the houses. They were well sealed.

VERMIN: Pest control was carried out quarterly by a contractor. The last visit had been three months prior to the report case. Although there was no overt evidence of vermin, factors such as poorly maintained outside areas and easily accessible straw could have encouraged them.

OTHER: There was a small pond and a series of drainage ditches close to the IP and these could have attracted wild birds. The field directly adjacent to house 1 (the first house to become affected) had recently been drilled and this may have attracted wild birds to the site.

Map with location in Great Britain and poultry density

Figure 352: Location of IP and poultry density



Overview of the surrounding area

The IP was surrounded by arable ground with drainage ditches. There was a river to the east and a nature reserve which was a significant overwintering site for wild ducks about 1.3 miles to the west. There was a small industrial estate adjacent to the IP. There were no contiguous commercial poultry units.

Ornithological assessment:

Desktop assessment: The landscape around this IP comprised arable fields and several watercourses. Nearby, there was also an extensive area of protected washland considered very attractive to waterbirds of all types. Wildfowl were locally abundant with large aggregations of mixed species (including migrants) associated with the nearby washland. Despite the season, the aggregation of wildfowl was still substantial enough to constitute a significant source of infection. However, the site

appeared unattractive to wildfowl and infection pressure directly from them was likely to be low. Waders and other waterbirds were likely to be abundant close to the IP but there was a declining likelihood that these produced a source of infection in the wider landscape. Furthermore, the site appeared unattractive to them and therefore they were likely to produce very little infection pressure. Gulls were locally abundant in this landscape and may have represented the strongest sources of infection pressure given their tendencies to scavenge carcasses from substantial aggregations of waterbirds and also to exploit farm resources. Corvids would have been present in the landscape and contributed some infection pressure. Small passerines, woodpigeon and starling might have supported indirect infection pathways, acquiring infection from nearby washland and thus producing additional infection pressure.

Local intelligence: Staff on the IP reported seeing pigeons, swans and wild ducks. At the time of the investigation, a pair of wild ducks was seen in one of the drainage ditches on the site.

Clinical picture

04/04/2022 – 11 ducks were found dead. Approximately 10% of the ducks were also showing neurological signs, specifically head tremor.

05/04/2022 – 69 ducks were found dead and suspicion of avian notifiable disease was reported.

06/04/2022 – at the investigation 315 more ducks were found dead. The mortality rate increased rapidly and a further 1,369 ducks were found dead on 7/4/2022.

09/04/2022 – increased mortality was recorded in house 2 with 47 ducks were found dead and approximately 15-20% had developed head tremor. House 3 remained unaffected.

With regard to the 11 deaths recorded on 4/4/2022, this was the first day that there had been an increase in deaths above recent normal fluctuations. As some of these birds may have become affected overnight, a precautionary approach was taken and the date for the onset of clinical signs was set for 3/4/2022.

Timeline

Tracings windows

Source tracings window:

High-risk:	31/03/2022 to 02/04/2022
Likely:	20/03/2022 to 30/03/2022
Precautionary:	15/03/2022 to 19/03/2022

Spread tracings window:

High-risk:	01/04/2022 to 05/04/2022
Likely:	21/03/2022 to 31/03/2022
Precautionary:	16/03/2022 to 20/03/2022

Most likely date of infection: 31/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 353: Source and spread timeline for AIV 2022/37

Source Tracing Window	Spread Tracing Window	Date	
		13/03/22	
		14/03/22	
Day 19		15/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		16/03/22	Start of precautionary spread tracing window (source + 24h).
Day 17		17/03/22	
Day 16		18/03/22	
Day 15		19/03/22	
Day 14		20/03/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	21/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	22/03/22	
Day 11	Day 3	23/03/22	
Day 10	Day 4	24/03/22	
Day 9	Day 5	25/03/22	
Day 8	Day 6	26/03/22	
Day 7	Day 7	27/03/22	
Day 6	Day 8	28/03/22	
Day 5	Day 9	29/03/22	
Day 4	Day 10	30/03/22	
Day 3	Day 11	31/03/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	01/04/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	02/04/22	
	Day 14	03/04/22	Precautionary onset of clinical signs.
	Day 15	04/04/22	11 ducks found dead (may have died overnight) and neurological signs seen in house 1
	Day 16	05/04/22	69 deaths, 601 sick birds culled. Notification of suspicion of disease to APHA. (DPR 2022/83). Restrictions served. Carcasses collected.
		06/04/22	APHA investigation and sampling. HPAI H5N1 confirmed by CVO based on PCR results from carcasses with case reference AIV2022 37
		07/04/22	
		08/04/22	Culling commenced
		09/04/22	
		10/04/22	Culling completed
		11/04/22	Preliminary C&D completed
		12/04/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

39 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-82 birds.

0 premises holding both pigs and poultry.

15 premises holding both pigs and poultry.

SZ/RZ (3-10 km)

111 premises with poultry were reported to be within 10 km of the IP holding between 1-50,000 birds.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were identified for a visiting area manager, a builder (who could not be contacted), feed deliveries and straw deliveries during the high-risk window. Enquiries were also made about the source of the straw. It came from a local farm with no poultry on site. All tracings were deemed low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds. This was attributed a high likelihood with low uncertainty.

Assessment and evidence base for the likely source

There were various biosecurity inadequacies in the routine management of the unit which would have promoted indirect contact with wild birds on the site. These included:

- (i) storage of straw bedding in open sided barn that could be accessed by wild birds
- (ii) daily addition of straw bedding involving taking a tractor, trailer and straw chopper into the houses
- (iii) poorly maintained outside areas which could encourage vermin
- (iv) clothing and footwear not dedicated to bird areas
- (v) hygiene barrier in lobby area not suitable for purpose.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

All other potential spread pathways were negligible likelihood with low uncertainty except one which was considered to be low likelihood with medium uncertainty. The medium uncertainty level reflected the fact that the particular visitor could not be contacted.

Remaining uncertainty

The builder who visited the site during the source and spread period could not be contacted.

AIV 2022/38, Near Tedburn St Mary, Teignbridge, Devon, England

Description of the premises

Overview of the premises and the wider business

This premises was a private dwelling with a small flock of ducks and chickens producing eggs for household consumption only.

Species and number of each present

10 ducks, 25 chickens.

Description of the housing

The birds were kept in the back garden of the property in three wooden sheds, with beak-to-beak contact. Since the Housing Order came into force, they had occasionally been allowed out into a netted enclosure. There was a pond in the garden that was used by the ducks. Corvids were known to visit the garden but there were no reports of waterfowl.

Plan of the infected premises

Figure 354: Plan of AIV 2022/38

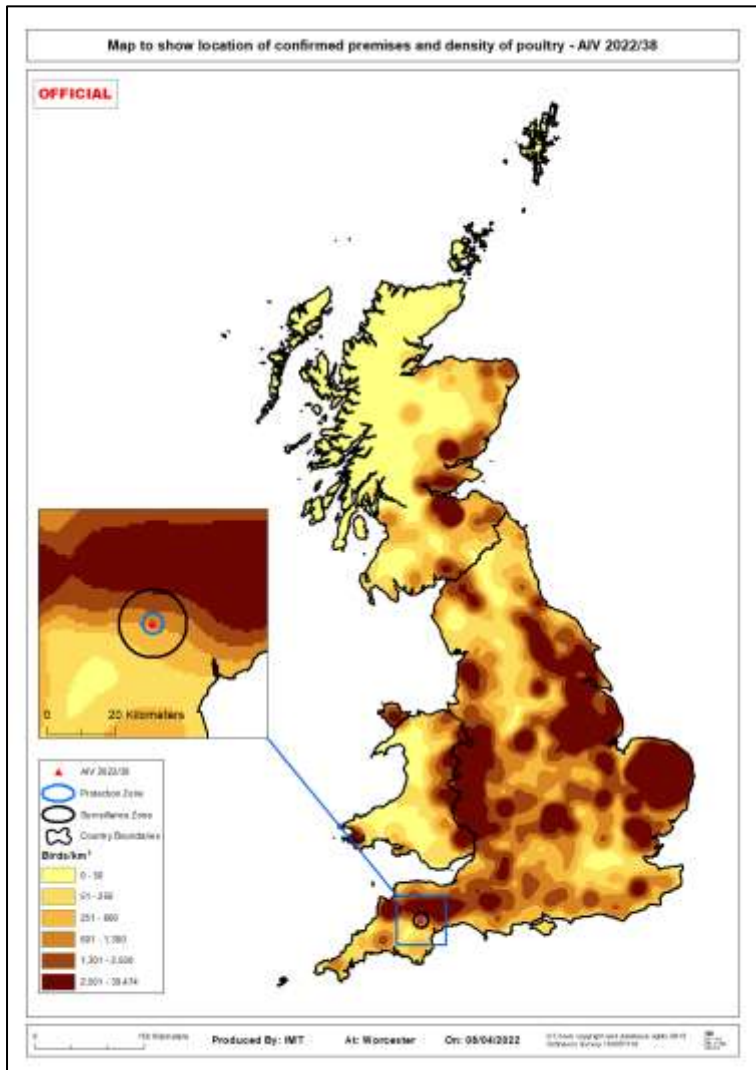


Overview of biosecurity

The biosecurity was poor with no points for cleansing and disinfection or dedicated footwear.

Map with location in Great Britain and poultry density

Figure 355: Location of IP and poultry density



Overview of the surrounding area

There was a pond and woodland nearby.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Pond and woodland nearby. This premises was linked to AIV 2022/36 through the purchase of ducks during the high-risk spread tracing period.

Clinical picture

30/03/2022 – Five ducks were purchased during the high-risk tracing window from what became AIV 2022/36.

02/04/2022 – One chicken was seen ill.

03/04/2022 – The chicken that was ill died and two more were ill with diarrhoea.

05/04/2022 – Nine chickens and one duck died overnight. Suspicion of avian notifiable disease was reported to APHA. At the APHA investigation the chickens presented with yellow diarrhoea and swollen heads. Some ducks had opaque corneas and torticollis.

06/04/2022 – In light of the clinical picture and the epidemiological link with AIV 2022/36, the UK CVO decided to slaughter on suspicion and this case became AIV SOS 2022/07.

Timeline

Tracings windows

Source tracings window:

High-risk:	30/03/2022 to 01/04/2022
Likely:	18/03/2022 to 29/03/2022
Precautionary:	15/03/2022 to 17/03/2022

Spread tracings window:

High-risk:	31/03/2022 to 05/04/2022
Likely:	19/03/2022 to 30/03/2022
Precautionary:	16/03/2022 to 18/03/2022

Most likely date of infection: 30/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 356: Source and spread timeline for AIV 2022/38

Source Tracing Window	Spread Tracing Window	Date	
Day 17		15/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		16/03/22	Start of precautionary spread tracing window (source + 24h).
Day 15		17/03/22	
Day 14		18/03/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 12	Day 1	19/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 13	Day 2	20/03/22	
Day 12	Day 3	21/03/22	
Day 11	Day 4	22/03/22	
Day 10	Day 5	23/03/22	
Day 9	Day 6	24/03/22	
Day 8	Day 7	25/03/22	
Day 7	Day 8	26/03/22	
Day 6	Day 9	27/03/22	
Day 5	Day 10	28/03/22	
Day 4	Day 11	29/03/22	
Day 3	Day 12	30/03/22	Most likely infection date. Five ducks purchased from AIV 2022-36; the most likely pathway. Start of high risk source tracing window (-3d)
Day 2	Day 13	31/03/22	Start of high risk spread windows(source +24h).
Day 1	Day 14	01/04/22	
	Day 15	02/04/22	One chicken ill. Precautionary onset of clinical signs.
	Day 16	03/04/22	
	Day 17	04/04/22	
	Day 18	05/04/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/082). Restrictions served.
	Day 19	06/04/22	Premises confirmed as a Slaughter-On-Suspicion with reference SOS 2022-07
	Day 20	07/04/22	H5N1 confirmed by CVO with reference AIV 2022-38. Culling commenced and completed. Preliminary C & D applied
	Day 21	08/04/22	Preliminary C & D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

39 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-34,250 birds.

0 premises holding both pigs and poultry.

22 premises holding both pigs and poultry.

SZ/RZ (3-10 km)

195 premises with poultry are reported to be within 10 km of the IP holding between 1-36,647 birds Investigations on the infected premises.

Source investigations:

Hypothesis for the source

The most likely source identified was introduction of live birds from an infected premises.

Assessment and evidence base for the likely source

The ducks from AIV 2022/36 were purchased within the high-risk source window and known to be infected at the time of introduction.

Spread investigations:

Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/39, Near Ilminster, South Somerset, Somerset, England

Description of the premises

Overview of the premises and the wider business

This was a mixed poultry commercial smallholder hobby farm.

Eggs were sold at the farm gate using an “honesty box” system and egg sales were untraceable.

The keeper also owned 2 sows, 1 boar and 18 piglets at a different location 4 miles away.

Three ducks were purchased on 2/4/2022 from a farm, later confirmed as AIV 2022/36. The purchase date was within the high-risk spread window of AIV 2022/36 (confirmed IP on 06/04/2022, following report of suspicion on 04/04/2022, when movement restrictions were placed).

Species and number of each present

114 chickens and 9 ducks

21 pigs at a different location 4 miles away

Description of the housing

Ducks and chickens on the premises were kept in the following groups:

1- Ducks – Three purchased ducks and six resident ducks in a wooden shed with access to a run covered in mesh with a solid roof

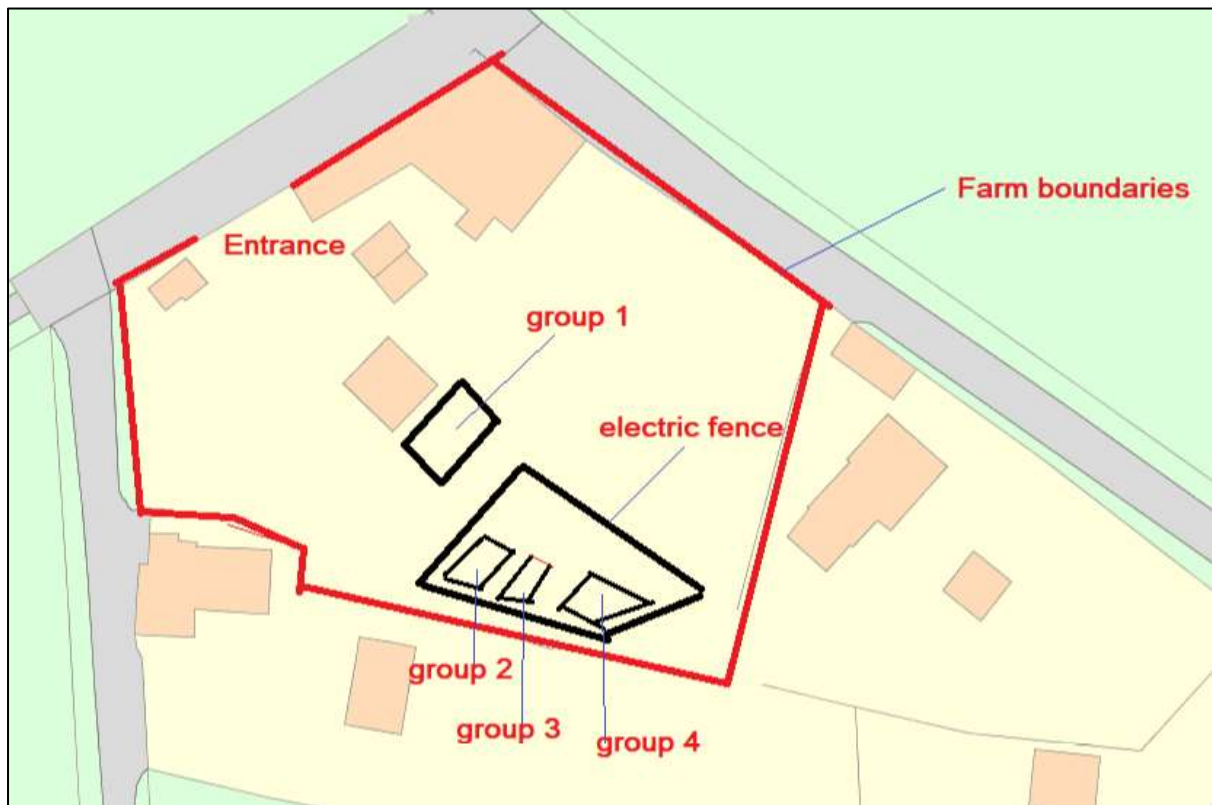
2- Chickens – 20 chickens in a wooden shed with access to a run made of mesh, with a solid roof. This shed was in same field as Group 1 at approximately 20 m distance.

3- Chickens – Seven young birds in a wooden shed with access to a run with a solid roof.

4- Chickens – 87 hens in a wooden shed with access to a run with textile mesh on top.

Plan of the infected premises

Figure 357: Plan of AIV 2022/39



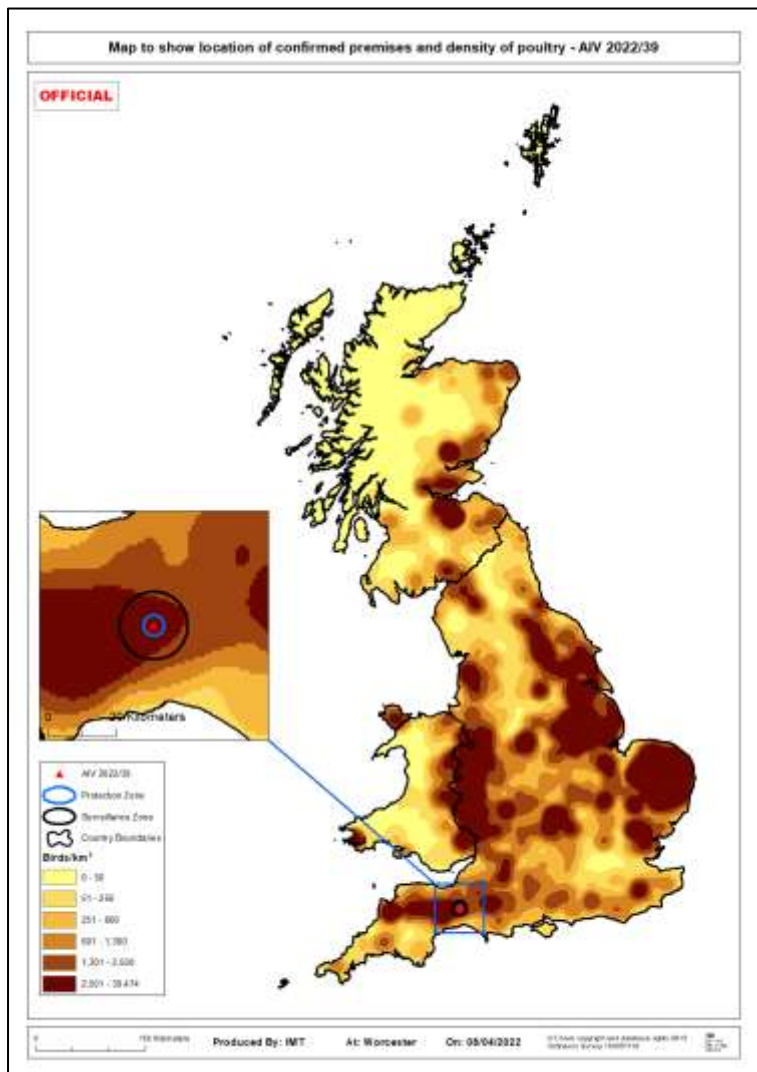
Overview of biosecurity

The owner/keeper was the only person routinely involved with the poultry and had awareness of biosecurity principles. Biosecurity was reasonable for the category of premises, with effective group separation and some disinfectant foot baths (although disinfectant was not approved for poultry diseases). However the possibility of direct or indirect contact with wild birds could not be ruled out. The only vermin control was electric fencing against foxes. Contact with other vermin was possible.

Some biosecurity measures were in place when attending the pigs 4 miles away. PPE was dedicated to the pig location and no equipment/product was shared with the birds.

Map with location in Great Britain and poultry density

Figure 358: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density, but there were no other poultry immediately around the farm.

The IP appeared to be relatively isolated from previous IPs, with the nearest one being AIV 2022/36 (also the IP from where ducks were purchased), 28 miles away.

Ornithological assessment:

Desktop assessment: Not carried out.

Local intelligence: Nothing to note.

Clinical picture

02/04/2022 – the three purchased ducks were mixed with the 6 resident ducks. The owner noticed that the purchased ducks were not eating from the time of their arrival

and showed abnormal nervous clinical signs from 03/04/2022. The owner then separated the purchased ducks from the resident ducks.

05/04/2022 – Suspicion of avian notifiable disease was reported by the owner.

06/04/2022 – At the time of the investigation visit, all three purchased ducks had been found dead and the 6 resident ducks were very quiet and had not laid eggs. Samples were taken

One resident duck was subsequently found dead on 07/04/2022 and another on 08/04/2022 when the first clinical signs in the chickens were seen.

08/04/2022 – three chickens in the group of layers (Group 4) were found dead, five more died during the day and eight more displayed neurological clinical signs.

Timeline

Tracings windows

Source tracings window:

High-risk:	02/04/2022 to 02/04/2022
Likely:	19/03/2022 to 01/04/2022
Precautionary:	15/03/2022 to 18/03/2022

Spread tracings window:

High-risk:	02/04/2022 to 05/04/2022
Likely:	20/03/2022 to 01/04/2022
Precautionary:	16/03/2022 to 19/03/2022

Most likely date of infection: 02/04/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 359: Source and spread timeline for AIV 2022/39

Source Tracing Window	Spread Tracing Window	Date	
Day 19		15/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		16/03/22	Start of precautionary spread tracing window (source + 24h).
Day 17		17/03/22	
Day 16		18/03/22	
Day 15		19/03/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 14	Day 1	20/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 13	Day 2	21/03/22	
Day 12	Day 3	22/03/22	
Day 11	Day 4	23/03/22	
Day 10	Day 5	24/03/22	
Day 9	Day 6	25/03/22	
Day 8	Day 7	26/03/22	
Day 7	Day 8	27/03/22	
Day 6	Day 9	28/03/22	
Day 5	Day 10	29/03/22	
Day 4	Day 11	30/03/22	
Day 3	Day 12	31/03/22	
Day 2	Day 13	01/04/22	
Day 1	Day 14	02/04/22	Most likely infection date for this IP and start of high risk source tracing window , when affected birds (three ducks) collected from what is now IP AIV 2022-36. Precautionary onset of clinical signs at IP. Start of high risk spread tracing window
	Day 15	03/04/22	Clinical signs seen by keeper on purchased ducks- nervous signs and inappetance
	Day 16	04/04/22	
	Day 17	05/04/22	Notification of suspicion of disease to APHA. Restrictions served. 3 purchased ducks are lethargic, showing neurological signs and are not eating or drinking
	Day 18	06/04/22	APHA investigation and sampling (DPR 2022/84). 3 purchased ducks found dead. Resident ducks stopped laying eggs (first clinical signs on resident birds)
	Day 19	07/04/22	First resident duck death
	Day 20	08/04/22	First signs in chickens (separate epi group) noticed. HPAI H5N1 confirmed on lab results. Culling complete. Preliminary C&D complete
	Day 21	09/04/22	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

75 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-621 birds.

0 premises holding both pigs and poultry.

42 premises holding both pigs and poultry.

SZ/RZ (3-10 km)

115 premises with poultry were reported to be within 10 km of the IP holding between 1-215,000 birds.

Investigations on the infected premises

Overview of tracing activities

Animal products: Eggs were sold locally at farm gate with an honesty box system. Eggs were untraceable but only a very small quantity and none produced after the 02/04/2022 were sold.

People movements: Keeper to location 4 mile away where pigs kept. Dedicated PPE was used and there were no poultry at the location. Tracing closed with no further action.

Vehicle movements: Vehicle of a keeper's family relative that transported the purchased ducks on 02/04/2022. The car was disinfected with approved disinfectant and the driver did not own or contact any other poultry. Tracing closed with no further action.

Source investigations:

Hypothesis for the source

The most likely source identified was the purchase of 3 infected ducks on 02/04/2022, during the high-risk spread window from the premises subsequently confirmed as IP AIV 2022/36.

Assessment and evidence base for the likely source

02/04/2022 – the first clinical signs were observed in purchased ducks immediately after their arrival on farm.

06/04/2022 – the first clinical signs in the resident ducks were observed which corresponded with a most likely infection date of 02/04/2022, when the purchased and resident ducks were mixed.

08/04/2022 – the first evidence of spread into chickens (a separate epidemiological group) of mortality and clinical signs was seen.

Spread investigations:

Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

While there is high certainty in the introduction of disease via purchased ducks, the possibility of a parallel incursion of disease via direct/indirect contact with infected wild birds could not be ruled out.

AIV 2022/40, Near Eye, Mid Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a small commercial poultry and waterfowl breeder and seller with 183 mixed poultry (chickens, ducks, geese) of different breeds and ages.

Also present on site were pygmy goats (9 adults and 1 kid), Sheep (19 adults and 11 lambs), pigs (5 adults and 12 piglets), 3 dogs and 2 cats.

In addition to the poultry breeding/sales business the owner also ran a business offering several other services:

1. Dog walking or dog day care/livestock & pet holiday relief (including poultry care) or pet care in your own home or animal socialising /pet taxi service – with most species of animals & livestock catered for,
2. Incubator space available for rental for all poultry and waterfowl hatching needs on the premises,
3. Incubators or brooders were available for hire for school projects/care homes for chick hatching,
4. Sales of a small range of hen houses, brooders, heat lamps, feeders, poultry and waterfowl feed,
5. Provision of full poultry and waterfowl keeping starter kits all year round.

The owner also supplied eggs at the farm gate. However, no moves on or off of live birds or hatching eggs were reported during the precautionary tracing windows.

Species and number of each present

Chickens (126): aged 0-8 years – 18 cockerels, 70 hens and 38 chicks.

Ducks (53): aged 0-3 years – 39 ducks, 7 drakes, 1 Carolina duck, 1 Carolina drake and 5 ducklings.

Geese (4): aged 2-7 years.

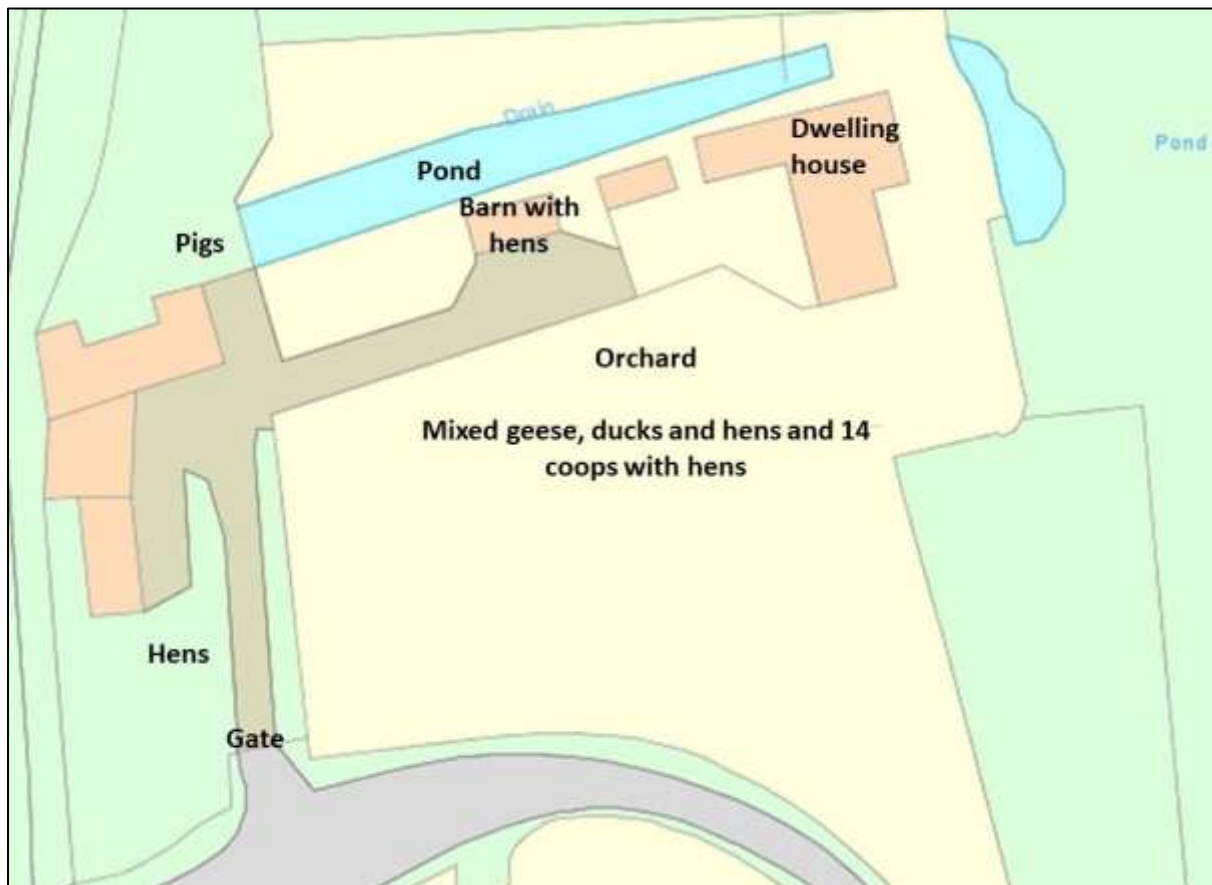
Description of the housing

The ducks and geese were free ranging, moving around in the yard and orchard and in contact with wild birds at the onsite water stream and pond. The owner reported that she had tried to house these but had welfare concerns, contacted her private veterinary surgeon regarding it, and decided to leave them outdoors.

The chickens were kept in 14 coops within the orchard, some in a barn, some in a stable and greenhouse and a smaller number were also accidentally free ranging along with the ducks and geese having escaped from a stable when it was being cleaned out on 04/04/2022. Wild ducks were also mixing with the resident domestic ducks and geese.

Plan of the infected premises

Figure 360: Plan of AIV 2022/40



Overview of biosecurity

Overall, the standard of biosecurity was considered to be suboptimal and the owner did not wear dedicated protective clothing when tending the poultry, although disinfected wellington boots and disposable gloves were reported to be used when accessing the bird areas.

There was a physical barrier at the main gate but overall, the fencing surrounding the premises was not secure and some birds from the premises had been observed to have been straying into neighbouring premises and onto the access lane that ran past the site.

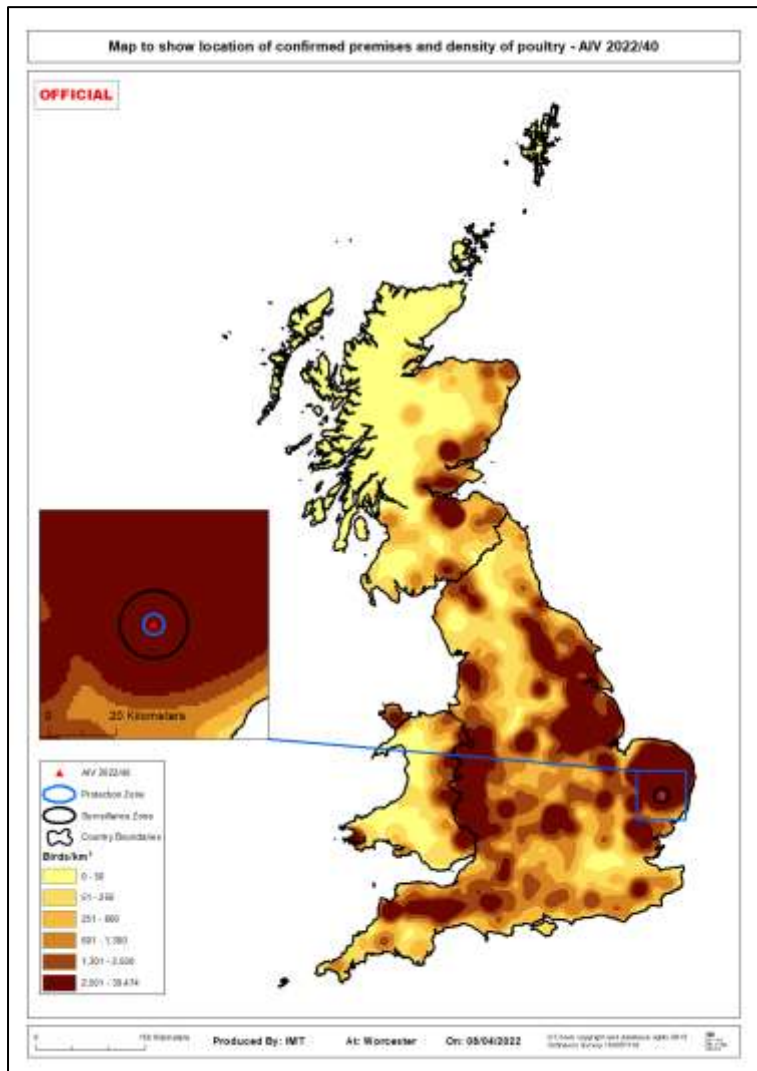
At the main gate access there was a foot pad with approved disinfectant (Neogen Viroxide Super[®]) but it was visibly muddy and so unlikely to be effective. A similar situation was present at the entrance to the orchard. Additional foot dips and brushes were present at the entrance to the stable and the pig enclosure.

Ducks, geese and some of the chickens were free ranging around the yard and orchard and could access the onsite pond and stream which was frequented by wild birds. Wild ducks were seen mixing with resident birds.

There was an obvious rodent problem as evidenced by the placing of rat poison in the barn and reports by the owner that some dead chickens in the barn exhibited signs of rodent predation. In addition to the mesh fronting on the individual chicken coops not being of a gauge likely to prevent rodent access there was also some apparent evidence of potential rodent damage (gnaw marks) on the wood frames of some of the coop doors in the orchard.

Map with location in Great Britain and poultry density

Figure 361: Location of IP and poultry density.



Overview of the surrounding area

This premises was situated within an area of high poultry density and was within the Surveillance Zones of AIV 2022/25 (confirmed 26/02/22) and AIV 2022/28 (confirmed 11/03/22). Several other confirmed IPs were present within the surrounding area.

A large commercial broiler unit belonging to a large integrated poultry company was located approximately 200 metres away and both premises shared a common

access lane. There had been reports of some semi-wild ducks from this IP flying over the fences and straying onto this lane and into neighbouring areas. At the time of the investigation the broiler unit was in the process of depopulating birds to slaughter.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The onsite pond and orchard were frequented by wild birds including wild waterfowl and wild ducks were seen mixing with the resident poultry.

Clinical picture

01/04/2022 – one hen in the barn was found dead.

02/04/2022 and 03/04/22 – one hen died on each day.

04/04/2022 – two hens died,

05/04/2022 – five hens died in the barn.

06/04/2022 – a further three hens were found dead in coops in the orchard and suspicion of notifiable avian disease was reported. The owner had initially attributed the deaths in the barn to accidental poisoning by rat baits being used in the barn and did not become concerned until finding the five dead hens in the barn on 05/04/2022. At the time of notifying suspicion of disease to APHA the owner had reported that some of the dead birds had exhibited yellow-green diarrhoea, some with purple tinged combs and that some of the birds in the barn were dull and not drinking or eating much. Other than three bagged carcasses being retained at the time of the report case, the owner had incinerated the others on a bonfire on 05/04/2022.

06/04/2022 – during the investigation five hens in the orchard were exhibiting lethargy, dullness, depression and were moribund. During sampling one affected hen died and the owner euthanased a further two on welfare grounds. All other birds on site appeared clinically normal.

08/04/2022 – a further five hens died (three in the barn, two in the orchard).

Nasal swabs were collected from 10 pigs on 08/04/2022 (with the exception of one recently farrowed sow and her litter which were not sampled on health and safety and animal welfare grounds as the sow was aggressively defensive of her litter however, she had been mixing with the other pigs until 07/04/2022). All swabs tested negative to HPAI H5 PCR test.

Timeline

Tracings windows

Source tracings window:

High-risk: 28/03/2022 to 06/04/2022
 Likely: 17/03/2022 to 27/03/2022
 Precautionary: 16/03/2022 to 16/03/2022

Spread tracings window:

High-risk: 29/03/2022 to 06/04/2022
 Likely: 18/03/2022 to 28/03/2022
 Precautionary: 17/03/2022 to 17/03/2022

Most likely date of infection: 28/03/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 362: Source and spread timeline for AIV 2022/40

Source Tracing Window	Spread Tracing Window	Date	
Day 15		16/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 14		17/03/22	Start of precautionary spread tracing window (source + 24h). Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	19/03/22	
Day 11	Day 3	20/03/22	
Day 10	Day 4	21/03/22	
Day 9	Day 5	22/03/22	
Day 8	Day 6	23/03/22	
Day 7	Day 7	24/03/22	
Day 6	Day 8	25/03/22	
Day 5	Day 9	26/03/22	
Day 4	Day 10	27/03/22	
Day 3	Day 11	28/03/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/03/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/03/22	
	Day 14	31/03/22	Precautionary onset of clinical signs.
	Day 15	01/04/22	1 chicken found dead in barn in morning.
	Day 16	02/04/22	1 chicken found dead in barn.
	Day 17	03/04/22	1 chicken found dead in barn.
	Day 18	04/04/22	2 chickens found dead in barn.
	Day 19	05/04/22	5 chickens found dead in barn.
	Day 20	06/04/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/85). Restrictions served. 3 chickens found dead in coops. 5 hens in orchard showing clinical signs at time of investigation.
	Day 21	07/04/22	
	Day 22	08/04/22	HPAI H5N1 confirmed based on PCR results with case reference AIV 2022/40.
	Day 23	09/04/22	Culling commenced and completed.
	Day 24	10/04/22	Preliminary C&D completed.
	Day 25	11/04/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

58 premises with poultry were reported to be within 3 km of the IP with the premises holding between 1-141,963 birds (6 premises with 50 or more birds)

One premises holding both pigs and poultry

SZ/RZ (3-10 km)

273 premises with poultry were reported to be within 10 km of the IP holding between 1-352,110 birds (44 premises with 50 or more birds)

23 premises holding both pigs and poultry

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were initiated for a builder, the feed supplier, seven visitors (of whom some also received table eggs) and four people who received feed from the IP. These telephone tracings resulted in four visits to contacts who kept birds of their own. These comprised three of the visitors and one recipient of feed. All tracings were closed following assessment as being of very low risk.

Source investigations:

Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Ducks, geese and some hens were free ranging through the yard and orchard and could access an onsite pond and stream frequented by wild birds, including wild waterfowl.

Biosecurity was suboptimal and there were rodent problems across the site (including in the barn where the first deaths were observed). There was evidence of rodents accessing some feed bags stored for private use in the back of a Gator vehicle, although not the main feed storage bin, and evidence of apparent rodent damage on some of the outside chicken coops.

Spread investigations:

Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

Tracings investigations showed that all other potential spread pathways were of low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/41 Near Tedburn St Mary, Teignbridge, Devon, England

Description of the premises

Overview of the premises and the wider business

The IP was a mixed flock of birds and was part of a commercial beef and sheep enterprise occupying 24 acres. It was mainly a hobby poultry farm but sometimes live birds were sold.

Approximately 180 mixed species and breeds of poultry and captive bird species were present on site kept in several different groups across the site.

A total of three staff, the family members, tended to the livestock and birds and none of the family had contact with other poultry units. None had attended any poultry sales since October 2021.

All eggs were reported to be consumed by the family with none being sold or otherwise gifted or moved off the premises. There were no reported movements of live birds on or off the farm since at least October 2021 however, there was some uncertainty due to a lack of record keeping.

The owner also worked as a gardener at local properties and reported that none of his clients kept poultry.

Species and number of each present

- Chickens – 64 (mixed breeds and crossbreeds) Ducks – 17 (mixed breeds and crossbreeds)
- Turkeys – 2 Pigeons – 76 (racing and fancy breeds) Aviary birds – 23 (mixed breeds and species)

All birds were aged over 12 months had previously been purchased. There had been no moves on since at least October 2021.

Other species on site:

- 24 Rabbits kept in hutches outside around the private dwelling.
- 15 cattle
- 1 goat
- 136 adult sheep + approximately. 50 lambs
- 3 house dogs – these were taken for walks up the lane rather than down onto the farming area of the property
 - 3 house cats, no feral cats.

Description of the housing

The poultry were kept in runs and poultry arcs, separated by species. The chickens and turkeys were housed in solid wooden and wire mesh pens/hutches within a paddock, fenced around with pig wire.

The pigeons and aviary birds were housed in similarly enclosed accommodation.

Ducks were housed in a solid wood and metal roofed house with access to a fenced pen which had no netting over top and so was accessible to wild birds.

In front of the cattle shed was a concreted area on which some pigeons were housed. All other birds' accommodation was on earth/field type flooring. There was some pooling of water next to the ducks, but all other areas were dry at the time of visit.

Wild ducks were known to access the paddock area and the concreted area so could potentially have had direct beak to beak contact with the enclosed birds.

The birds had been housed since the mandatory Housing Order came into force on 07/11/2021.

Plan of the infected premises

Figure 363: Plan of AIV 2022/41

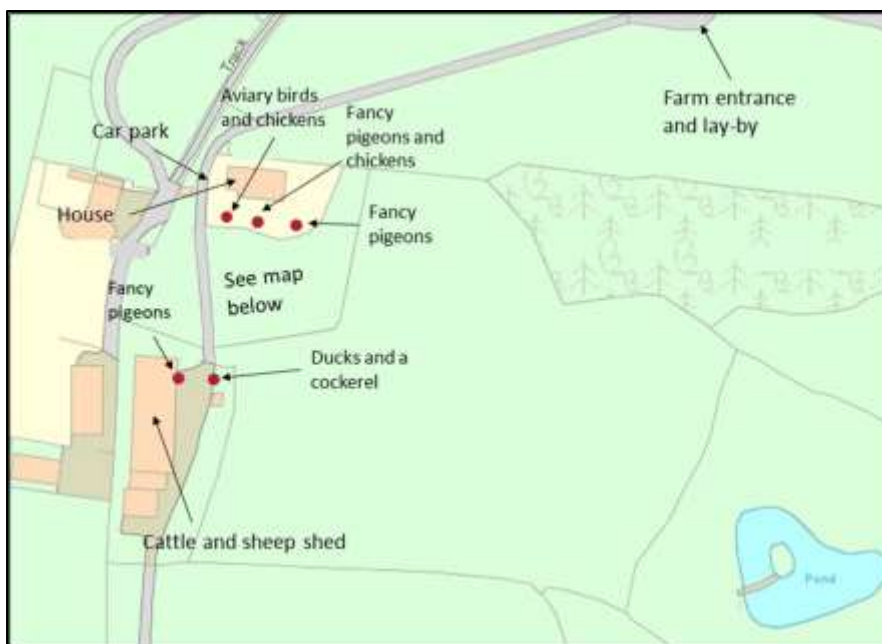
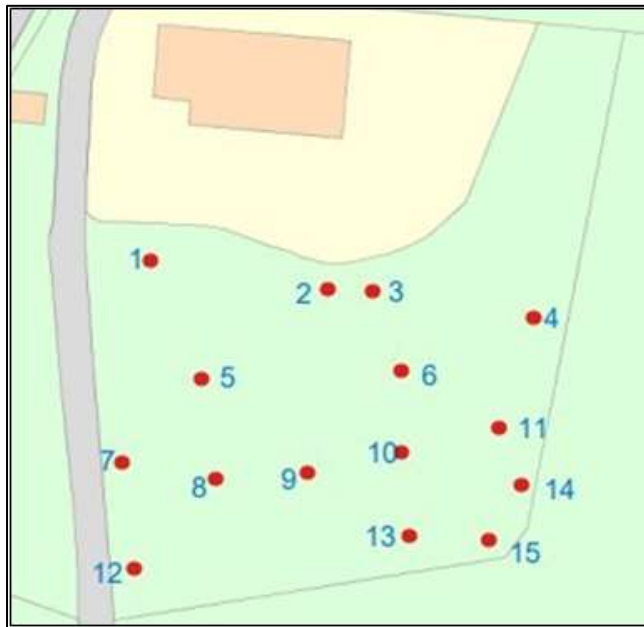


Figure 364: Detail of the locations in the paddock



- Key:
- 1. Racing pigeons
 - 3. Turkeys
 - 2. & 4 – 15 Small groups of chickens (between 1 -10 in each)

Overview of biosecurity

Overall, biosecurity standards were found to be poor.

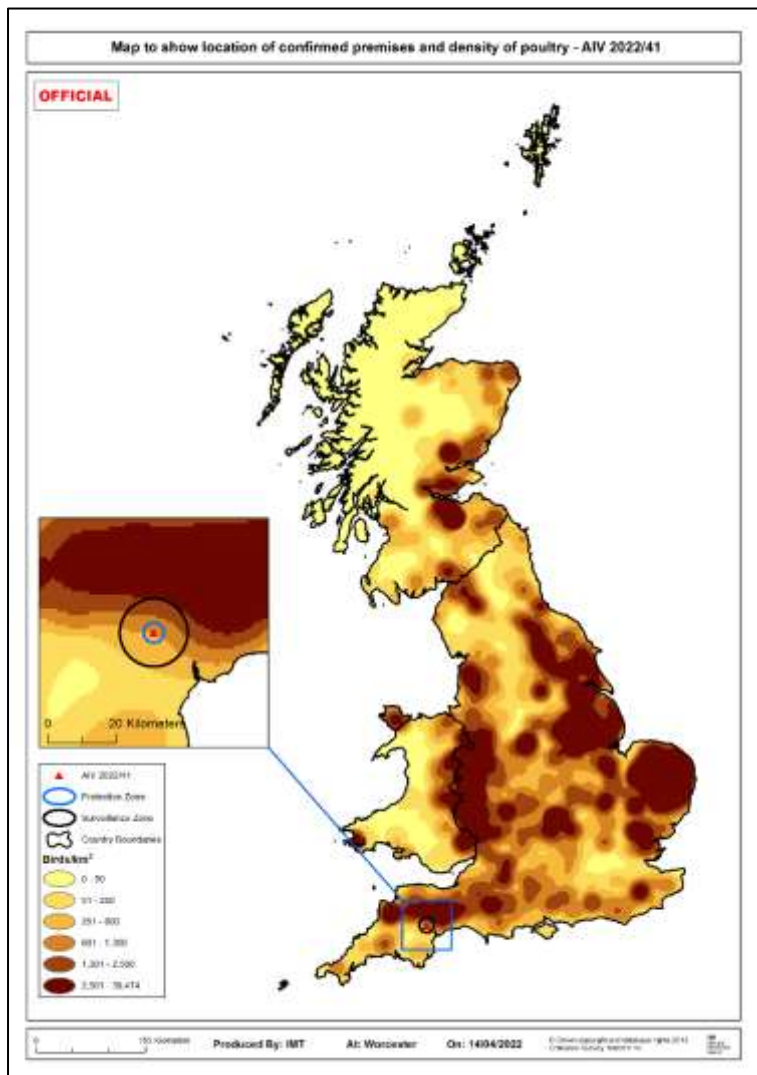
There was no use of disinfectant foot dips and no formal rodent control was in although no particular rodent issues reported.

All housing apart from the duck pen was of solid construction with little chance of entry by wild birds into the housing. Most birds were kept in a small paddock fenced with pig wire – however wild ducks could enter the paddock and have beak to beak contact with the poultry. There was a pond nearby and the owner had observed wild ducks in the paddock.

No records were kept in relation to the poultry.

Map with location in Great Britain and poultry density

Figure 365: Location of IP and poultry density



Overview of the surrounding area

The premises was located in an area of medium poultry density and within the surveillance zones of AIV 2022/36 (confirmed 06/04/22) and AIV 2022/38 (confirmed 07/04/22). No direct epidemiological links to either of these IPs had been identified.

There was a large ornamental pond approximately 170 m to the southeast of the paddock. Wild ducks lived on the pond and visited the premises, although they were not fed or otherwise encouraged.

Garden birds, crows and rooks were also seen in the area.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Wild ducks visited the site and other wild birds were seen in the area.

Two Canada geese collected as part of the wild bird surveillance scheme on 06/04/22 from Shobrooke, Devon (approximately 7.5 km from the premises) tested positive for HPAI H5N1. There had also been other wild bird positive cases in the Exeter area between February and April 2022.

Clinical picture

12/04/2022 to four chickens were found dead and two others were culled by the owner on welfare grounds as they were showing signs of disease. Several other chickens were reported to be lethargic and showing signs of diarrhoea and congested combs. Suspicion of notifiable avian disease was reported.

At the APHA investigation the same day, it was confirmed that only the chicken groups were clinically affected and showing suspect clinical signs of sudden onset of mortality, lethargy, diarrhoea, inflamed combs, low appetite, drooping of the wings and swollen legs. Egg production was reported to have dropped slightly in the laying hens in the last few days, but there had been no observed change in feed and water intake.

The other bird species groups were reported to be in good health.

Timeline

Tracings windows

Source tracings window:

High-risk:	08/04/2022 to 10/04/2022
Likely:	28/03/2022 to 07/04/2022
Precautionary:	22/03/2022 to 27/03/2022

Spread tracings window:

High-risk:	09/04/2022 to 12/04/2022
Likely:	29/03/2022 to 08/04/2022
Precautionary:	23/03/2022 to 28/03/2022

Most likely date of infection: 08/04/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 366: Source and spread timeline for AIV 2022/41

Source Tracing Window	Spread Tracing Window	Date	
Day 20		22/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		23/03/22	Start of precautionary spread tracing window (source + 24h).
Day 18		24/03/22	
Day 17		25/03/22	
Day 16		26/03/22	
Day 15		27/03/22	
Day 14		28/03/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	29/03/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	30/03/22	
Day 11	Day 3	31/03/22	
Day 10	Day 4	01/04/22	
Day 9	Day 5	02/04/22	
Day 8	Day 6	03/04/22	
Day 7	Day 7	04/04/22	
Day 6	Day 8	05/04/22	
Day 5	Day 9	06/04/22	
Day 4	Day 10	07/04/22	
Day 3	Day 11	08/04/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	09/04/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	10/04/22	
	Day 14	11/04/22	Precautionary onset of clinical signs.
	Day 15	12/04/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/90). Restrictions served.
	Day 16	13/04/22	HPAI H5N1 confirmed on PCR (AIV 2022/41).
	Day 17	14/04/22	Culling commenced and completed. Preliminary C&D completed.
	Day 18	15/04/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

51 premises with poultry were reported to be within 3 km of the IP holding between 1-36,647 birds (1 premises with 50 or more birds).

One premises holding both pigs and poultry.

SZ/RZ (3-10 km)

265 premises with poultry are reported to be within 10 km of the IP holding between 1-25,000 birds (20 premises with 50 or more birds).

20 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for a private vet who visited the premises during the high-risk tracing windows. No other poultry contacts were identified for this tracing and it was assessed as very low risk, no further action was required and the tracing was closed.

Source investigations:

No source tracings were identified.

Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

A pond containing wild ducks was located approximately 170 m away from the poultry areas.

Wild ducks were known to visit the paddock containing the chicken coops and beak to beak contact could be possible. Garden birds and corvids had also been observed in the immediate area.

The netted enclosures could easily have been contaminated with wild bird faeces.

Two Canada geese collected on 06/04/22 from Shobrooke, Devon (approximately 7.5 km from the premises) as part of the wild bird surveillance scheme tested positive for HPAI H5N1, in addition to other wild bird positive cases in the Exeter area between February and April 2022.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

All other potential spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

Some uncertainty remained because of the lack of record keeping in relation to the poultry and captive bird collection.

AIV 2022/42, Near Ilkeston, Erewash, Derbyshire, England

Description of the premises

Overview of the premises and the wider business

This was a mixed backyard flock of birds between two and six years old. The chicken eggs were eaten by the owners but the duck eggs are sold via an honesty box, with no records being kept.

Species and number of each present

9 chickens, 30 ducks and 4 geese.

Description of the housing

The birds were kept together in one large shed with mesh sides, wired underneath and with a solid roof. They had been housed since the Housing Order but had been let out twice a week whilst the enclosure was cleaned out. During this time, they had access to a gravelled area and a pond where wild birds had frequently been seen.

Plan of the infected premises

Figure 367: Plan of AIV 2022/42

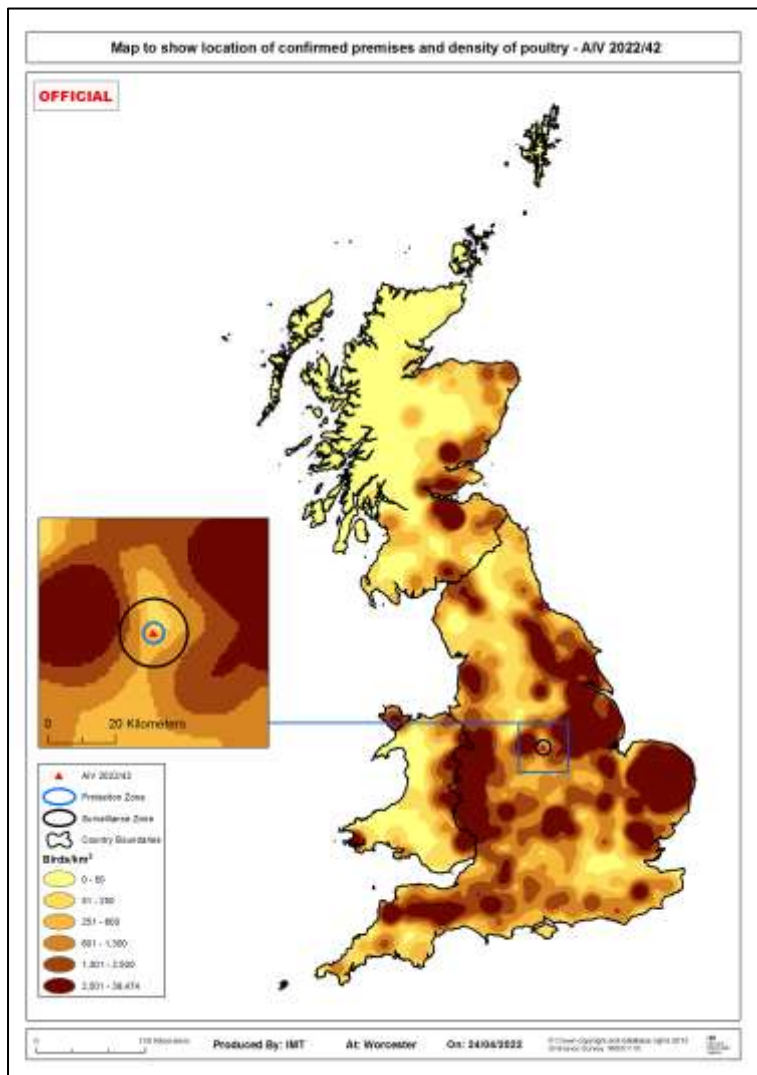


Overview of biosecurity

Biosecurity standards were found to be moderate, with the use of foot bath at the entrance to the shed. Records of bird mortality were kept and the premises were clean, tidy, and well-maintained.

Map with location in Great Britain and poultry density

Figure 368: Location of IP and poultry density



Overview of the surrounding area

The premises was in an urban area made up of residential properties. There were several mature trees nearby and there were open fields and a pond around the village.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: There was a pond in the birds' enclosure that attracted wild ducks.

Clinical picture

17/04/2022 – Two ducks were found dead.

18/04/2022 – Two chickens were found dead.

19/04/2022 – Two more chickens were found dead

21/04/2022 – One chicken and one goose died. Increased mortality, egg drop, appetite reduction and mild diarrhoea was seen in remaining birds. The owner reported suspicion of avian notifiable disease and samples were taken at the investigation.

22/04/2022 – H5N1 HPAI was confirmed by the CVO. The serology results indicated that the ducks had been infected for up to 2 weeks before the sampling date.

Timeline

Tracings windows

Source tracings window:

High-risk:	09/04/2022 to 15/04/2022
Likely:	02/04/2022 to 08/04/2022
Precautionary:	31/03/2022 to 01/04/2022

Spread tracings window:

High-risk:	10/04/2022 to 21/04/2022
Likely:	03/04/2022 to 09/04/2022
Precautionary:	01/04/2022 to 02/04/2022

Most likely date of infection: 09/04/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 369: Source and spread timeline for AIV 2022/42

Source Tracing Window	Spread Tracing Window	Date	
Day 17		31/03/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		01/04/22	Start of precautionary spread tracing window (source + 24h).
Day 15		02/04/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 14	Day 1	03/04/22	Start of likely spread tracing window (source tracing window +24h).
Day 13	Day 2	04/04/22	
Day 12	Day 3	05/04/22	
Day 11	Day 4	06/04/22	
Day 10	Day 5	07/04/22	
Day 9	Day 6	08/04/22	
Day 8	Day 7	09/04/22	Earliest possible infection date based on serology. Start of high-risk source tracing window.
Day 7	Day 8	10/04/22	Start of high risk spread tracing window (source +24h).
Day 6	Day 9	11/04/22	
Day 5	Day 10	12/04/22	
Day 4	Day 11	13/04/22	
Day 3	Day 12	14/04/22	
Day 2	Day 13	15/04/22	
Day 1	Day 14	16/04/22	Latest possible infection date based on serology. Precautionary onset of clinical signs (first deaths overnight 16/17). End of high-risk source tracing window.
	Day 15	17/04/22	
	Day 16	18/04/22	
	Day 17	19/04/22	
	Day 18	20/04/22	
	Day 19	21/04/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/96). Restrictions served.
	Day 20	22/04/22	H5N1 confirmed by CVO with reference AIV 2022-38
	Day 21	23/04/22	Cull started and completed. Preliminary C & D applied
	Day 22	24/04/22	Preliminary C & D consider effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on

Surveillance activity

PZ (0-3 km)

110 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-101 birds.

0 premises holding both pigs and poultry.

18 premises holding both pigs and poultry.

SZ/RZ (3-10 km)

320 premises with poultry were reported to be within 10 km of the IP holding between 1-746 birds.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

The birds were let out twice a week allowing access to areas where wild ducks had been.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2022/43, Near Lowdham, Newark and Sherwood, Nottinghamshire, England

Description of the premises

Overview of the premises and the wider business

This was a free-range table egg laying farm although chickens were housed at the time of notification. Eggs were supplied to a large wholesaler. It was a family run farm that included a 2,000 pig fattening unit in four buildings located approximately 100 m from the chicken housing.

Species and number of each present

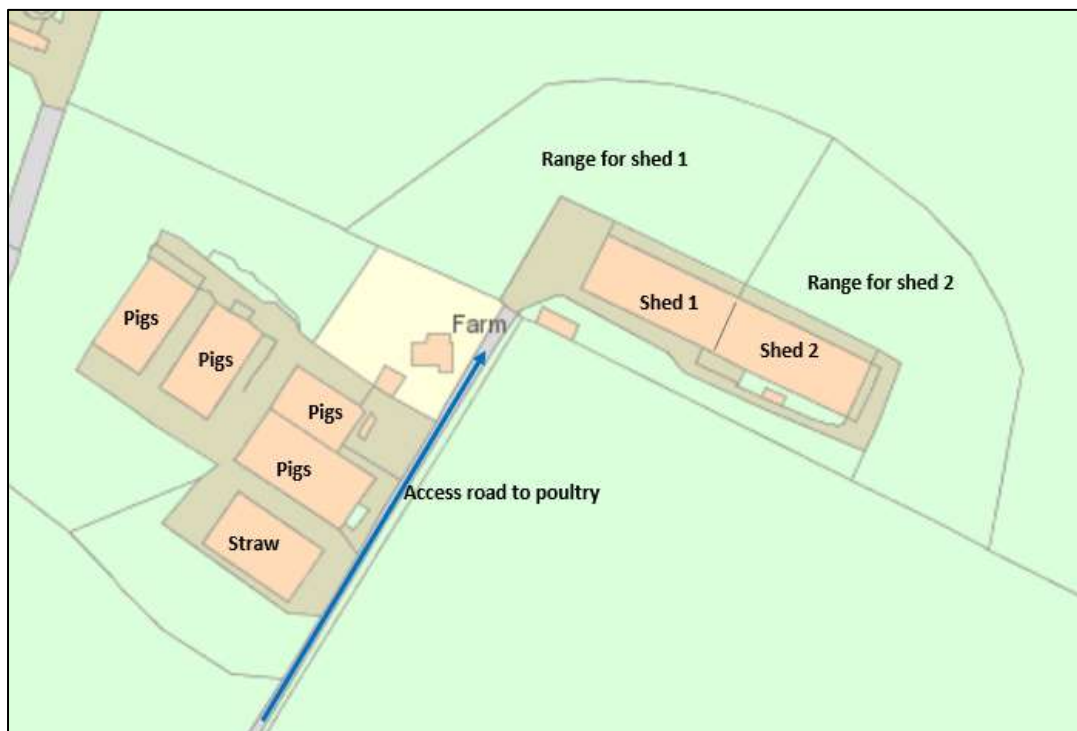
12,000 chickens

Description of the housing

The birds were housed on slats in a flat deck building with hens split into two sections containing 6,000 hens each and separated by an egg collection room in between. The house appeared well built with wooden side walls and a solid roof and was about 20 years old. Ventilation consisted of roof vents and slits in the side walls, all covered with mesh.

Plan of the infected premises

Figure 370: Plan of AIV 2022/43



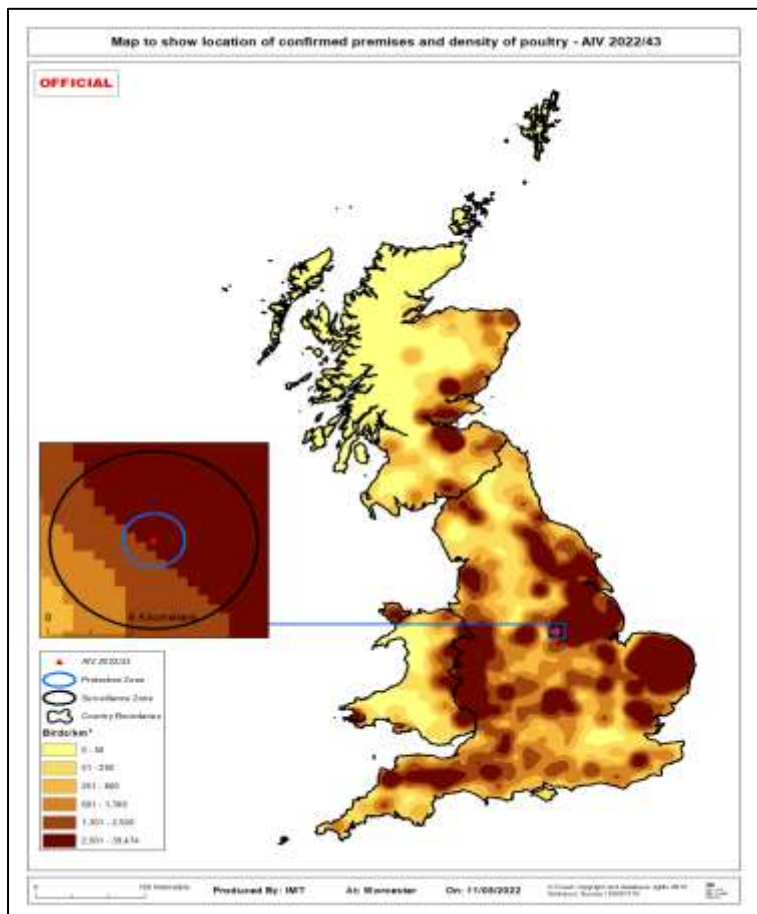
Overview of biosecurity

The poultry were tended to by two family members who had no other poultry contacts. There were biosecurity measures on site with restricted site entry, vehicle washes and foot dips both at the entrance to the bird shed and in front of the pig sheds. No measures were taken by staff moving between the two poultry houses although overalls and hand sanitisers were present. The poultry house was in good condition with no apparent ingress sites for rodents or wild birds.

The chickens had been housed since the national housing order came into place in the previous November (2021) but were let out on 03/05/2022 and 04/05/2022 following the relaxing of the order on 02/05/2022. Flaps leading to the ranges were partly opened by about 10 cm on 02/12/2022 to let some light in. While the hens were unable to exit the shed at this time, they may have stuck their heads outside allowing potential for direct or indirect contact with infected wild birds.

Map with location in Great Britain and poultry density

Figure 371: Location of IP and poultry density



Overview of the surrounding area

Multiple ponds were located on a fish farm about 0.5 km to the west.

Some wild birds, including geese carcasses, were collected as part of the national surveillance scheme for wild bird die-offs on 26/04/22 about 1.5 km to the west. These subsequently tested positive for HPAI H5N1.

Ornithological assessment:

Desktop assessment: Wildfowl were likely to have been abundant and breeding around the numerous waterbodies nearby including the Dover beck (0.5 km), river Trent (6.5 km), ponds and lagoons, and maintaining local circulation of virus.

The recent infected wild geese carcasses close to the Dover beck suggest a local ephemeral source of infection. Gulls especially black headed were likely to be frequent visitors to the infected premises. Starlings and other passerines and woodpigeon were considered common and potentially contributing to infection pressure acquiring infection at a nearby source and moving onto the infected premises as they moved across their daily winter home range.

Local intelligence: It was reported that wild geese, partridges and ducks regularly flew over the farm. Associated with the adjacent estate shoot, pheasants were reported to have regularly roamed the chicken ranges.

Clinical picture

05/05/2022 to 40 dead chickens were found in shed 2. Mortalities continued during the day reaching a total of 147 by the end of the day. Some birds were affected with diarrhoea and water consumption and egg production had reduced.

06/0205/22 – 200 overnight mortalities and birds were lethargic and diarrhoea was again reported in shed 2.

07/05/2022 – in shed 2, the mortality had increased to 50% and the majority of birds Showed clinical signs. Shed 1 remained unaffected. Erysipelas infection was confirmed from samples taken in shed 2 on the 06/05/2022 which may have affected the clinical presentation.

Timeline

Tracings windows

Source tracings window:

High-risk:	01/05/2022 to 03/05/2022
Likely:	20/04/2022 to 30/04/2022
Precautionary:	14/04/2022 to 19/04/2022

Spread tracings window:

High-risk:	02/05/2022 to 06/05/2022
Likely:	21/04/2022 to 01/05/2022
Precautionary:	15/04/2022 to 20/04/2022

Most likely date of infection: 01/05/2022 (Start of high-risk source tracing window).

Timeline chart

Figure 372: Source and spread timeline for AIV 2022/43

Source Tracing Window	Spread Tracing Window	Date	
Day 21		13/04/22	
Day 20		14/04/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		15/04/22	Start of precautionary spread tracing window (source + 24h).
Day 18		16/04/22	
Day 17		17/04/22	
Day 16		18/04/22	
Day 15		19/04/22	
Day 14		20/04/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	21/04/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	22/04/22	
Day 11	Day 3	23/04/22	
Day 10	Day 4	24/04/22	
Day 9	Day 5	25/04/22	
Day 8	Day 6	26/04/22	
Day 7	Day 7	27/04/22	
Day 6	Day 8	28/04/22	
Day 5	Day 9	29/04/22	
Day 4	Day 10	30/04/22	
Day 3	Day 11	01/05/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	02/05/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	03/05/22	Birds let out onto ranges for first time.
	Day 14	04/05/22	Precautionary onset of clinical signs.
	Day 15	05/05/22	40 dead overnight in house 2 & increasing over the day to 147. Suspicion (initial notification) reported to APHA and negated by CAD.
	Day 16	06/05/22	Re-notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/103). Restrictions served. Feed and water intake slightly reduced. No decrease in egg production. 200 more dead.
	Day 17	07/05/22	HPAI H5N1 confirmed by CVO and given case reference AIV2022-43. 50% mortality & 100% morbidity reported in house 2.
	Day 18	08/05/22	
	Day 19	09/05/22	Culling completed.
	Day 20	10/05/22	Preliminary C&D completed.
	Day 21	11/05/22	Preliminary C&D considered effective.
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on		

Surveillance activity

PZ (0-3 km)

6 premises with poultry, including the IP (CPH 32/142/0051), were reported to be within 3 km of the IP with the additional premises holding between 12-85,000 birds (3 premises with 50 or more birds)

0 premises holding both pigs and poultry

SZ (3-10 km)

55 premises with poultry were reported to be within 10 km of the IP holding between 2-452,001 birds (16 premises with 50 or more birds)

6 premises holding both pigs and poultry (10 previously)

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were generated for the egg collection lorry and driver, egg packing station, feed delivery, pig delivery to adjacent sheds, pig worker, a visitor who checked the egg room, carcasses sent to the private vet and an ABP collection. There was some uncertainty around the biosecurity of the ABP collection which took place just before restrictions were served on 06/05/22. As a result, the route of the ABP lorry was scrutinised and seven visits were instructed to premises that had poultry and were visited after the IP. No evidence of disease spread was found and all tracings were closed.

Source investigations:

Within the high-risk source tracing period, an egg collection, a feed delivery, and visit from supervisor for the egg company were investigated.

Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds most likely on the 02 or 03/05/2022 when the chickens were exposed to the outside environment after the pop-hole flaps were partially opened initially and then fully to let them out onto the ranges.

Assessment and evidence base for the likely source

The timing of the release from housing and potential exposure of the chickens to infected wild birds with onset of clinical signs was consistent with the incubation period seen for this virus. Nearby, wild birds had been found infected about a week beforehand. No evidence was found to support the involvement of other risk pathways.

Spread investigations: Assessment of potential and likelihood of spread

An egg collection, dispatch of carcasses for post-mortem examination and collection of animal by-products for disposal were investigated.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/44, Near Southwell, Newark and Sherwood, Nottinghamshire, England

Description of the premises

Overview of the premises and the wider business

This was a small commercial breeding flock of chickens and ducks. Some eggs were hatched on the premises and some were sold at a local club or consumed by the owner and his family.

Species and number of each present

25 chickens and 18 ducks.

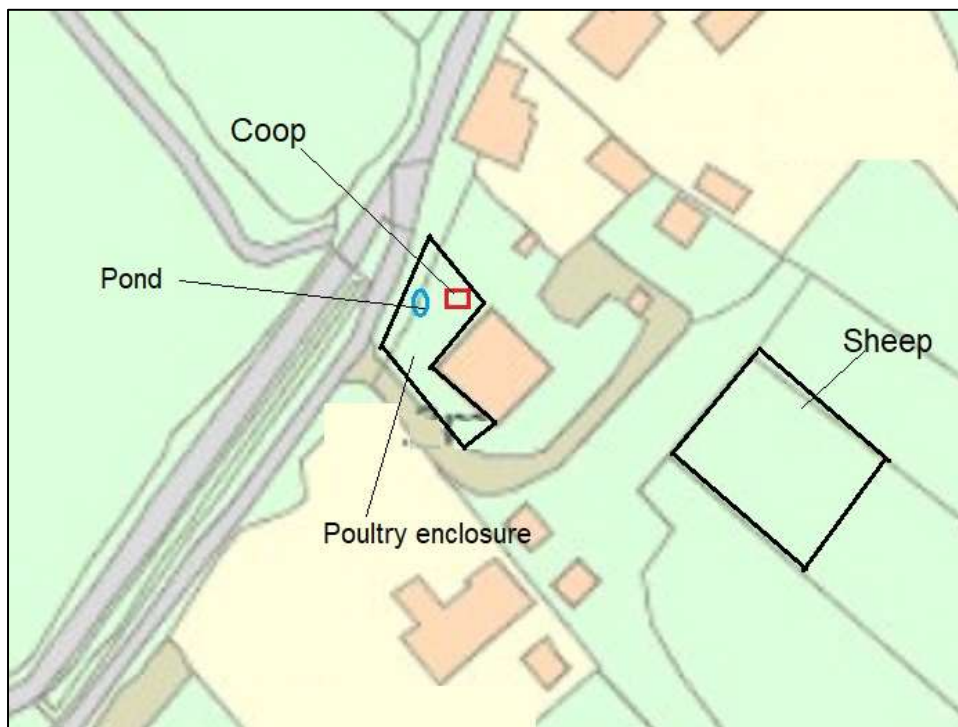
Six sheep.

Description of the housing

The birds were kept in an enclosure at the end of the garden. The enclosure was surrounded by wire mesh on the sides only and contained a straw-bedded shed. Feed troughs and a small artificial pond were also within the enclosure.

Plan of the infected premises

Figure 1: Plan of AIV 2022/44



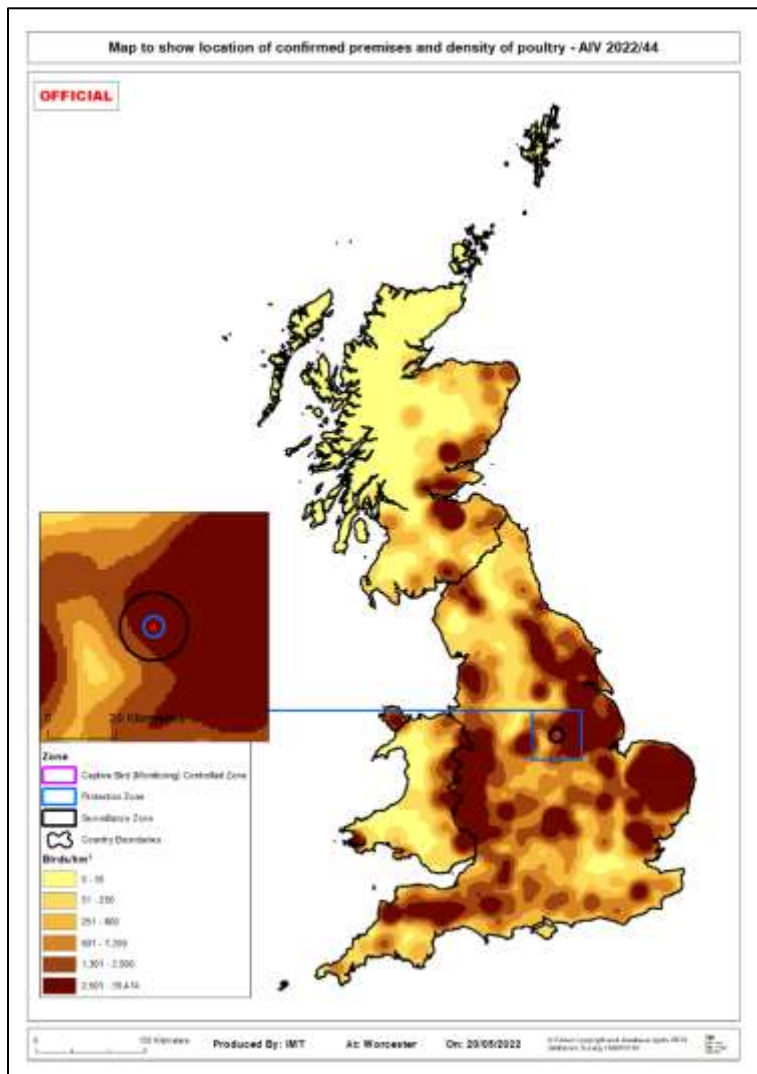
Overview of biosecurity

There were no added biosecurity measures on site. The owner was the only person looking after the birds but he did not wear dedicated clothing and there was no footbath at the entrance. The mesh surrounding the pen was in good condition but it

was only on the sides allowing entry to wild birds which were attracted by the food and water available.

Map with location in Great Britain and poultry density

Figure 2: Location of IP and poultry density



Overview of the surrounding area

The surrounding area was comprised of mainly arable agricultural land. There were no commercial poultry units in the immediate vicinity. It was within the SZ of AIV 2022/43 and infected wild geese had been found in the area.

Ornithological assessment:

Desktop assessment: Ornithological advice was as per AIV 2022/43 specifically that wild bird surveillance indicated a not insubstantial local infection pressure and that wild birds were a likely source of infection for this IP.

Local intelligence: Ducks and other waterfowl had been seen accessing the feed and water inside the pen and magpies regularly entered the coop inside the pen to eat the eggs.

Clinical picture

18/05/2022 – Seven chickens were found dead with no prior clinical signs. All the dead birds had congested combs. Egg production was unaffected in both hens and ducks. The owner reported suspicion of notifiable avian disease.

19/05 – Two further chickens and one duck were found dead. Three other chickens were lethargic and the remainder were subdued.

20/05 – At the time of culling, one more duck and three more chickens had died leaving 12 ducks and 5 chickens still alive. The remaining chickens were lethargic but the remaining ducks were unaffected.

Timeline

Tracings windows

Source tracings window:

High-risk:	14/05/2022 to 16/05/2022
Likely:	03/05/2022 to 13/05/2022
Precautionary:	27/04/2022 to 02/05/2022

Spread tracings window:

High-risk:	15/05/2022 to 18/05/2022
Likely:	04/04/2022 to 14/05/2022
Precautionary:	28/04/2022 to 03/05/2022

Most likely date of infection: 14/05/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 3: Source and spread timeline for AIV 2022/44

Source Tracing Window	Spread Tracing Window	Date	
Day 21		26/04/22	
Day 20		27/04/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		28/04/22	Start of precautionary spread tracing window (source + 24h).
Day 18		29/04/22	
Day 17		30/04/22	
Day 16		01/05/22	
Day 15		02/05/22	
Day 14		03/05/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	04/05/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	05/05/22	
Day 11	Day 3	06/05/22	
Day 10	Day 4	07/05/22	
Day 9	Day 5	08/05/22	
Day 8	Day 6	09/05/22	
Day 7	Day 7	10/05/22	
Day 6	Day 8	11/05/22	
Day 5	Day 9	12/05/22	
Day 4	Day 10	13/05/22	
Day 3	Day 11	14/05/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	15/05/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	16/05/22	
	Day 14	17/05/22	Precautionary onset of clinical signs.
	Day 15	18/05/22	7 hens died overnight, 2 hens lethargic. Notification of suspicion of disease reported to APHA. APHA investigation and sampling (DPR 2022 105). Restrictions served.
	Day 16	19/05/22	HPAI H5N1 confirmed by CVO and given case reference AIV 2022 44.
	Day 17	20/05/22	Culling completed, Preliminary C&D completed
	Day 18	21/05/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

33 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 2-200 birds.

0 premises holding both pigs and poultry.

SZ (3-10 km)

171 premises with poultry were reported to be within 10 km of the IP holding between 1-452,002 birds.

6 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Local infection pressure from wild birds was high given the locations proximity to AIV 2022/43. There have been several confirmed cases of HPAI in wild birds in the area.

Wild birds could access the resident birds' enclosure and were attracted by the on-site pond. Magpies had been seen inside the coop.

There was poor biosecurity and there were no tracings identified in the high-risk tracing window.

Spread investigations: Assessment of potential and likelihood of spread

No tracings within the high-risk tracing windows had been identified

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2022/45, Island of Whalsay, Shetland Islands, Scotland

Description of the premises

Overview of the premises and the wider business

This was a small, commercial, mixed poultry, free range, egg laying premises

Species and number of each present

Approximately 270 hens and 30 ducks

The keeper's family kept sheep in the surrounding fields.

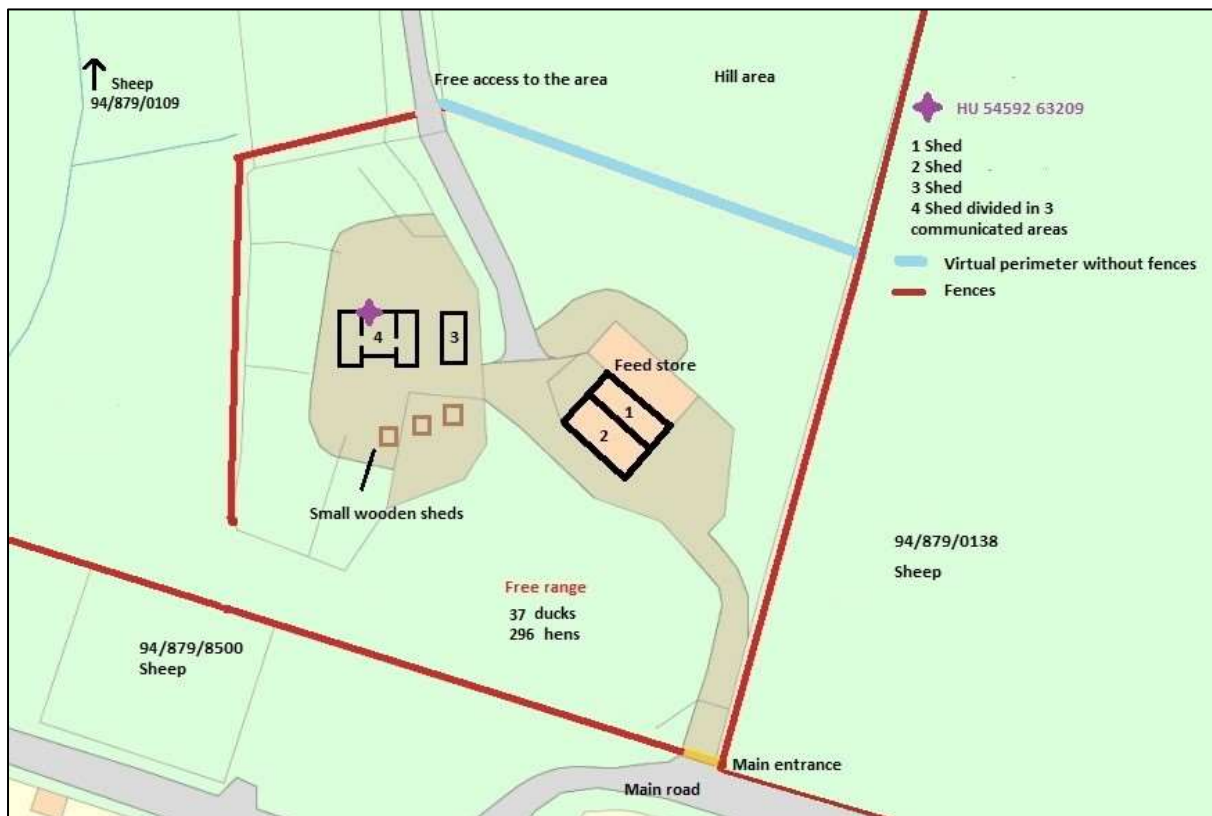
Description of the housing

The IP consisted of several sheds and shipping containers that were used for poultry housing, as well as open ranges.

After the housing order was lifted, the hens and ducks were able to roam freely between the sheds and the range, and the different species could co-mingle.

Plan of the infected premises

Figure 373: Plan of AIV 2022/45

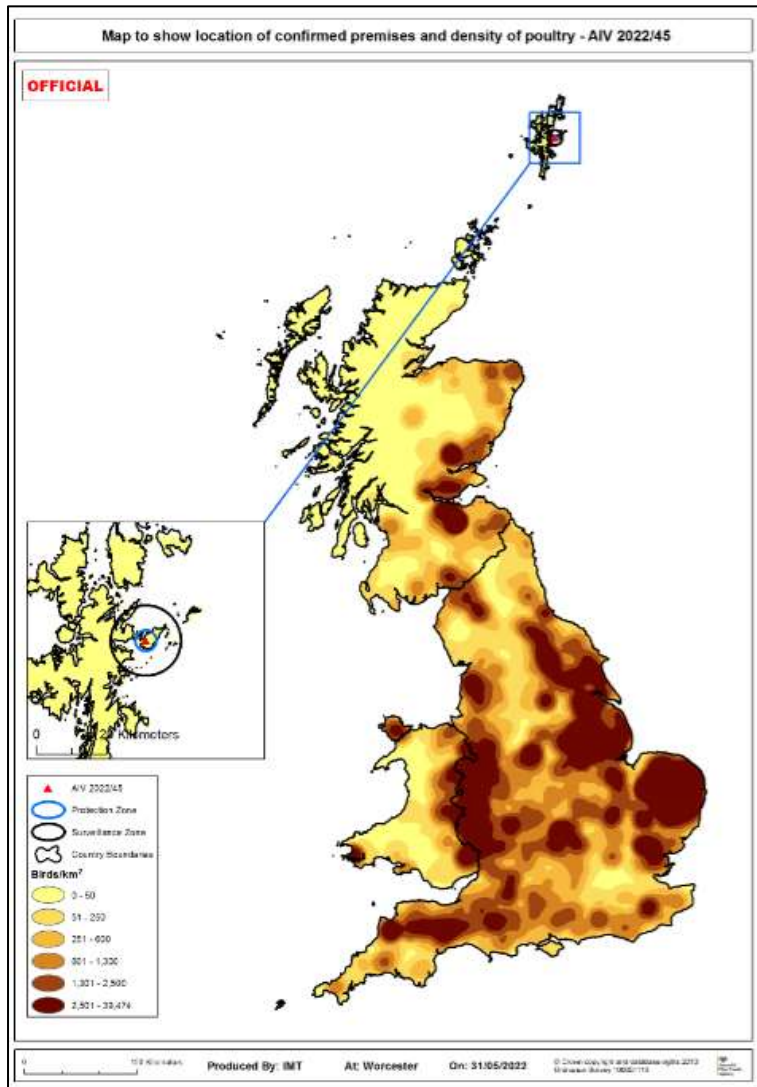


Overview of biosecurity

Biosecurity on the premises was poor and there were no measures in place at the time of the visit by APHA.

Map with location in Great Britain and poultry density

Figure 374: Location of IP and poultry density



Overview of the surrounding area

The premises was in a coastal area with low poultry density.

Ornithological assessment:

Desktop assessment: Not conducted due to the coastal location of this IP and the obvious abundance of shorebirds and waterfowl.

Local intelligence: Wild birds were observed on the IP at the time of inspection.

Clinical picture

24/05/2022 – 10 dead hens were found and other birds showed some clinical signs.

25/05/2022 – there were a further 20 deaths.

26/05/2022 – 20 more hens had died and 20-30 were showing clinical signs including lethargy, reluctance to move, dyspnoea, torticollis, diarrhoea and cyanotic wattles. Suspicion of notifiable avian disease was reported.

27/05/2022 – Due to the remote location, it was not possible to get to the premises on the day the report was made. At the APHA investigation the ducks appeared unaffected but cumulative mortality in the hens had reached approximately 59%. There were no records of feed intake, egg laying or medicines usage available. Samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk:	20/05/2022 to 23/05/2022
Likely:	09/05/2022 to 19/05/2022
Precautionary:	05/00/2022 to 08/00/2022

Spread tracings window:

High-risk:	21/05/2022 to 02/06/2022
Likely:	10/05/2022 to 20/05/2022
Precautionary:	06/05/2022 to 09/05/2022

Most likely date of infection 20/05/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 375: Source and spread timeline for AIV 2022/45

Source Tracing Window	Spread Tracing Window	Date	
Day 10		05/05/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 11		06/05/22	Start of precautionary spread tracing window (source + 24h).
Day 12		07/05/22	
Day 13		08/05/22	
Day 14		09/05/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	10/05/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	11/05/22	
Day 11	Day 3	12/05/22	
Day 10	Day 4	13/05/22	
Day 9	Day 5	14/05/22	
Day 8	Day 6	15/05/22	
Day 7	Day 7	16/05/22	
Day 6	Day 8	17/05/22	
Day 5	Day 9	18/05/22	
Day 4	Day 10	19/05/22	
Day 3	Day 11	20/05/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	21/05/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	22/05/22	
	Day 14	23/05/22	Precautionary onset of clinical signs.
	Day 15	24/05/22	10 birds found dead. (most likely some died overnight.)
	Day 16	25/05/22	20 birds found dead
	Day 17	26/05/22	Additional 20 dead birds. Case reported to APHA. Verbal and written restrictions
	Day 18	27/05/22	APHA on farm investigation. Further 40 deaths overnight.
	Day 19	28/05/22	On farm cull initiated
	Day 20	29/05/22	
	Day 21	30/05/22	
	Day 22	31/05/22	On farm cull complete
	Day 23	01/06/22	Preliminary C and D completed 12:25
	Day 24	02/06/22	Preliminary C and D considered effective 12:25
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP.

Surveillance activity

PZ (0-3 km)

23 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-350 birds (1 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ/ RZ (3-10 km)

0 premises with poultry were reported to be within 10 km of the IP.

0 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

The only tracings generated from this IP were related to table eggs that had been moved off. The latest consignment was retrieved from the local shop by the owner. Previous batches which had left within the high-risk window were seized from local shops where they were still present.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds (high likelihood with low uncertainty).

Assessment and evidence base for the likely source

Poor biosecurity and birds free ranging, so wild birds could have had direct or indirect contact with the kept birds on the IP. Wild birds were observed on the IP at the time of inspection. There were several confirmed cases of HPAI in wild birds in the Shetland Islands in the weeks around disease confirmation in this IP.

All other potential source pathways were assessed as very low or lower likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

All other potential spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/46, Near Ludlow, Ludlow, Shropshire, England

Description of the premises

Overview of the premises and the wider business

This was an independent commercial producer of fattening turkeys and operated an all-in all-out system with all sheds being stocked and slaughtered-out at the same time.

The turkeys were sourced from, and reared on behalf of, a large integrated poultry company. They had been placed on site on 04/03/2022 at 39 days of age. The affected birds were 124 days old at the time of the disease report.

The site manager had one full-time assistant and neither had contact with poultry elsewhere.

Species and number of each present

Approximately 40,000 fattening turkeys in 12 houses with around 3,000 to 3,300 birds in each.

Description of the housing

The 12 poultry houses were made of wood and were originally built in the 1960s. All 12 poultry houses had been completely refurbished between 2013 and 2016 with new fans and fan chimneys, new wiring, new ventilation inlets and new feeders and drinkers to current industry standards. Houses 1 to 8 had new steel roofs to replace existing asbestos ones. Houses 9 to 12 were several years younger and already had steel roofs which were in good condition and were not replaced.. The buildings were maintained in a generally good condition.

Each building had a central entrance half-way along which led into a lobby area. There were doors from here to separate sheds at either end of the house (A and B).

The houses were mechanically ventilated with extractor fans on the roof ridges and inlets along both sides of the houses. The inlets were covered by a wooden overhang, about 12 inches out from the wall. The ventilation gap along the building was 6-12 inches high, varying automatically with temperature in the shed.

There was no netting in the inflows and small wild birds had been seen entering the buildings through the intakes, with some even nesting under the wooden overhang. It had been planned to install wire mesh into the intake areas to stop wild birds entering the houses in this way. The aim was to begin installation once the site was depopulated.

The feed was stored in bins located half-way along the sheds, with two bins for each pair of sheds (A and B).

Water supply to the site was from a borehole into a sealed tank. There was reportedly no possibility of the water being directly contaminated by wildlife/vermin.

The bedding used was chopped straw delivered as individual bales wrapped in clear plastic on a pallet with an outer white plastic wrapping and was stored outdoors in the yard.

The outer wrapping could have become contaminated with wild bird faeces and this could potentially have contaminated the inner clear plastic wrap when unwrapping. The bales wrapped in clear plastic were taken into houses intact before being opened inside. The inner wrapping was reportedly not disinfected before the bedding was taken into the houses. Once an individual pallet had the outer wrapping removed all bales were immediately used.

Plan of the infected premises

Figure 376: Plan of AIV 2022/46



Overview of biosecurity

Biosecurity on the farm was generally considered to be of a good standard despite the sheds being relatively old and given the presence of four nearby ponds with wild waterfowl and released pheasants being observed around the site.

However, as previously described the ventilation inlets/outlets were not bird-proofed potentially allowing wild birds to access poultry areas. There was a dedicated facility for changing into boiler suits and wellington boots at the site entrance. A visitors book was kept there and appeared to be used accurately. There were disinfectant footbaths at the entrances to the site and to the lobby areas in each of the sheds with Virex® disinfectant being used at the correct dilution rate.

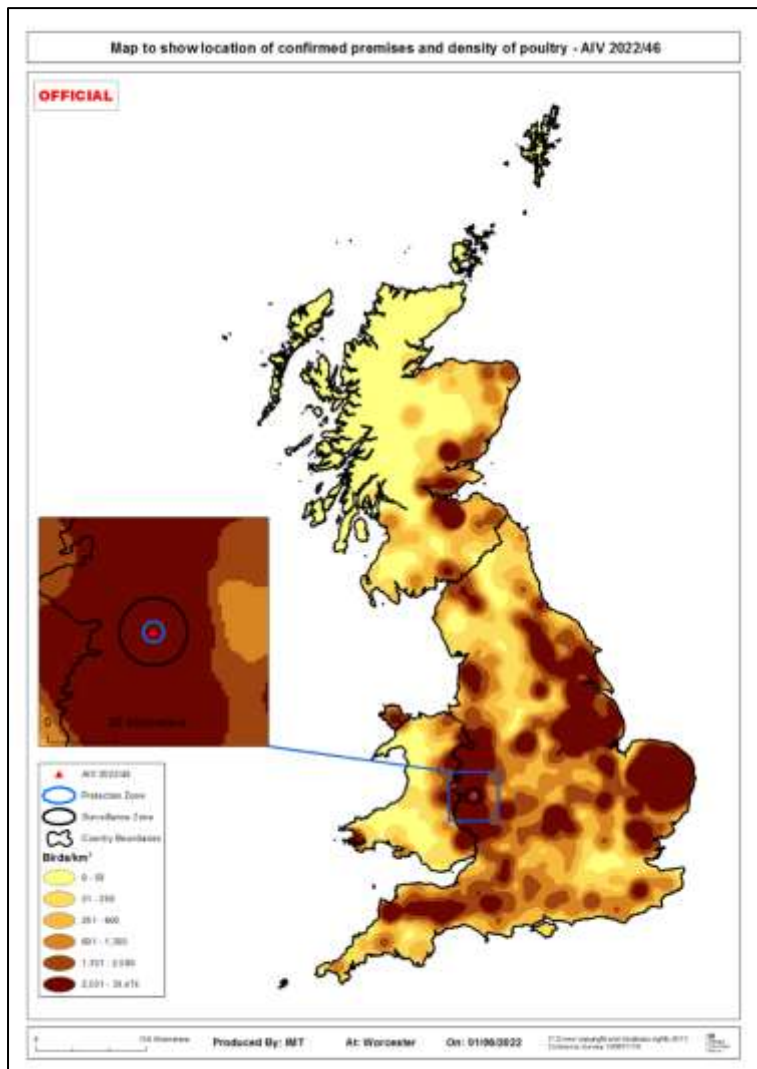
Lobby areas were swept out and disinfected twice weekly.

Dedicated indoor boots for each end of the shed (A and B) would be donned via a stepover wooden hygiene barrier with outdoor boots remaining outside, although there was no change of overalls. Hand sanitisers were provided in the lobby areas.

The site was regularly baited for vermin by a professional pest control contractor.

Map with location in Great Britain and poultry density

Figure 377: Location of IP and poultry density



Overview of the surrounding area

The IP was located within an area of high poultry density.

Another unrelated large poultry unit was located approximately 800 metres to the southeast of the premises and there were a number of large ponds adjacent to the site.

Ornithological assessment:

Desktop assessment: A full ornithological expert assessment was not undertaken.

Local intelligence: A range of wild birds had been seen on the site by the staff. Geese and ducks would land on the site and were regularly seen. Released pheasants were also present in the vicinity.

Small sparrow-sized birds were known to enter the eaves of the roofs via small gaps in the roof trim and had also been seen the wooden overhangs covering the unnetted ventilation intakes. Some were even found to have nested here.

Clinical picture

27/05/2022 – a slight increase in mortality in shed 5B was noted with one bird death and one culled.

28/05/2022 – four birds were found dead and a further four were culled.

29/05/2022 – six birds died and a further six culled.

30/05/2022 – 58 birds died. The PVS visited and conducted PME's and prescribed a course of amoxicillin for suspected erysipelas.

31/05/2022 – a further 175 birds had died overnight and suspicion of notifiable avian disease was reported.

At the APHA investigation the same day, 250 further birds were dead in shed 5B. Approximately two thirds of the birds remaining alive were depressed, quiet to moribund and some presented with cyanotic appearance. Several were displaying nervous signs (torticollis and wing flapping), watery diarrhoea and coughing. Water consumption was slightly increased from previous days. A PME revealed enlarged liver and spleen, pericarditis and consolidated lungs.

In the neighbouring shed (5A), birds were quieter and huddled but no mortality was seen at that time. Birds in the other houses appeared healthy at the time of the visit. Samples were submitted.

01/06/2022 – approximately 1600 birds were reported dead in total in house 5B. The neighbouring house 5A had 8 deaths. Houses 6A and 6B reported 5 deaths each while houses 4A and 4B reported 4 deaths each.

Timeline

Tracings windows

Source tracings window:

High-risk:	23/05/2022 to 25/05/2022
Likely:	12/05/2022 to 22/05/2022
Precautionary:	10/05/2022 to 11/05/2022

Spread tracings window:

High-risk:	24/05/2022 to 31/05/2022
Likely:	14/05/2022 to 23/05/2022
Precautionary:	11/05/2022 to 12/05/2022

Most likely date of infection 23/05/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 378: Source and spread timeline for AIV 2022/46

Source Tracing Window	Spread Tracing Window	Date	
Day 16		10/05/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 15		11/05/22	Start of precautionary spread tracing window (source + 24h).
Day 14		12/05/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	13/05/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	14/05/22	
Day 11	Day 3	15/05/22	
Day 10	Day 4	16/05/22	
Day 9	Day 5	17/05/22	
Day 8	Day 6	18/05/22	
Day 7	Day 7	19/05/22	
Day 6	Day 8	20/05/22	
Day 5	Day 9	21/05/22	
Day 4	Day 10	22/05/22	
Day 3	Day 11	23/05/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	24/05/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	25/05/22	
	Day 14	26/05/22	Precautionary onset of clinical signs - 1 dead bird and 1 cull in House 5b at 07:00 on 27th May.
	Day 15	27/05/22	
	Day 16	28/05/22	4 deaths, 4 culls in House 5b
	Day 17	29/05/22	6 deaths, 6 culls
	Day 18	30/05/22	58 deaths
	Day 19	31/05/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/111). Restrictions served. 175 deaths.
	Day 20	01/06/22	CVO Confirmed HPAI H5N1. AIV 2022/46
	Day 21	02/06/22	
	Day 22	03/06/22	Cull commenced.
	Day 23	04/06/22	
	Day 24	05/06/22	
	Day 25	06/06/22	Cull completed.
	Day 26	07/06/22	
	Day 27	08/06/22	
	Day 28	09/06/22	
	Day 29	10/06/22	
	Day 30	11/06/22	Preliminary C&D completed.
	Day 31	12/06/22	Preliminary C&D considered effective.
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

62 premises with poultry were reported to be within 3 km of the IP holding between 1-352,000 birds (6 premises with 50 or more birds).

2 premises holding both pigs and poultry.

SZ (3-10 km)

138 premises with poultry were reported to be within 10 km of the IP holding between 1-280,000 birds (20 premises with 50 or more birds)

10 premises holding both pigs and poultry

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were raised for feed deliveries, two visitors, a private vet visit, a worker and an ABP collection in the high-risk period. All were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Wild waterfowl were observed frequenting the adjacent ponds and had been seen landing on the IP. Released pheasants were present around the farm buildings at the time of the APHA inspection. Wild bird faeces (possibly waterfowl) was observed on one of the house roofs.

Although biosecurity procedures were observed to be followed during the APHA visit a heavily contaminated environment due to the presence of wild birds could have facilitated ingress of infection into the poultry areas.

Ventilation inlets were not meshed and could potentially have allowed access of small wild birds into the housing.

Small wild birds had been seen entering gaps in the roof trim and had been observed entering and even nesting in the ventilation inlet coverings.

Bedding stored outdoors observed to be contaminated with wild bird faeces and wrapping not disinfected before being taken into bird accommodation.

Spread investigations: Assessment of potential and likelihood of spread

The high-risk spread window for this IP overlapped the high-risk source window for AIV 2022/47 and there were known links between them (via the same integrated poultry company and a shared area manager, although he had reportedly not visited here during the source window for AIV 2022/47).

However, some uncertainty remains due to some contradicting/missing information in the visitors book for AIV 2022/47.

Genomic analysis of viruses isolated from AIV 2022/46 and 47 indicated that the genomes were closely related, which could indicate both independent incursions from wild birds onto each site (the sites are separated by approximately 7.5 km), but also lateral spread between the premises. The genomic analyses for all clusters are discussed in detail in the relevant cluster reports earlier in this document.

Likelihood of onward transmission through wildlife was not considered to be higher than the background risk.

All other potential spread pathways were of low, very low or negligible likelihood.

Remaining uncertainty

The potential for spread from AIV 2022/46 to AIV 2022/47 as above, although this was considered to be of very low likelihood.

AIV 2022/47, Near Ludlow, Ludlow, Shropshire, England

Description of the premises

Overview of the premises and the wider business

The IP was an indoor commercial stag turkey fattening unit with an all-in, all-out system. It was part of a larger multisite company.

Turkeys were sourced from one site owned by the parent company. They were placed on 28/04/2022, over a month before the most likely infection date for this outbreak. There were no other animals at this premises.

Species and number of each present

8,560 turkeys.

Description of the housing

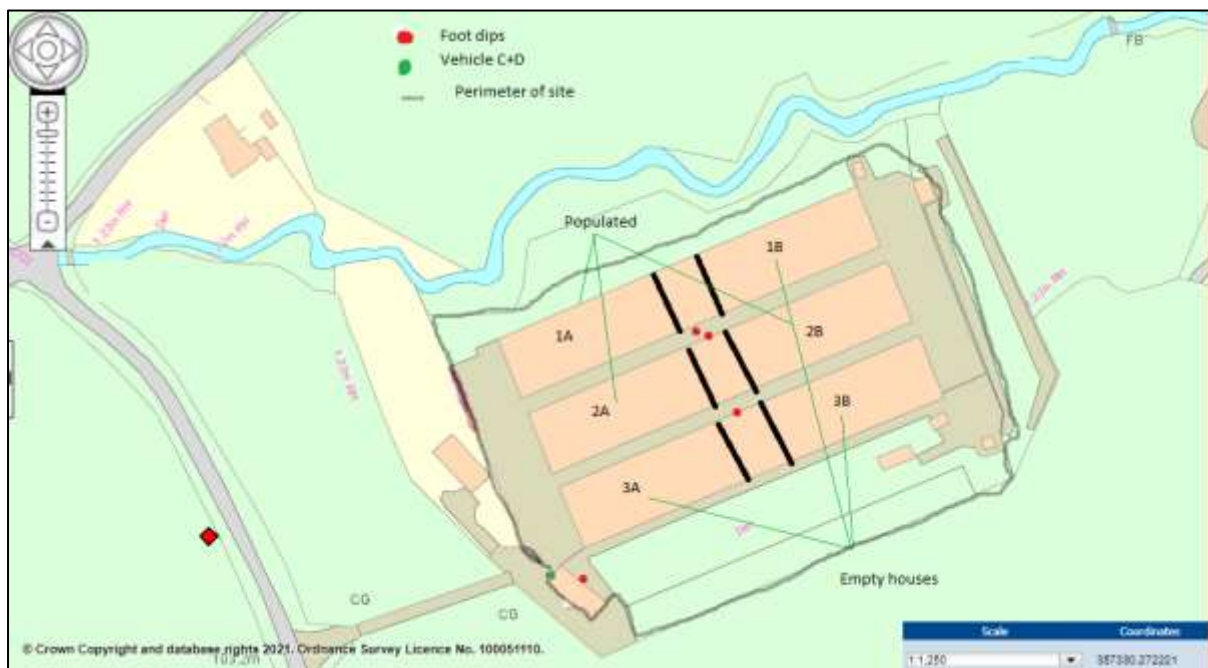
Poultry accommodation consisted of three buildings (built in 1985) each subdivided into 2 separate houses, creating 6 houses in total. Only three were populated at the time of the outbreak (1A, 2A and 2B).

The walls of the houses were made from concrete blocks with the uppermost made of wood. There were internal wooden posts and APB boarding covering the walls and ceilings. Two rows of feeders and cup drinkers were dedicated to each sub-division.

The houses were surrounded by a concrete yard with some stone chipped areas between the sheds. They appeared well maintained and clean and the grass was kept short.

Plan of the infected premises

Figure 379: Plan of AIV 2022/47



Overview of biosecurity

There was dedicated PPE supplied prior to accessing the yard, in the visitor reception area, where a number of showers are also available for use.

Off the central control room, each house had a bio-secure area delineated by a wooden barrier approximately 50 cm high in front of each door. This held boots specific to each house subdivision (or overshoes). There was also a hand sanitiser at the door to each subdivision.

There were multiple foot dips at strategic points, including by the entrance to each of the 3 houses. Cyclex® at 1% was used and was changed three times per week.

The access to the premises was down a narrow country lane and there was a vehicle wash by the main gate alongside the office wall. This consisted of a power wash facility with an added automated dosing device (Dosatron®), with Viroshield® at 1%.

There was a site manager and 2 regular staff.

Feed was delivered approximately every 9 days from a mill belonging to the parent company, and water was from a mains supply.

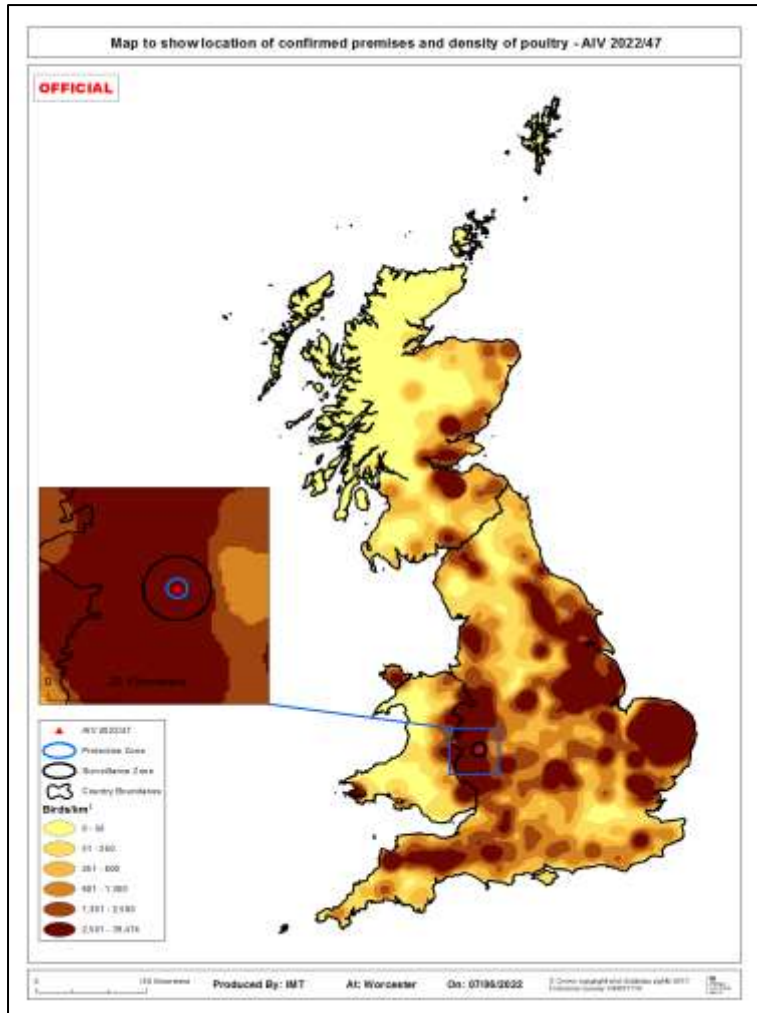
Long straw was brought in only at the time of placement and was sourced from a local farm. Chopped straw was brought in double-wrapped every month from a commercial supplier and was stored in the yard outside the respective house until required. It was placed in the housing normally every 3 days. The outer layer was removed, but not disinfected, before moving the bales into the houses for topping up.

There was maintenance necessary for some of the houses and a vermin problem that was being addressed.

The visitors book proved not to be very accurate when cross-referenced with known activity.

Map with location in Great Britain and poultry density

Figure 380: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density, in a rural setting with a brook and ponds nearby, although outside the premises perimeter.

The IP was in the SZ of AIV 2022/46, an IP inked to the same parent company.

Ornithological assessment:

Desktop assessment: A full ornithological expert assessment was not commissioned

Local intelligence: There was a stream running along the northern boundary of the farm and a pond, approximately 400 m away, which attracted wild birds. Wild birds were seen around the ABP bins and droppings noticed throughout the site.

Clinical picture

04/06/2022 – following 50 deaths and the culling of 21 birds in house 2B, suspicion of notifiable avian disease was reported. Birds in the other houses appeared unaffected. PMEs had been conducted with none showing signs of AI.

05/06/2022 – at the APHA investigation, increased morbidity and mortality in house 2B was noted together with the onset of morbidity/mortality in houses 1A and 2A.

Analysis of the mortality records pointed to 01/06/2022, as precautionary date of onset of clinical signs.

Timeline

Tracings windows

Source tracings window:

High-risk:	29/05/2022 to 31/05/2022
Likely:	18/05/2022 to 28/05/2022
Precautionary:	14/05/2022 to 17/05/2022

Spread tracings window:

High-risk:	30/05/2022 to 04/06/2022
Likely:	19/05/2022 to 29/05/2022
Precautionary:	15/05/2022 to 18/03/2022

Most likely date of infection 29/05/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 381: Source and spread timeline for AIV 2022/47

Source Tracing Window	Spread Tracing Window	Date	
Day 18		14/05/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		15/05/22	Start of precautionary spread tracing window (source + 24h).
Day 16		16/05/22	
Day 15		17/05/22	
Day 14		18/05/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	19/05/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	20/05/22	
Day 11	Day 3	21/05/22	
Day 10	Day 4	22/05/22	
Day 9	Day 5	23/05/22	
Day 8	Day 6	24/05/22	
Day 7	Day 7	25/05/22	
Day 6	Day 8	26/05/22	
Day 5	Day 9	27/05/22	
Day 4	Day 10	28/05/22	
Day 3	Day 11	29/05/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	30/05/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	31/05/22	
	Day 14	01/06/22	Precautionary onset of clinical signs.
	Day 15	02/06/22	First mortality increase with 3 birds dead and 1 culled
	Day 16	03/06/22	86 additional deaths/culls
	Day 17	04/06/22	Suspicion of NAD reported to APHA by private veterinary surgeon. Restrictions served
	Day 18	05/06/22	APHA veterinary investigation, samples taken
	Day 19	06/06/22	Based on history and clinical signs, CVO decided to slaughter on suspicion
	Day 20	07/06/22	Positive laboratory results. DCVO confirmed HPAI H5N1. Cull completed
	Day 21	08/06/22	
	Day 22	09/06/22	Preliminary C&D completed
	Day 23	10/06/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP.

Surveillance activity

PZ (0-3 km)

40 premises with poultry were reported to be within 3 km of the IP holding between 1-115,200 birds (4 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

162 premises with poultry are reported to be within 10 km of the IP holding between 1-352,000 birds (25 premises with 50 or more birds).

20 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were generated for a feed delivery, two workers and visits from an auditor and the private vet within the high-risk window. All were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds (assessed as high likelihood with low uncertainty).

A second hypothesis for source (assessed as medium likelihood with medium uncertainty) was indirect introduction from domestic infected flock

Assessment and evidence base for the likely source

Indirect contact with infected wild birds: There was evidence of wild birds on the IP, leading to contamination of the external environment. Several potential pathways were identified for introduction of this contamination:

There was increased staff (including attendance of non-dedicated staff) activity during the high-risk source window to prepare an external welfare audit. There was also replenishment of potentially contaminated bedding during this source window. Some maintenance issues in the feed system and building were identified.

Indirect introduction via vermin could not be ruled out and neither could entry of contamination through ventilations system or small gaps in the structure.

Indirect introduction from domestic infected flock: The high-risk spread window for AIV 2022/46 overlapped the HR source window for AIV 2022/47 and there were known links between them. While site staff were dedicated to the IP and had no contact with other poultry, some area staff visited AIV 2022/47 during the high-risk source window to prepare an external welfare audit. These were not thought to have been on AIV 2022/46; however, some uncertainty remained due to some inaccurate recording in the visitors' book.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

Tracings investigations showed that all other potential spread pathways were of low or negligible likelihood.

Remaining uncertainty

As noted in likely source assessment.

AIV 2022/48, Near Bexhill-on-Sea, Rother, East Sussex, England

Description of the premises

Overview of the premises and the wider business

This was a small backyard flock in the garden of a residential area approximately 2-3 km from the sea. The birds had been housed while the Poultry Housing Order was in force and let out to range in the back garden on 02/05/2022. Eggs were used for personal consumption only.

Species and number of each present

14 chickens.

Description of the housing

The poultry were free ranging in the back garden and housed overnight in a wooden shed with an attached uncovered wire mesh run.

Plan of the infected premises

Figure 382: Plan of AIV 2022/48

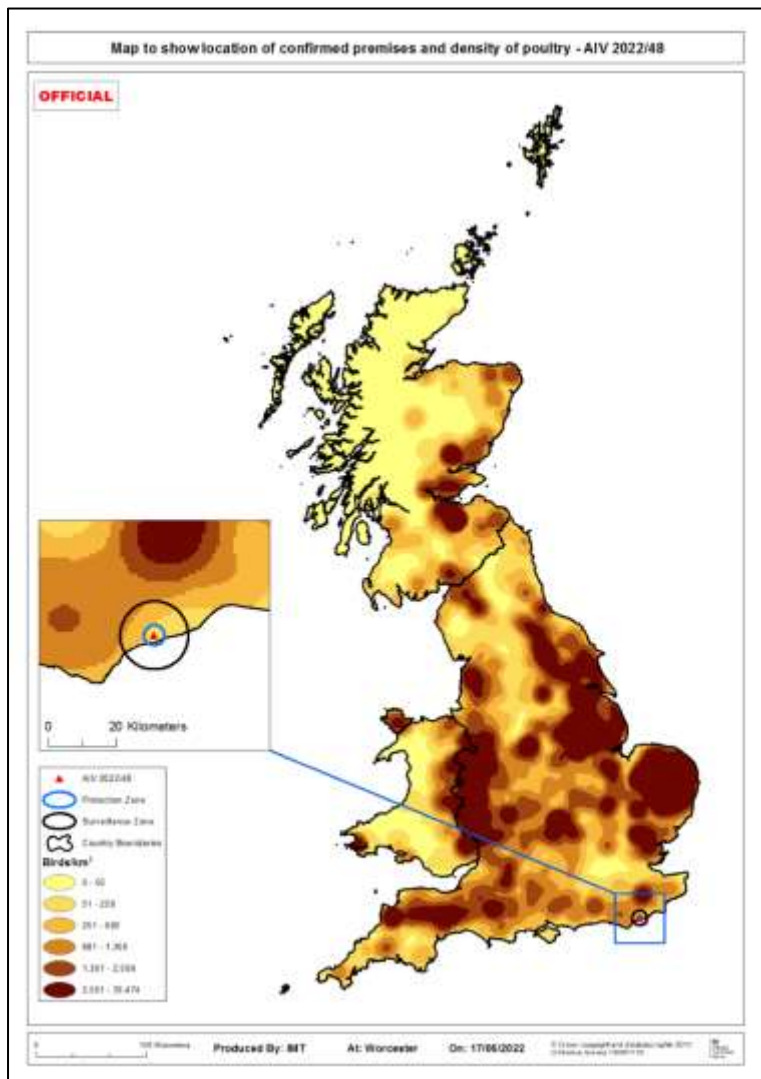


Overview of biosecurity

No biosecurity measures other than a (non-Defra approved) disinfectant spray used by the keeper to spray the soles of his shoes on entering/leaving the poultry shed. Food and bedding was stored in a bird proof garage.

Map with location in Great Britain and poultry density

Figure 383: Location of IP and poultry density



Overview of the surrounding area

There was parkland to the north-east of the property with park and arable land to the east. A lake was situated 2 km to the east and the sea was 2 km to the south/southeast. Immediately surrounding the premises in other directions were residential properties.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: There were numerous wild birds nearby and fed in the garden. There had been a recent confirmation of HPAI H5N1 in a herring gull in the area indicating circulating infection in the local wild bird population, specifically seabirds.

Clinical picture

11/06/2022 – One chicken was found dead in the evening with no prior clinical signs.

12/06/2022 – One chicken with a swollen head died during the day.

13/06/2022 – Two chickens had swollen heads and cyanotic combs. One died.

14/6/22 – Three chickens were lethargic with swollen heads and cyanotic combs/wattles. Several birds had diarrhoea. Suspicion of avian notifiable disease was reported.

14/06/2022 – At the APHA inquiry the birds were subdued and had diarrhoea. Two birds had swollen heads with cyanotic combs and wattles. No neurological or respiratory signs were observed. Samples were taken. 6 birds died overnight

15/6/22 two more birds died.

Timeline

Tracings windows

Source tracings window:

High-risk:	08/06/2022 to 10/06/2022
Likely:	28/05/2022 to 07/06/2022
Precautionary:	24/05/2022 to 27/05/2022

Spread tracings window:

High-risk:	09/06/2022 to 14/06/2022
Likely:	29/05/2022 to 08/06/2022
Precautionary:	25/05/2022 to 28/05/2022

Most likely date of infection 08/06/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 384: Source and spread timeline for AIV 2022/48

Source Tracing Window	Spread Tracing Window	Date	
Day 18		24/05/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		25/05/22	Start of precautionary spread tracing window (source + 24h).
Day 16		26/05/22	
Day 15		27/05/22	
Day 14		28/05/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	29/05/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	30/05/22	
Day 11	Day 3	31/05/22	
Day 10	Day 4	01/06/22	
Day 9	Day 5	02/06/22	
Day 8	Day 6	03/06/22	
Day 7	Day 7	04/06/22	
Day 6	Day 8	05/06/22	
Day 5	Day 9	06/06/22	
Day 4	Day 10	07/06/22	
Day 3	Day 11	08/06/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	09/06/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	10/06/22	
	Day 14	11/06/22	Precautionary onset of clinical signs - first bird died in the afternoon.
	Day 15	12/06/22	
	Day 16	13/06/22	
	Day 17	14/06/22	Notification of suspicion of disease to APHA. Initial APHA investigation (DPR 2022/115). Restrictions served.
	Day 18	15/06/22	HPAI H5N1 confirmed (AIV 2022/48).
	Day 19	16/06/22	Cull completed. Preliminary C&D completed.
	Day 20	17/06/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

101 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-250 birds.

0 premises holding both pigs and poultry.

SZ (3-10 km)

157 premises with poultry are reported to be within 10 km of the IP holding between 1-3,200 birds.

16 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

No nearby poultry premises and the keepers did not have contact with any other poultry.

There were numerous wild birds nearby, including seabirds, so direct and indirect contact with the free ranging birds was likely. There had been a number of positive detections in wild birds in the area recently.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2022/49 Near Guestling Green, Rother, East Sussex

Description of the premises

Overview of the premises and the wider business

The IP was a charity run wildlife rehabilitation centre. At the time of the report case there were 206 animals present including 32 different species of both birds and mammals. There was a high throughput of animals due to rehabilitation aims. There were 10 different housing areas, some of which were inside a building and others were outdoor enclosures. Birds and mammals were brought to the centre by members of the public, collected by officers employed by the charity or members of other welfare organisations. There was a strict triage process prior to admission and if there was any suspicion of avian influenza, birds were euthanased. These were then submitted to APHA for testing under the wild bird surveillance scheme; positive results had been received from birds submitted prior to the report case. There were 12 permanent members of staff including two vets. They were assisted by volunteers and students.

Species and number of each present

The table below shows the number of each species that were present and their location on the site. This can be viewed in conjunction with the site plan below.

Table 16: Species and number of each present

	General Care	Cubicles	Holding Room	Mammal Pens	Pools	Case bird Aviary	Aviaries	Feral Pigeon Aviary	Small Mammal Pens
House Sparrow	2		5				7		
Robin	1		1						
Bluetit	1		8						
Goldfinch	2						5		
Wren	1								
Song thrush	1								
Swallow	1								
Feral Pigeon	1		3					6	
Blackbird	1		5				4		
Crow	2		1			3			
Jay	1								
Jackdaw	1		6			9			
Magpie	3					2			
Woodpigeon			2				5		
Great Tit			1						
Starling							3		
Siskin							1		

	General Care	Cubicles	Holding Room	Mammal Pens	Pools	Case bird Aviary	Aviaries	Feral Pigeon Aviary	Small Mammal Pens
Collared Dove							1		
Mallard Ducklings				15					
Shelduck ducklings				3					
Adult Gulls							8		
Gull chicks				20		18			41
Great Crested Grebe					1				
Black Backed Gull							1		
Buzzard							1		
Kestrel							1		
Tawny Owl							1		
Rabbit		2							
Badger		1							
Fox		3		1					
Hedgehog		3		1					
Seals					3				

Description of the housing

The main building on the site was the wildlife unit. This was comprised of a washroom, drying room, holding room, cubicles, kitchen, general care area, reception and staff area. There was also a small building near the entrance which held the triage room. Outside, there were the following:

1. 'Aviaries' numbered 1-7
2. 'Cagebird Aviaries' numbered 1-3
3. 'Mammal Pens' numbered 1-4
4. 'Feral Pigeon Aviary'
5. 'Small Mammal Pens' numbered 1-4
6. 'Pools' numbered 1-3
7. 'Seal Pool'
8. Store/walk-in freezer

Plan of the infected premises

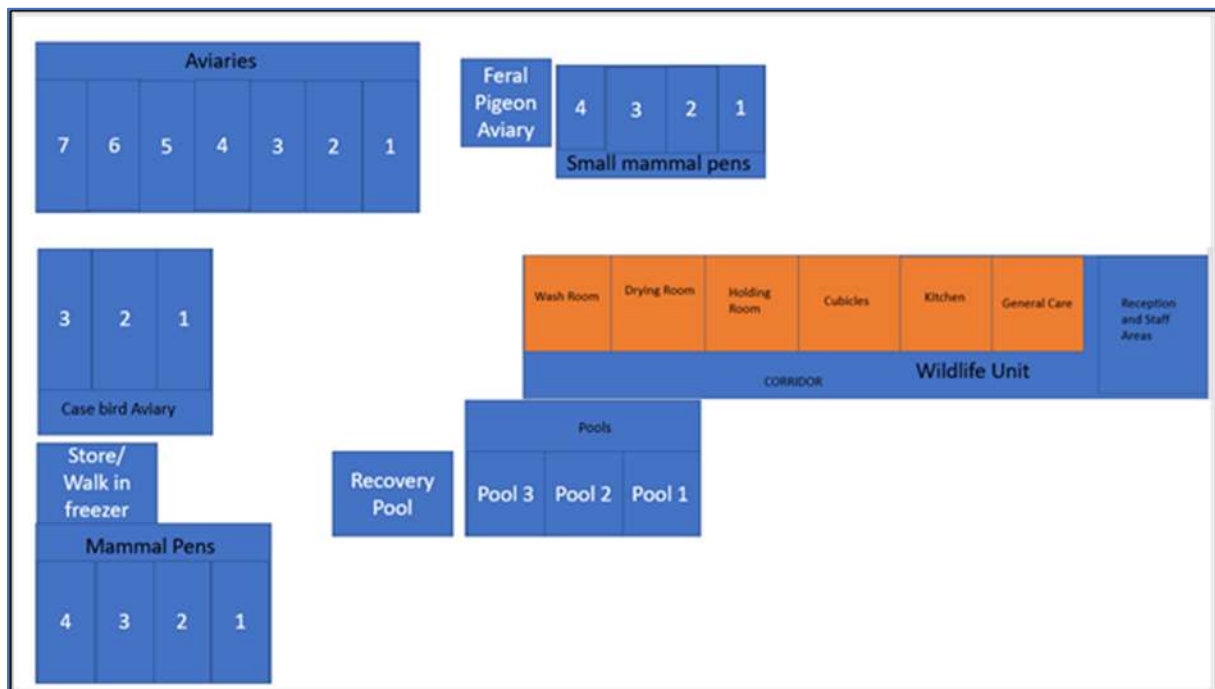
Figure 385: Plan of AIV 2022/49



Figure 1; Map of wildlife centre and immediate area.

- Key:
- 1-4 Wildlife Unit
 - 5 Pools
 - 6 Mammal pens
 - 7 Case bird aviary
 - 8 Aviaries
 - 9 Feral Pigeon Aviary
 - 10 Small Mammal pens

Figure 386: Detailed layout of the housing



Overview of biosecurity

Biosecurity measures were being implemented wherever possible and had been increased due to the risk of avian influenza. Compliance from all members of staff and volunteers was challenging to achieve. There were no rules about staff having no contact with other birds. Under normal circumstances, newly admitted birds would be isolated according to a detailed protocol, however due to the increase in the number of admissions at the time, this had not been possible.

PERSONNEL: On arrival, staff changed into dedicated boots or wellingtons for the site. FFP3 facemasks were worn and full length, full arm plastic aprons together with disposable gloves were available for each room /pen. According to the protocol, aprons should have been changed between each pen and gloves between handling each animal or bird. Some staff didn't wear aprons if they were not handling birds. Prior to entry to each pen, there was either a boot dip bucket or a disinfectant mat. Staff were required to use these on entry and exit of pens. It was noted that they were shallow and therefore would only contact the soles of footwear.

HOUSING: Windows in the wildlife unit were all covered with double mesh preventing wild bird access. All outdoor aviaries had measures in place to prevent wild bird access, except for the feral pigeon aviary. However, some of the mammal pens had sections where direct contact with wild birds would have been possible. The small mammal pens and pools had uncovered areas or uncovered roof which could have allowed wild bird faeces to fall in. There was separate cleaning equipment dedicated to each housing area.

DELIVERY VEHICLES: The carpark was outside the perimeter of the site and all deliveries were passed through the reception area. There was therefore no need for vehicles to enter the site.

FEED: Feed was either delivered to reception or collected by members of staff. It was stored in covered containers within a building and fed in bowls or scattered on the floor.

BEDDING: Hay, shavings or newspaper were used most commonly. This all came in via reception and was stored in a building.

WATER: Mains supply. Some pens contained pools that were filled using a hose.

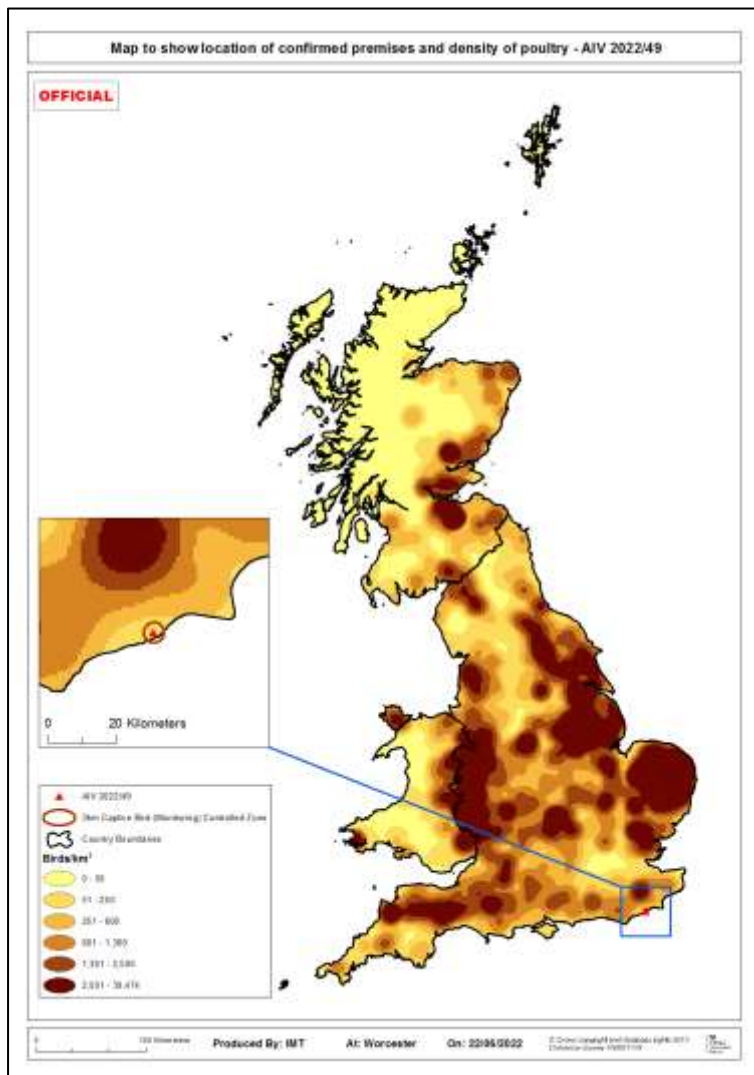
ABP: Birds which were euthanased due to showing clinical signs of avian influenza were double bagged and APHA was notified. They were placed in a freezer pending collection. All other deaths were bagged and held in the freezer for weekly collection by a pet crematorium which also collected clinical waste from the site.

VERMIN: Control was carried out by contractor who visited monthly. The most recent report suggested that control was good and that there was no sign of rodent activity.

TRIAGE: The triage room was used for all in-coming birds and disinfectant was used after each one has been assessed. However, the room was not suitable for full cleansing and disinfection. Staff who had handled any bird in the triage room would not enter the wildlife unit until they had carried out cleansing and disinfection of the room and themselves. However, they would then attend to other birds and mammals afterwards.

Map with location in Great Britain and poultry density

Figure 387: Location of IP and poultry density



Overview of the surrounding area

Directly adjacent to the IP, there was an education centre which was run by the same charity. It was otherwise surrounded by fields and woodland areas and was approximately one mile from the coast. There were no contiguous commercial poultry premises.

Ornithological assessment:

Desktop assessment: An assessment was not conducted however avian influenza was continuing to circulate at a substantial level in coastal areas at the time. This would have had a significant influence on infection pressure for this IP.

Local intelligence: The centre regularly received adult herring gulls displaying clinical signs which were consistent with avian influenza. These birds were euthanased and submitted to APHA under the wild bird surveillance scheme; many had been HPAI H5N1 positive. However on receipt of the first positive result, a decision was made to

no longer admit adult herring gulls to the centre. Wild birds including gulls were living and nesting on the site. At the time of the investigation, wild herring gulls had a nest with live chicks on top of one of the pool enclosures.

Clinical picture

16/06/2022 – One chick was found dead having died overnight. This chick had been placed in the drying room. There had been no clinical signs thought to be attributable to avian influenza prior to death. A further chick was found collapsed and gasping and subsequently died on the 17/6/2022. This chick was in small mammal pen 3. Both were from the same group of chicks that had been admitted on 14/6/2022. They had been housed separately immediately following admission due to differences in their size.

18/6/2022 – A further chick was found dead in the drying room. Bearing in mind the deaths and receipt of positive results under the wild bird surveillance scheme, the decision was taken to move all chicks from the drying room to the larger enclosures outside. Small mammal pens 1, 3 and 4 already contained older herring gull chicks, small mammal pen 2 and cagebird aviary 3 were both empty before the movement of chicks.

19/6/2022 – A rapid increase in deaths of the chicks as well as many showing neurological signs prompted the suspicion of avian influenza. All chicks displaying clinical signs were euthanised immediately.

20/06/2022 – Suspicion of notifiable avian disease was reported and APHA investigated on the same day. Clinical signs noted included twitching, dropped wings, head tremors, increased respiratory effort/gurgling, falling over, collapse and sudden death. At the time of the investigation, there had been no other deaths or clinical signs which could be attributable to avian influenza in any other species at the centre.

Although herring gull deaths at the centre were not uncommon, scrutiny of the mortality records for the period prior to the 16/06/2022 together with consideration of the likely incubation period, led to them being disregarded from the disease time course. As the chick that was found dead on 16/06/2022 had died overnight, the precautionary date for the onset of clinical signs was considered to be 15/06/2022.

Timeline

Tracings windows

Source tracings window:

High-risk:	12/06/2022 to 14/06/2022
Likely:	01/06/2022 to 11/06/2022
Precautionary:	30/05/2022 to 31/05/2022

Spread tracings window:

High-risk:	13/06/2022 to 20/06/2022
Likely:	02/06/2022 to 12/06/2022
Precautionary:	31/05/2022 to 01/06/2022

Most likely date of infection 12/6/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 388: Source and spread timeline for AIV 2022/49

Source Tracing Window	Spread Tracing Window	Date	
		27/05/22	
		28/05/22	
		29/05/22	
		30/05/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
		31/05/22	Start of precautionary spread tracing window (source + 24h).
		01/06/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
		02/06/22	Start of likely spread tracing window (source tracing window +24h).
Day 13	Day 1	02/06/22	
Day 12	Day 2	03/06/22	
Day 11	Day 3	04/06/22	
Day 10	Day 4	05/06/22	
Day 9	Day 5	06/06/22	
Day 8	Day 6	07/06/22	
Day 7	Day 7	08/06/22	
Day 6	Day 8	09/06/22	
Day 5	Day 9	10/06/22	
Day 4	Day 10	11/06/22	
Day 3	Day 11	12/06/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	13/06/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	14/06/22	
	Day 14	15/06/22	Precautionary onset of clinical signs.
	Day 15	16/06/22	1 herring gull chick found dead in the morning - died overnight.
	Day 16	17/06/22	1 herring gull chick found dead
	Day 17	18/06/22	1 herring gull chick found dead in the morning - died overnight.
	Day 18	19/06/22	
	Day 19	20/06/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/117). Restrictions served.
	Day 20	21/06/22	HPAI H5N1 AIV 2022-49 confirmed by CVO
	Day 21	22/06/22	
	Day 22	23/06/22	Culling completed. Preliminary C&D completed.
	Day 23	24/06/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

CBMCZ (0-3 km)

32 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-165 birds.

0 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were generated for a feed delivery, ABP collection, pest controller visit and for a number of personnel associated with the IP. These included two vets, a veterinary nurse, two workers, 22 other people who had attended the site, comprising other staff, volunteers and students, four RSPCA inspectors delivering wild birds and a visitor who had his own wildlife sanctuary. Four tracing visits were conducted to two other wildlife centres and two of the volunteers who kept poultry at home. All tracings were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds. This was attributed high likelihood with low uncertainty.

Assessment and evidence base for the likely source

As this site took in wild birds for rehabilitation, there was an ever-present risk of introducing a bird which was incubating avian influenza which may not have been recognised at the triage stage. Herring gull chicks and other species were admitted during the high-risk source period, two of which were the first to die. Other susceptible species were also admitted during this time. Several herring gulls were received, triaged and euthanased during the high-risk source period and subsequently tested positive for avian influenza. These could have provided a source of virus for the site, despite mitigations. Once the birds were placed in the enclosures, direct and indirect contact with wild birds was possible in certain areas. Although biosecurity measures were in place, they were unlikely to have been rigorous enough for this enterprise given the high-risk of introduction of virus. Compliance with the measures was hard to enforce with such a large number of staff, volunteers and students.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

Tracings investigations found all other potential spread pathways to be negligible or low likelihood with low to medium uncertainty.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/50, Near Birsay, Orkney Islands, Scotland

Description of the premises

Overview of the premises and the wider business

The hens were kept as a hobby but the owner supplied eggs to various households and through a shared honesty box that was situated at a neighbour's driveway. The owners also hatched some eggs and sold pullets.

Species and number of each present

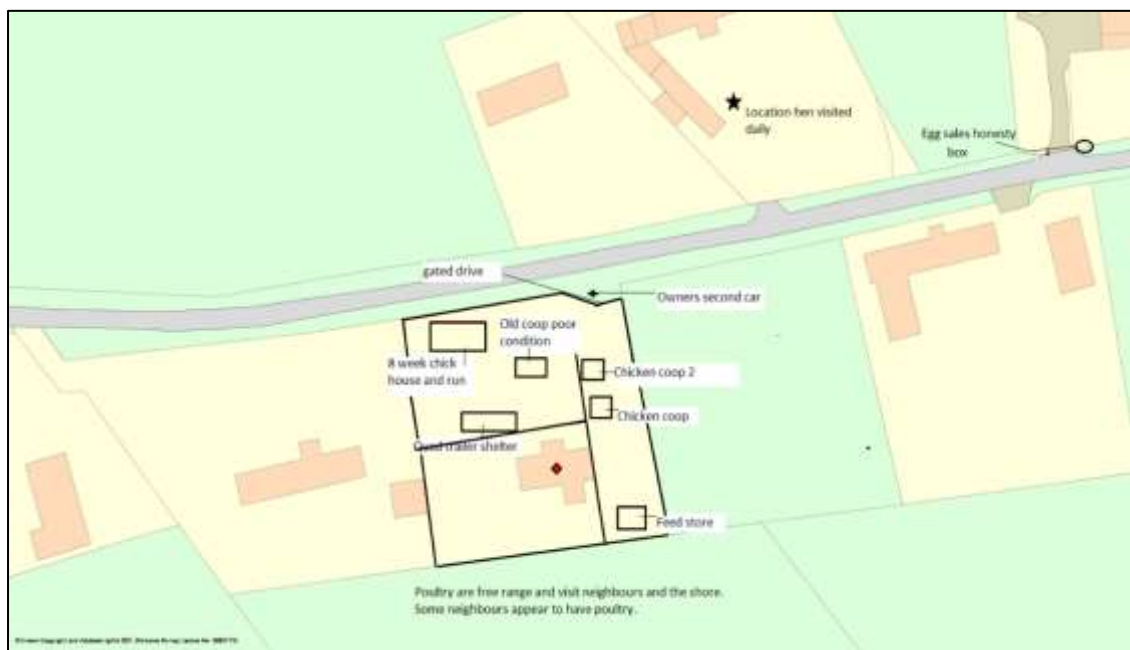
24 chickens (adults and chicks).

Description of the housing

The poultry were kept in several hutches within their free-ranging area. Chicks were kept in a run with an attached enclosure within the same area.

Plan of the infected premises

Figure 389: Plan of AIV 2022/50

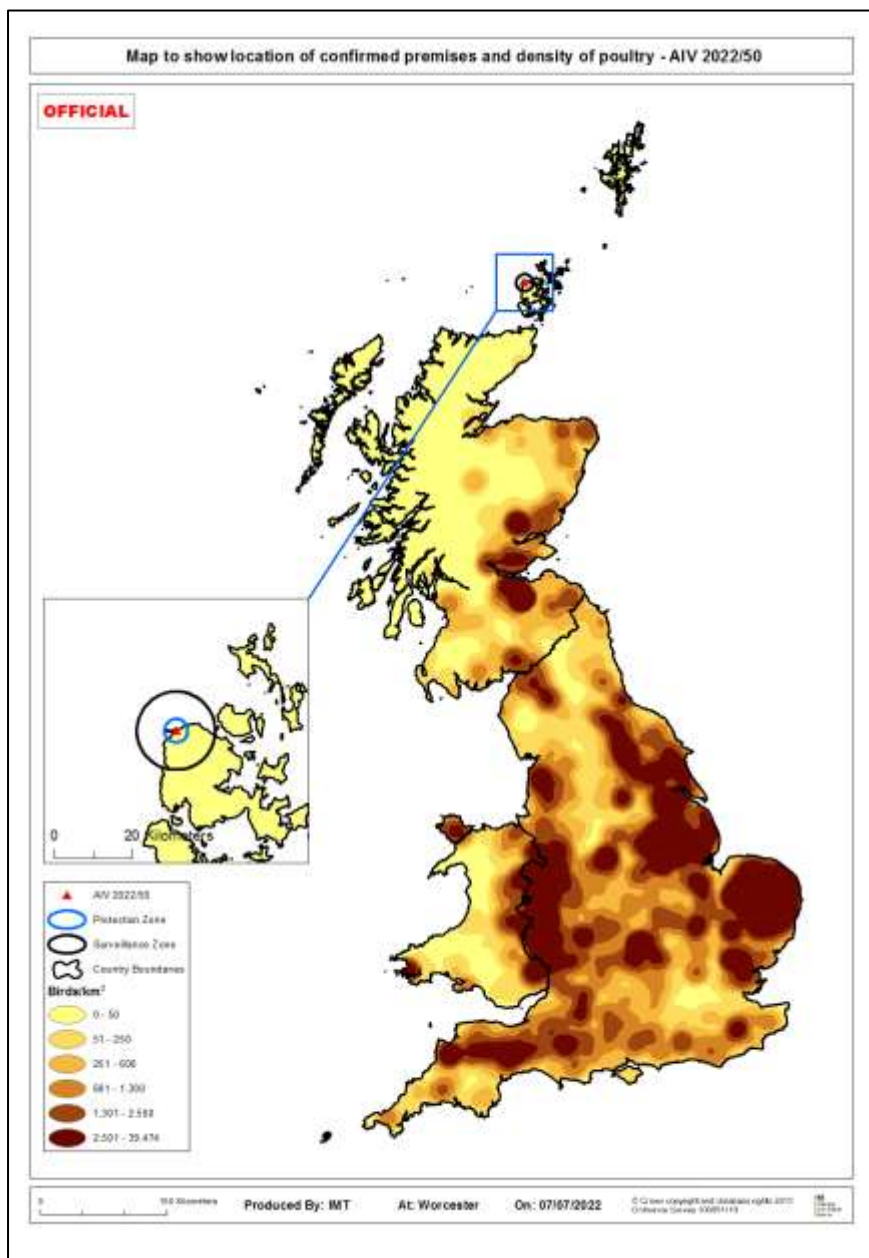


Overview of biosecurity

Biosecurity standards on the IP were found to be poor with no specific measures in place such as disinfectants or a change of clothing. The adult chickens were free ranging and contact, both direct and indirect, with wild birds (particularly sea birds) was certain.

Map with location in Great Britain and poultry density

Figure 390: Location of IP and poultry density



Overview of the surrounding area

The premises was situated close to the northwest corner of the main island on Orkney within 270 metres of the coast in a low-density poultry area.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The premises was near the sea and wild birds were abundant.

Clinical picture

01/07/2022 – One chicken (which used to roam away from the premises) died.

04/07/2022 – Suspicion of notifiable disease was reported by the PVS following six further deaths in the adult chickens without any other prior clinical signs. Two remaining adult chickens had respiratory signs and inappetence, one chicken had diarrhoea. Egg production was not affected.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/06/2022 to 30/06/2022
Likely:	17/06/2022 to 27/06/2022
Precautionary:	12/06/2022 to 16/06/2022

Spread tracings window:

High-risk:	29/06/2022 to 04/07/2022
Likely:	18/06/2022 to 28/06/2022
Precautionary:	13/06/2022 to 17/06/2022

Most likely date of infection: 28/06/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 391: Source and spread timeline for AIV 2022/50

Source Tracing Window	Spread Tracing Window	Date	
Day 19		12/06/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		13/06/22	Start of precautionary spread tracing window (source + 24h).
Day 17		14/06/22	
Day 16		15/06/22	
Day 15		16/06/22	
Day 14		17/06/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/06/22	Start of likely spread tracing window (source + 24 hrs)
Day 12	Day 2	19/06/22	
Day 11	Day 3	20/06/22	
Day 10	Day 4	21/06/22	
Day 9	Day 5	22/06/22	
Day 8	Day 6	23/06/22	
Day 7	Day 7	24/06/22	
Day 6	Day 8	25/06/22	
Day 5	Day 9	26/06/22	
Day 4	Day 10	27/06/22	
Day 3	Day 11	28/06/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/06/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/06/22	
	Day 14	01/07/22	Precautionary onset of clinical signs. First bird found dead.
	Day 15	02/07/22	Second bird died.
	Day 16	03/07/22	Several noted to be lethargic.
	Day 17	04/07/22	4 birds died overnight. Report case to APHA. Restrictions in place
	Day 18	05/07/22	
	Day 19	06/07/22	Avian Influenza H5N1 confirmed with case reference AIV2022-50.
	Day 20	07/07/22	
	Day 21	08/07/22	Cull and preliminary C&D completed
	Day 22	09/07/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction.
			Yellow col+A1:D31our reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread

Surveillance activity

PZ (0-3 km)

18 premises with poultry, including the IP CPH 87/614/8500, are reported to be within 3 km of the IP with the additional premises holding between 2-34 birds.

0 premises holding both pigs and poultry.

SZ/RZ (3-10 km)

4 premises with poultry are reported to be within 10 km of the IP holding between 9-2,250 birds.

0 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

The chickens were free ranging and in direct contact with wild birds which could also access their feeders and drinkers.

The IP was a few metres from the coast where there were many wild birds and the first chicken to die used to visit the neighbouring premises to feed on food put out for wild birds.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

No eggs or chicks had been moved off site since disease was suspected and all other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/51, Near Tiverton, Mid Devon, Devon, England

Description of the premises

Overview of the premises and the wider business

This was a small backyard flock kept as pets in the garden of a domestic dwelling. Eggs were eaten by the owners or gifted to friends.

Species and number of each present

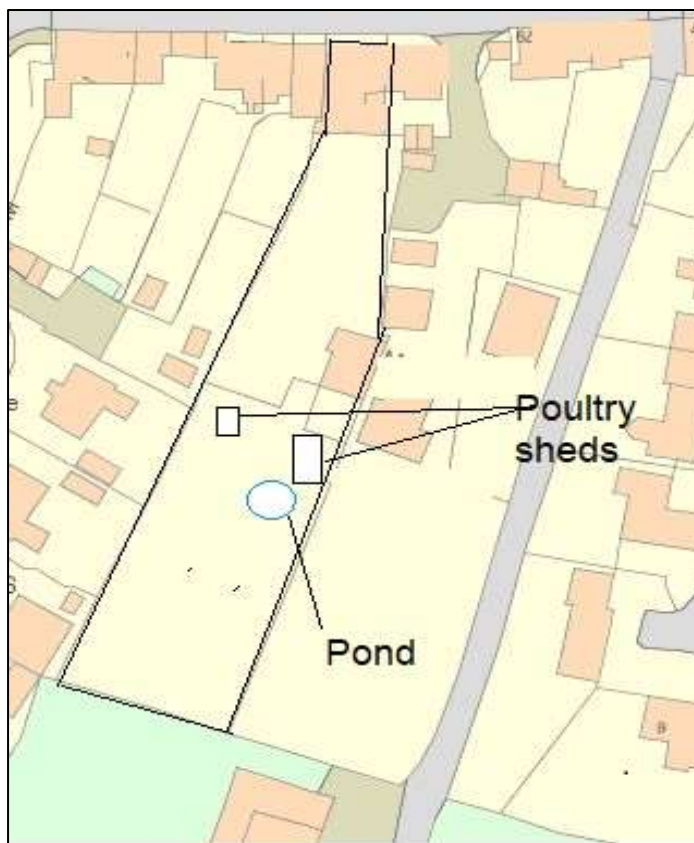
Nine chickens, two geese and three ducks.

Description of the housing

The birds were housed in sheds at night, divided by species. They were allowed to mix freely during the day and had access to a pond on which wild ducks had been seen. Wild birds could also access the outside feeders and drinkers.

Plan of the infected premises

Figure 392: Plan of AIV 2022/51



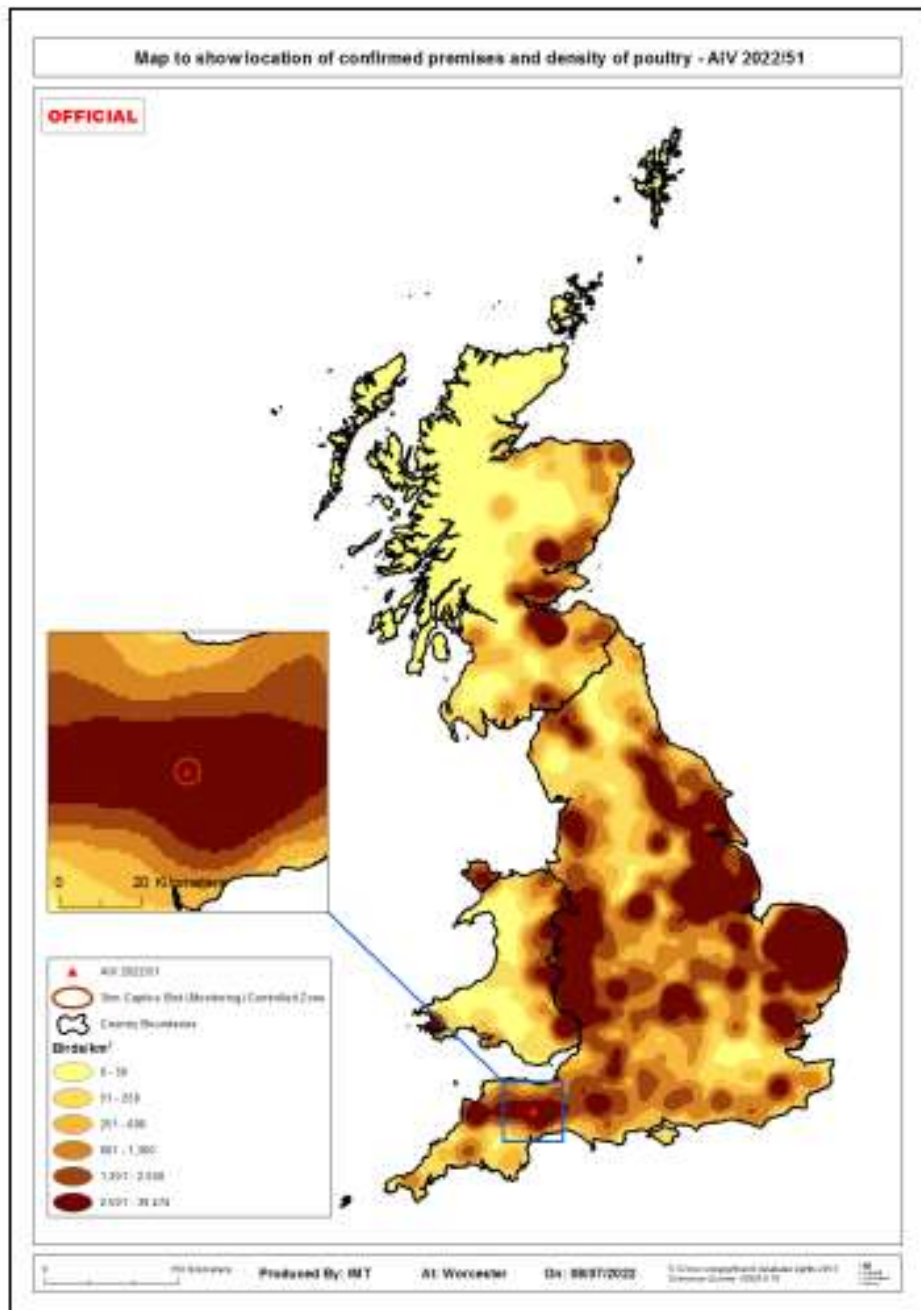
Overview of biosecurity

Biosecurity standards on the IP were found to be poor. There were no special biosecurity arrangements in place such as disinfectants or the use of dedicated

clothing. The feeders were accessible to wild birds and wild ducks had been seen on the pond.

Map with location in Great Britain and poultry density

Figure 393: Location of IP and poultry density



Overview of the surrounding area

The house was in the middle of a village. It had a large garden that had a dedicated area for the birds with a big artificial pond.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The premises was not within an active PZ or SZ and in area of low poultry density.

Clinical picture

01/07/2022 – One chicken seen to be ill and died overnight.

03/07/2022 to 05/07/2022 – Three further chickens died.

06/07/2022 – Three more chickens and one goose died. The other goose was lethargic and suspicion of notifiable avian disease was reported.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/06/2022 to 30/06/2022
Likely:	17/06/2022 to 27/06/2022
Precautionary:	15/06/2022 to 16/06/2022

Spread tracings window:

High-risk:	29/06/2022 to 06/07/2022
Likely:	18/06/2022 to 28/06/2022
Precautionary:	16/06/2022 to 17/06/2022

Most likely date of infection: 28/06/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 394: Source and spread timeline for AIV 2022/51

Source Tracing Window	Spread Tracing Window	Date	
Day 17		14/06/22	
Day 16		15/06/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 15		16/06/22	Start of precautionary spread tracing window (source + 24h).
Day 14		17/06/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/06/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	19/06/22	
Day 11	Day 3	20/06/22	
Day 10	Day 4	21/06/22	
Day 9	Day 5	22/06/22	
Day 8	Day 6	23/06/22	
Day 7	Day 7	24/06/22	
Day 6	Day 8	25/06/22	
Day 5	Day 9	26/06/22	
Day 4	Day 10	27/06/22	
Day 3	Day 11	28/06/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/06/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/06/22	
	Day 14	01/07/22	Precautionary onset of clinical signs. One chicken with clinical signs.
	Day 15	02/07/22	Chicken affected on 1/7/22 died.
	Day 16	03/07/22	One chicken died
	Day 17	04/07/22	One chicken died
	Day 18	05/07/22	One chicken died
	Day 19	06/07/22	Notification of suspicion of disease to APHA. Initial APHA investigation (DPR 2022/125). Restrictions served. Three chicken died.
	Day 20	07/07/22	
	Day 21	08/07/22	HPAI H5N1 confirmed by CVO and given case reference AIV2022-51. Culling started and completed. Preliminary C&D applied.
	Day 22	09/07/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

CBMCZ (0-3 km)

59 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 2-25,944 birds.

0 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The birds were free range in a garden with direct access to wild birds.

There had been no movements of birds on to the property and there were no known links to other poultry premises.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

No tracings were identified within the high-risk tracing windows and all other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/52, Near Dartington, South Hams, Devon, England

Description of the premises

Overview of the premises and the wider business

This was a commercial, organic, free-range flock, originally consisting of 24,000 broiler chickens, aged between 3 to 11 weeks old. The birds were housed in 32 mobile polytunnel houses, with approximately 600 birds per house. At the time of the disease investigation 28 houses were populated.

There were also 193 cattle, split between the IP and the linked premises, and 27 pet sheep on the premises.

There were also approximately 4,500 seven-day old chicks, housed at a linked but separate location, approximately 7 kms away. Birds would be brought to this site from a hatchery as day-old chicks, and kept there for 12 days inside a building, before being moved to mobile houses in a dedicated field on the IP. Normal practice was that finished broilers would then be consigned to slaughter at approximately 10 weeks of age.

This diversified farm business was registered with an organic assurance scheme, and in addition to the organic free range broiler production, the other main enterprises were the rearing of beef cattle and the production of cereals; in addition to organic potatoes and vegetables, for supply to a local supplier of organic food in Devon.

Seven staff members (family members and employees) tended to the birds on the premises, including an employee who tended the chicks and cattle on the linked premises. Movement of chicks from the separate linked rearing site to the IP and catching of birds on the IP for consignment to slaughter was undertaken by the farm staff with no external catching teams being used.

All feed deliveries were made to the IP. Bagged feed for the chicks at the linked premises would be taken there as needed by a farm vehicle.

Straw for bedding was brought from the linked premises and stored in a shed on the IP before being used to replenish bedding in the houses.

A pest control contractor was employed to control vermin at both sites. Vermin control was undertaken in and around the buildings, but not within the poultry field on the IP.

Any poultry carcasses from the linked premises would be brought to the IP from where they would be consigned to an approved ABP disposal site along with any carcasses from the IP.

Species and number of each present

24,000 broiler chickens reared in batches separated by two weeks of age. A letter and a number would be assigned to each batch – see Figure Table 17 below.

Chicks supplied to the linked rearing site from the hatchery would be reared there for 12 days before being moved to the IP.

At the time of the disease report five batches were present on the site; L4, L5, L6, L7 and L8. Only birds from houses 1, 2 and 3 (batch L5) appeared clinically affected. This batch had arrived on site from the linked rearing premises on 31/05/2022.

Table 17: Ages of birds on AIV 2022/52

House number	Age of birds	Batch
3	Affected house: 9 weeks	L5
2	Affected house: 9 weeks	L5
1	Affected house: 9 weeks	L5
4	9 weeks	L5
5	9 weeks	L5
6	9 weeks	L5
7	9 weeks	L5
8	9 weeks	L5
9	9 weeks	L5
10	7 weeks	L6
11	7 weeks	L6
12	7 weeks	L6
13	7 weeks	L6
J	11 weeks	L4
H	11 weeks	L4
G	11 weeks	L4
F	11 weeks	L4
E	11 weeks	L4
D	11 weeks	L4
C	11 weeks	L4
B	11 weeks	L4
A	11 weeks	L4

House number	Age of birds	Batch
17	5 weeks	L7
16	5 weeks	L7
15	5 weeks	L7
14	5 weeks	L7
19	3 weeks	L8
18	3 weeks	L8

Description of the housing

The birds were housed in mobile polytunnel houses ventilated through meshed windows on the doors and sides, with approximately 600 birds per house.

They were housed overnight, but let out onto the field each morning where they could mix freely.

The polytunnel houses were bedded with straw, which was topped up daily as required with straw brought from a shed at the nearby farmstead.

Feeders and drinkers were located inside the houses. The water supply to all houses was from a well and supplied to the drinkers from a covered water tank within each house.

Before new batches of birds arrived the polytunnels were cleansed and disinfected and moved to a new area of the field to try and maintain a degree of separation between batches.

Used litter was composted within the field after the removal of the polytunnels before being spread on a nearby field and ploughed in.

Plan of the infected premises

Figure 395: Overview plan of AIV 2022/52

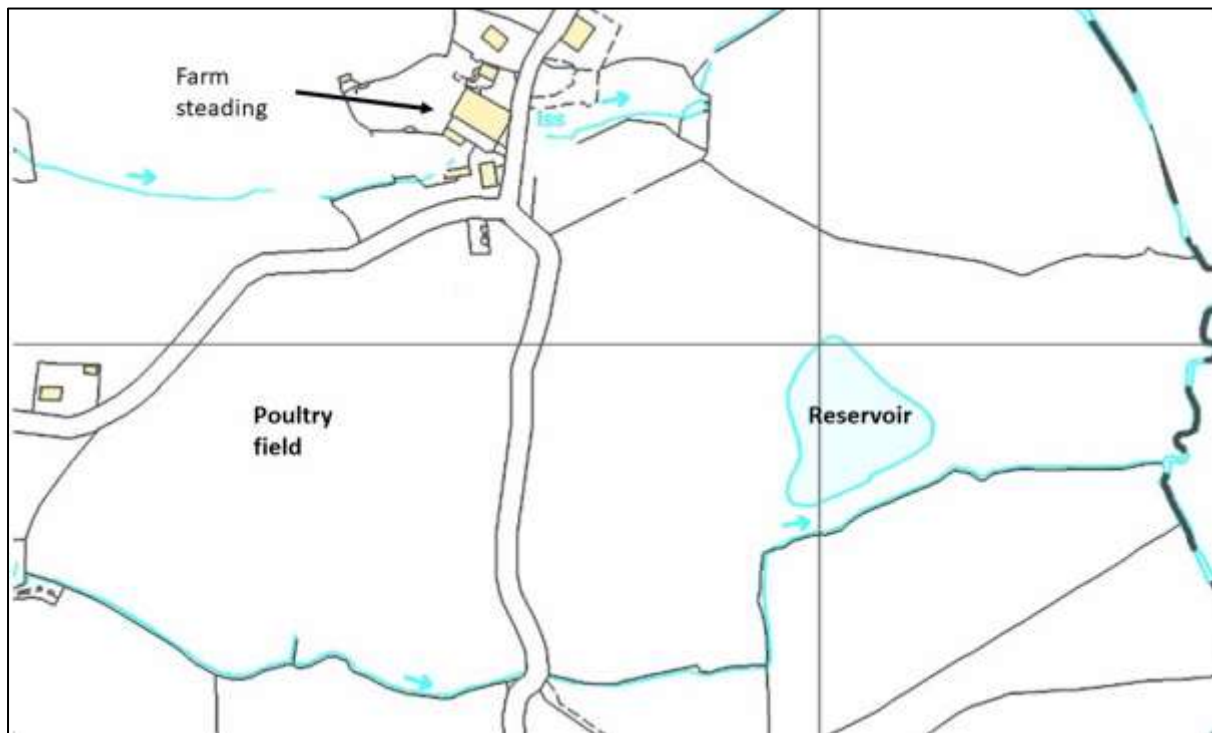


Figure 396: Plan of farm steading

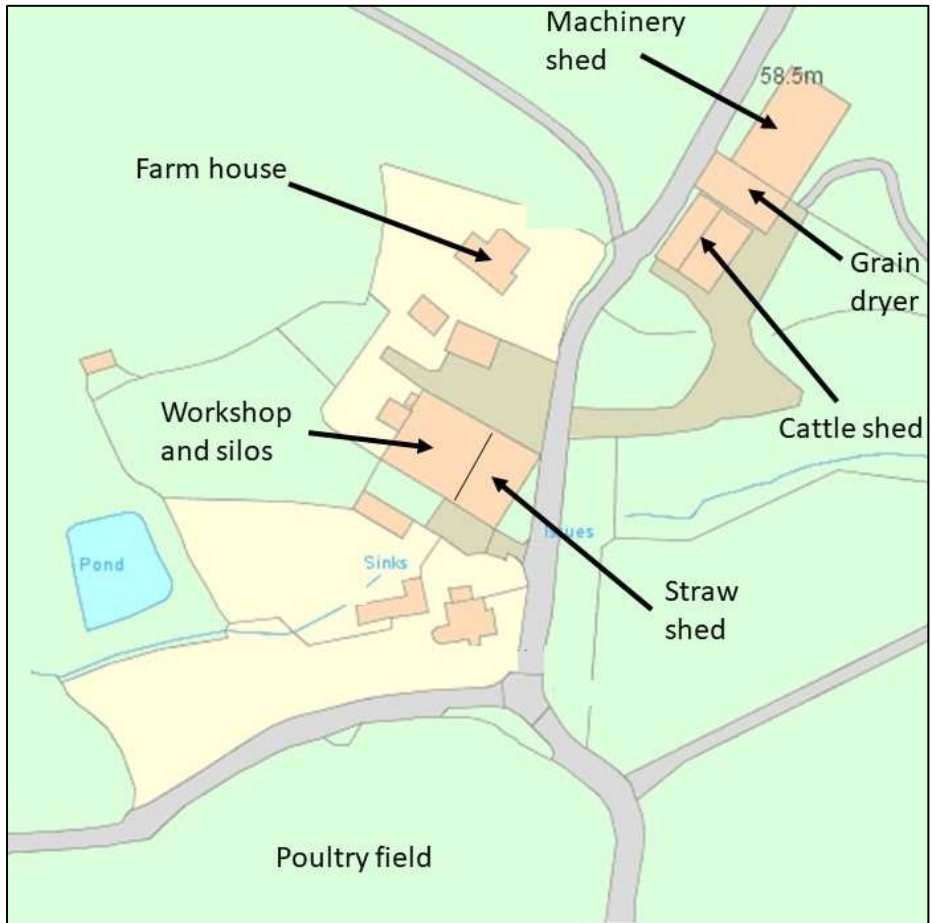
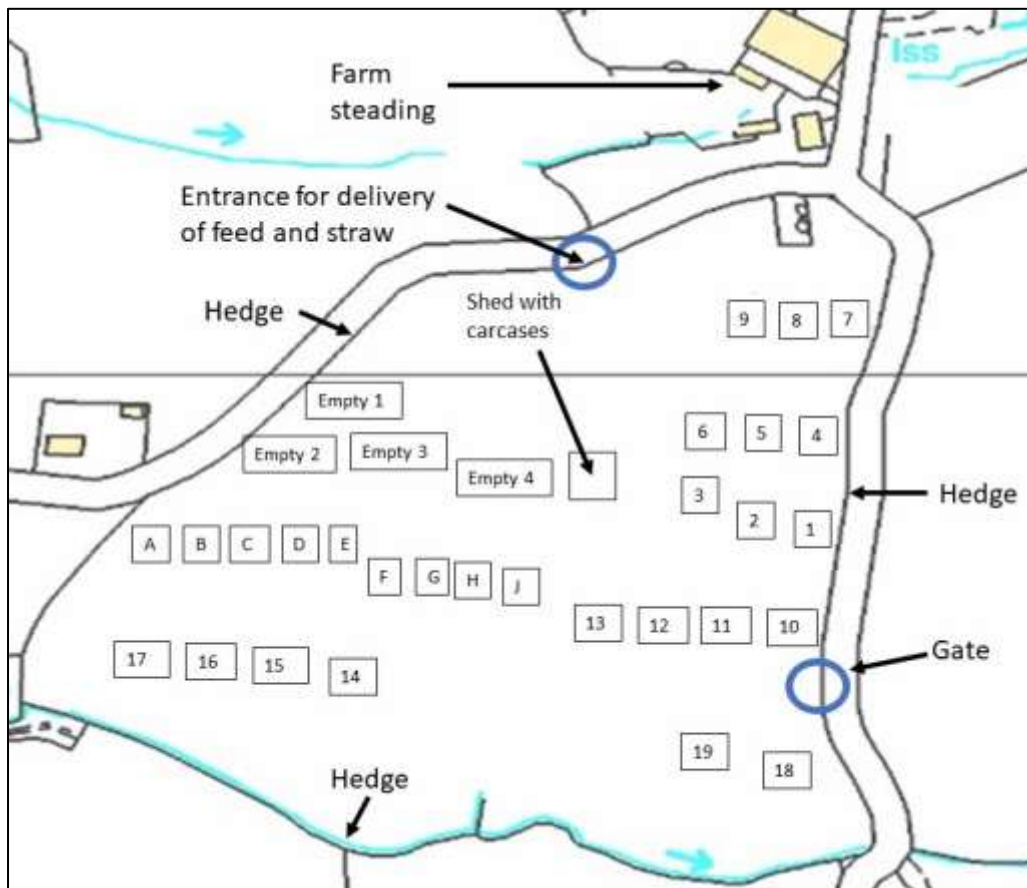


Figure 397: Plan of poultry field showing distribution of housing



Overview of biosecurity

The poultry field was accessed directly from the road via a gate. Although closed with a sign to prohibit access by members of the public, it was not secure.

At the opposite side of the field there was another gate for the access of farm vehicles to replenish feed and bedding straw.

There were buckets with disinfectant (Virkon S, occasionally FAM 30) and knapsack sprayers available.

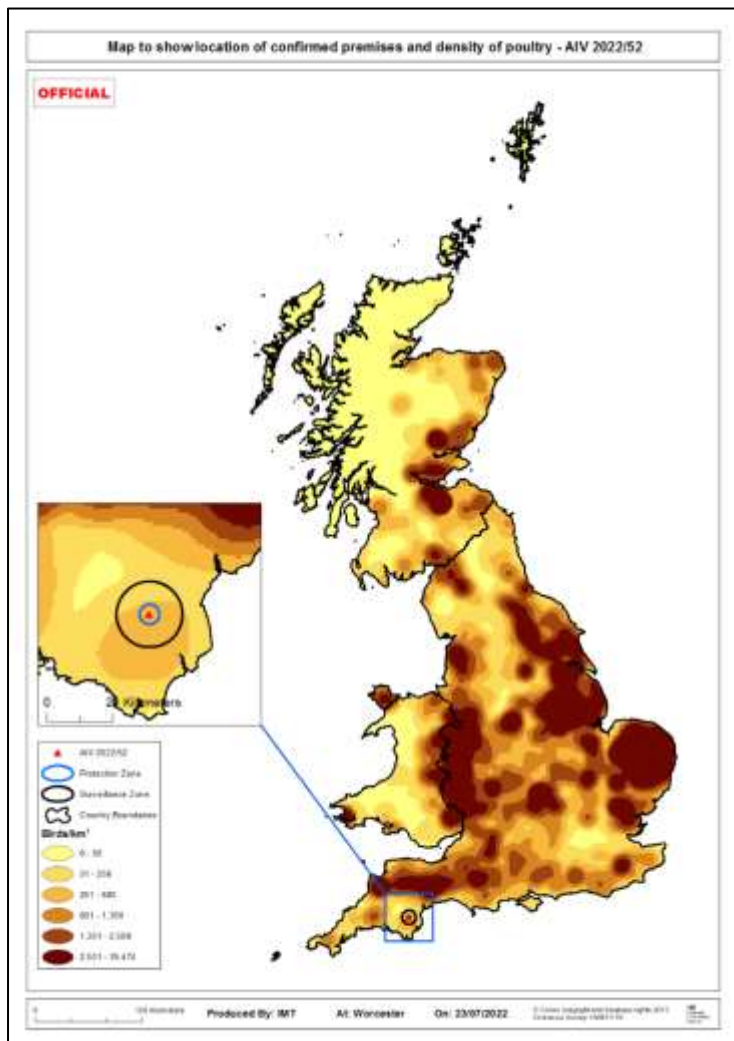
There were regular staff and vehicle movements between the IP and the separate linked premises where the seven-day old chicks were kept. This was subsequently assessed and culled as a dangerous contact premises.

Staff did not undertake any C&D whilst moving between houses and broilers could mix in the large central range area shared by all houses during the day. Wild birds had been observed visiting the field.

While pest control was undertaken around the buildings this did not extend to the poultry field and mobile houses.

Map with location in Great Britain and poultry density

Figure 398: Location of IP and poultry density



Overview of the surrounding area

The IP was in a medium-low poultry density area and at the time of the disease report, was not in any existing disease control zones. However a previously confirmed IP (AIV 2021/69, confirmed on 22/12/2021) was approximately 3.5 km away.

There was a water reservoir, approximately 250 metres away, separated by a lane and other fields. Wild birds, in particular wild geese, had frequently been observed in the fields.

Other wild birds that had been observed visiting the poultry field included rooks, crows, magpies and seagulls. Wild ducks had been seen on the pond by the farm steading.

The poultry field was bounded by a hedge and with gates on either side which opened to a road and lane respectively. There were no public paths crossing the field.

A small flock of hobby chickens was reported to be present on nearby premises across the road to the west of the poultry field.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: In addition to the presence of wild birds as described, gamebirds had also been released onto land approximately 800-900 m to the northwest of the poultry field.

A number of HPAI H5N1 positive wild birds had been detected in nearby areas in the recently preceding weeks.

Clinical picture

15/07/2022 to 19/07/2022 – an increase in mortality in batch L5 was noted between but this was initially attributed to very hot weather conditions.

20/07/2022 – increased mortality in Houses 1, 2 and 3 was seen with 138 birds found dead. Suspicion of notifiable disease was reported. The night before, the birds had appeared lethargic. Other reported clinical signs included swollen heads, blue combs, cyanotic spots on their feet and legs, pyrexia but no respiratory symptoms or diarrhoea. No drop in feed intake was observed.

At the APHA investigation the same day, the remaining birds in Houses 1, 2 and 3 appeared depressed, unwilling to move and some were recumbent. A few had difficulties with breathing, swollen heads, green diarrhoea, dark combs and wattles and leg haemorrhages. No neurological signs were observed. Approximately 50% morbidity was reported in the three affected houses. Post-mortem examination of one dead bird was unremarkable with exception of dark combs and legs.

Birds in all the other houses appeared normal. Samples were submitted.

21/07/2022 – continuing mortality in the same three houses.

25/07/2022 – Following an epidemiological assessment of the linked premises with the seven-day old chicks, it was designated as a Dangerous Contact and was culled. Sampling at culling was undertaken with negative results.

Timeline

Tracings windows

Source tracings window:

High-risk: 11/07/2022 to 13/07/2022
 Likely: 30/06/2022 to 10/07/2022
 Precautionary: 29/06/2022 to 29/06/2022

Spread tracings window:

High-risk: 12/07/2022 to 20/07/2022
 Likely: 01/07/2022 to 11/07/2022
 Precautionary: 30/06/2022 to 30/06/2022

Most likely date of infection 11/07/2022 (Start of high-risk source tracing window).

Timeline chart

Figure 399: Source and spread timeline for AIV 2022/52

Source Tracing Window	Spread Tracing Window	Date	
Day 15		29/06/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 14		30/06/22	Start of precautionary spread tracing window (source + 24h). Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	01/07/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	02/07/22	
Day 11	Day 3	03/07/22	
Day 10	Day 4	04/07/22	
Day 9	Day 5	05/07/22	
Day 8	Day 6	06/07/22	
Day 7	Day 7	07/07/22	
Day 6	Day 8	08/07/22	
Day 5	Day 9	09/07/22	
Day 4	Day 10	10/07/22	
Day 3	Day 11	11/07/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	12/07/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	13/07/22	
	Day 14	14/07/22	Precautionary onset of clinical signs based on production records.
	Day 15	15/07/22	
	Day 16	16/07/22	
	Day 17	17/07/22	
	Day 18	18/07/22	
	Day 19	19/07/22	
	Day 20	20/07/22	Notification of suspicion of disease to APHA. Initial APHA investigation (DPR 2022/131). Restrictions served.
	Day 21	21/07/22	Avian Influenza HPAI H5N1 confirmed based on PCR results with case reference AIV 2022/52.
	Day 22	22/07/22	
	Day 23	23/07/22	Culling commenced.
	Day 24	24/07/22	Culling completed.
	Day 25	25/07/22	Preliminary C&D completed.
	Day 26	26/07/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

28 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-6,105 birds (4 premises with 50 or more birds).

1 premises holding both pigs and poultry.

SZ (3-10 km)

265 premises with poultry were reported to be within 3 -10 km of the IP holding between 1-18,000 birds (25 premises with 50 or more birds)

25 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for ABP disposal of carcasses, movement of birds to slaughter and the associated driver and equipment, staff movements to a linked premises, feed deliveries and a pest control visit within the high-risk tracing windows. This resulted in a visit to the linked premises which, due to the very high-risk of disease transmission from this IP, was designated as a dangerous contact premises.

The driver of the vehicle moving the birds to the slaughterhouse was identified as having his own poultry and an initial tracing visit was completed. A further 21-day post contact tracing visit was also completed, assessed as a very low risk and the tracing was closed. The relevant authority was informed about the movement of birds to slaughter. All other tracings were assessed as being very low risk and they were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

The birds were free ranging during the day and as such could have direct and/or indirect contact with wild birds.

There was a waterbody in close proximity which was known to attract wild waterfowl, especially geese.

Birding species such as corvids and seagulls were known to visit the site and ducks had been observed on a pond near the farmstead.

A number of HPAI H5N1 positive wild birds had been detected in nearby areas in recent weeks.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife was assessed as medium likelihood with medium uncertainty; the broilers were free ranging during the day and could have direct or indirect contact with wild birds. Some evidence of fox predation had been noted and rodent control was not undertaken for the houses in the poultry field.

All other potential spread pathways were assessed as very low or lower likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/53 Near Sandy, Central Bedfordshire, Bedfordshire, England

Description of the premises

Overview of the premises and the wider business

This was a hobby-flock of ornamental geese and ducks next to the keeper's dwelling. Birds were bred, reared and occasionally sold. No birds had been sold for several months prior to disease confirmation.

Species and number of each present

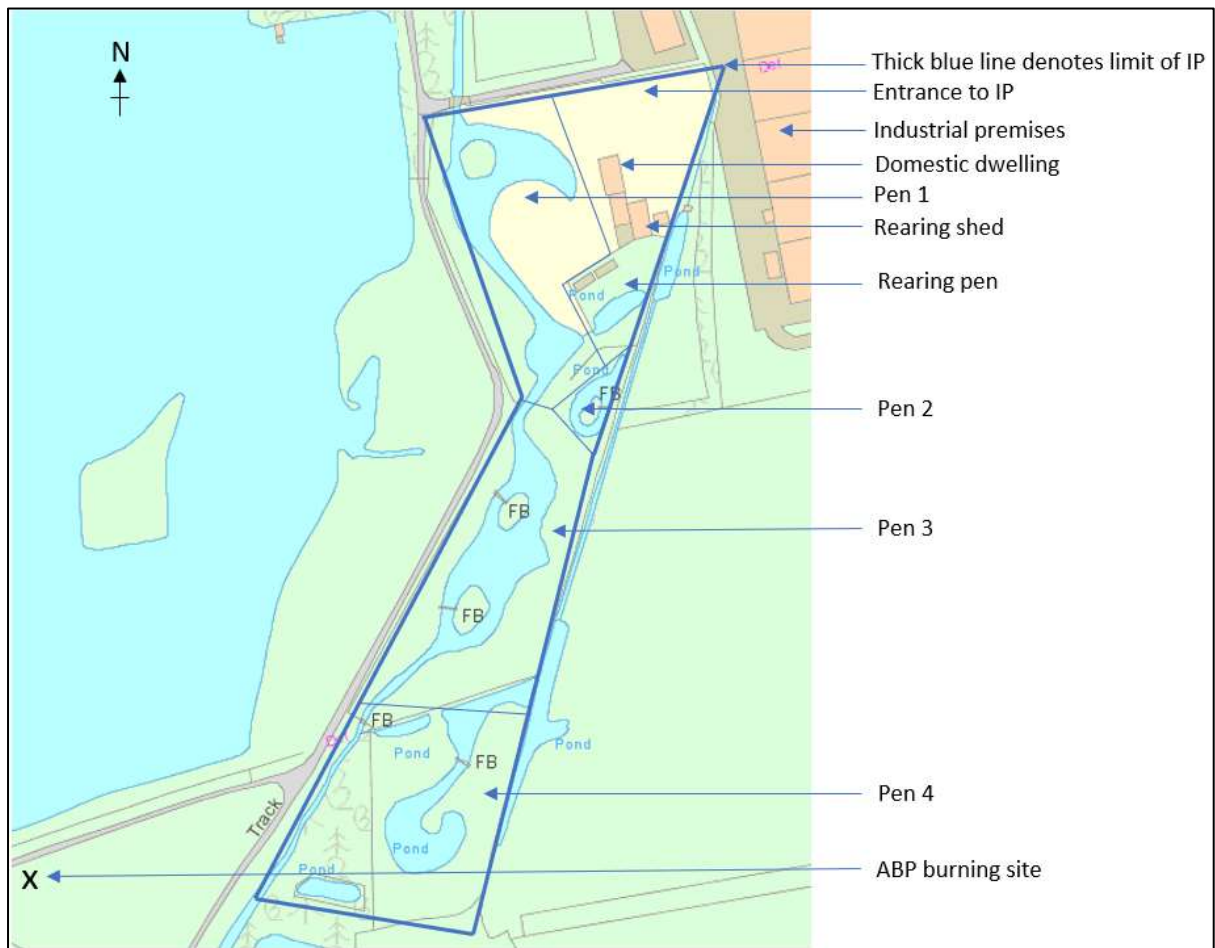
There were 236 ducks and geese of various non-native species and 14 bantam chickens. Some species were regarded as vulnerable and near-threatened.

Description of the housing

Ducks and geese were kept in a series of netted rearing pens and unnetted large ponds. Eggs and hatchlings were reared in the hatching shed until three weeks of age and then moved into outdoor pens covered in netting. There was no biosecure inside accommodation. The ponds were linked by waterflow i.e. water flowed from a large lake into the southern pen (4) and northwards to pens 3-1.

Plan of the infected premises

Figure 400: Plan of AIV 2022/53

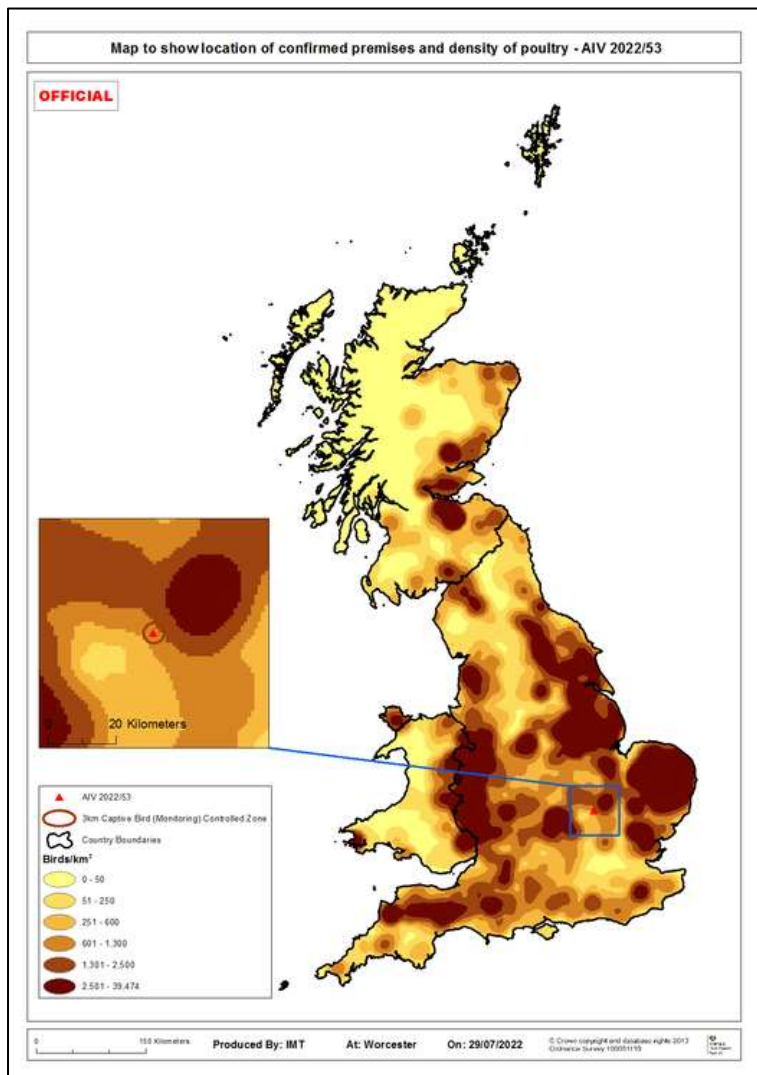


Overview of biosecurity

There was no biosecurity. The IP was accessed through an industrial unit. There was no facility for vehicle C and D. The large pens were unnetted and there were no individual clothing or boots for personnel. Animal by-products were burnt on-site on a bonfire. There was no filtering or treatment of the water supplying the ponds.

Map with location in Great Britain and poultry density

Figure 401: Location of IP and poultry density



Overview of the surrounding area

The IP was next to a large industrial warehouse which had no animals or animal products on site. It was next to a naturally occurring lake. Although the IP was in an area of medium poultry density, there were no contiguous poultry premises.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The IP was in an area rich in rivers and lakes. A large number of waders, gulls and passerines will have been present. The lake beside the IP was likely to have attracted a large number of waterbirds, that may well have mingled with the captive birds.

Clinical picture

20/07/2022 – two birds in the rearing pen died suddenly.

26/07/2022 – suspicion of avian notifiable disease was reported following the further deaths of 23 geese and 36 ducks during the week. Birds showed neurological signs and died within 48 hours. Adult birds in the other pens were unaffected i.e. only young birds were affected.

Timeline

Tracings windows

Source tracings window:

High-risk:	16/07/2022 to 18/07/2022
Likely:	05/07/2022 to 15/07/2022
Precautionary:	none as it fell within the likely period

Spread tracings window:

High-risk:	17/07/2022 to 26/07/2022
Likely:	06/07/2022 to 16/07/2022
Precautionary:	none as it fell within the likely period

Most likely date of infection 16/07/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 402: Source and spread timeline for AIV 2022/53

Source Tracing Window	Spread Tracing Window	Date	
Day 14	Day 1	05/07/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA). Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 2	06/07/22	Start of precautionary spread tracing window (source + 24h). Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 3	07/07/22	
Day 11	Day 4	08/07/22	
Day 10	Day 5	09/07/22	
Day 9	Day 6	10/07/22	
Day 8	Day 7	11/07/22	
Day 7	Day 8	12/07/22	
Day 6	Day 9	13/07/22	
Day 5	Day 10	14/07/22	
Day 4	Day 11	15/07/22	
Day 3	Day 12	16/07/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 13	17/07/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 14	18/07/22	
	Day 15	19/07/22	Precautionary onset of clinical signs.
	Day 16	20/07/22	First 2 deaths noted in rearing pen
	Day 17	21/07/22	
	Day 18	22/07/22	
	Day 19	23/07/22	
	Day 20	24/07/22	
	Day 21	25/07/22	
	Day 22	26/07/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/136). Restrictions served.
	Day 23	27/07/22	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2022-53.
		~	
	Day 28	01/08/22	Culling started and completed.
	Day 29	02/08/22	Prelim C and D applied
	Day 30	03/08/22	Prelim C and D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

29 premises with poultry holding between 1-73 birds. 1 premises with >50 birds.

No premises with pigs and poultry.

SZ (3-10 km)

No SZ in place.

Investigations on the infected premises

Overview of tracing activities

Two telephone tracings were generated for this IP. One for the private veterinary practice that received carcasses for post-mortem examination and one for the son of the IP owner who visited regularly and had a bird collection of his own. A tracing visit

was completed to this collection premises and the risk of transmission assessed as very low.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

Whilst the birds in the rearing pen had enclosures with netting, this netting did not prevent wild birds from coming into direct and indirect contact with kept birds. There was effectively no biosecurity and virus could have been carried on keepers' footwear or clothing.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/54 Near Ashburton, Teignbridge, Devon, England

Description of the premises

Overview of the premises and the wider business

The premises was a beef farm which had a backyard flock of chickens, ducks and geese.

The poultry were kept for the owner's consumption (meat and eggs). Surplus eggs were to neighbours.

Species and number of each present

50 chickens, 15 ducks and two geese.

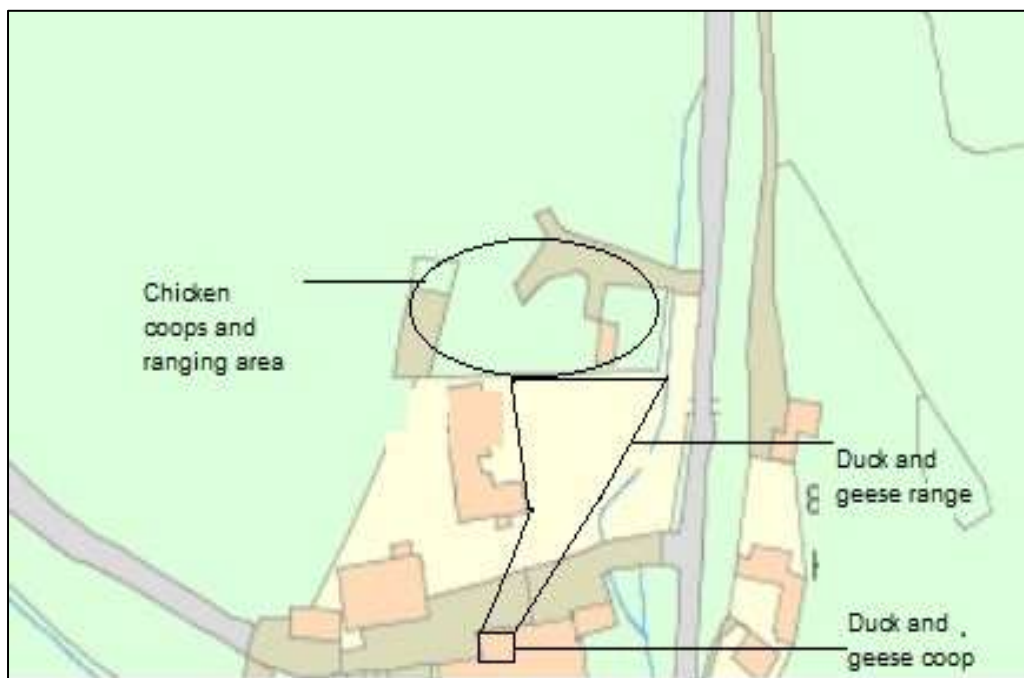
62 cattle, two horses and four cats.

Description of the housing

The birds were entirely free ranging with coops or sheds for housing overnight. During the day, the chickens were in a field and the geese and ducks had the run of the farmyard area. The separation of these areas was not absolute and often the chickens were able to mix with the ducks and geese. Troughs and feeders were located outside and could be accessed by wild birds.

Plan of the infected premises

Figure 403: Plan of AIV 2022/54

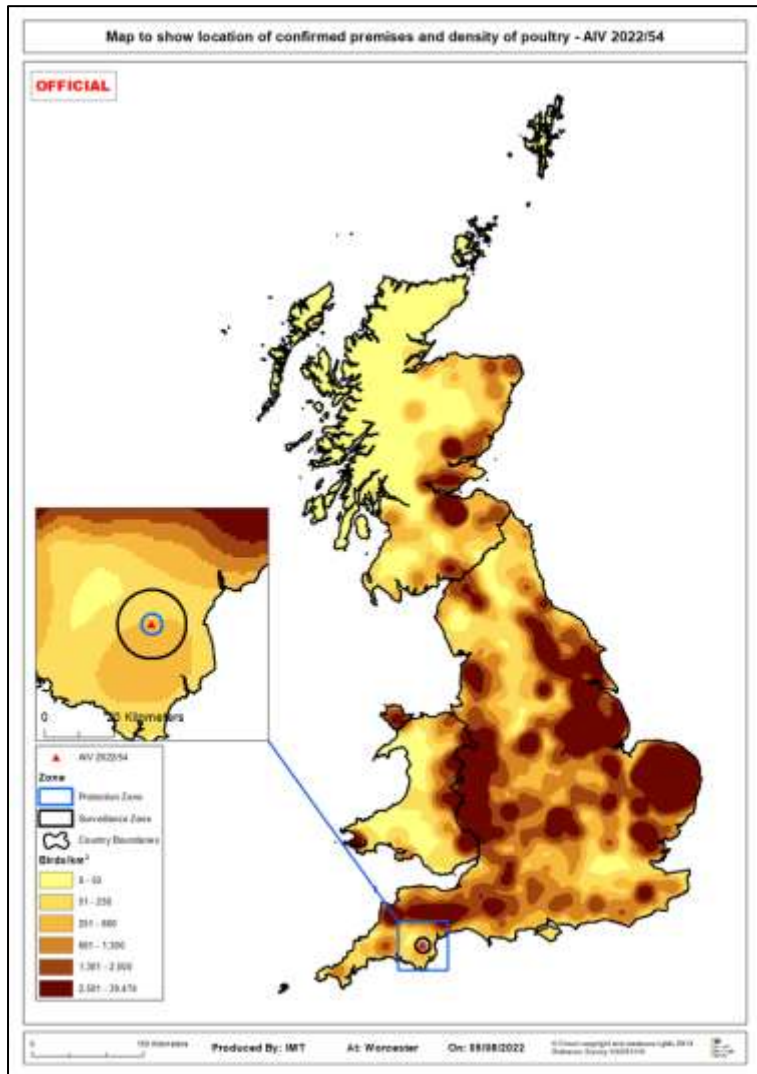


Overview of biosecurity

No biosecurity measures, such as foot-dips or dedicated clothing were used.

Map with location in Great Britain and poultry density

Figure 404: Location of IP and poultry density



Overview of the surrounding area

The surrounding area comprised fields and small woodland areas. There were no nearby waterbodies and no contiguous poultry premises.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The IP was located in an area of medium to low poultry density and within the PZ of AIV 2022/52.

Clinical picture

02/08/2022 – Two chickens were seen to be ill.

03/08/2022 – 11 chickens were found dead and suspicion of notifiable avian disease was reported. During the investigation, two chickens had cyanotic combs, swollen heads, ocular discharge and diarrhoea. These birds and one other died during the day.

05/08/2022 – Two more chickens died. The ducks and geese did not display any clinical signs prior to culling.

Timeline

Tracings windows

Source tracings window:

High-risk:	29/07/2022 to 31/07/2022
Likely:	18/07/2022 to 28/07/2022
Precautionary:	13/07/2022 to 17/07/2022

Spread tracings window:

High-risk:	30/07/2022 to 03/08/2022
Likely:	19/07/2022 to 29/07/2022
Precautionary:	14/07/2022 to 18/07/2022

Most likely date of infection 29/07/2022 (Start of high-risk source tracing window):

Timeline chart

Figure 405: Source and spread timeline for AIV 2022/54

Source Tracing Window	Spread Tracing Window	Date	
		10/07/22	
		11/07/22	
		12/07/22	
Day 19		13/07/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		14/07/22	Start of precautionary spread tracing window (source + 24h).
Day 17		15/07/22	
Day 16		16/07/22	
Day 15		17/07/22	
Day 14		18/07/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	19/07/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	20/07/22	
Day 11	Day 3	21/07/22	
Day 10	Day 4	22/07/22	
Day 9	Day 5	23/07/22	
Day 8	Day 6	24/07/22	
Day 7	Day 7	25/07/22	
Day 6	Day 8	26/07/22	
Day 5	Day 9	27/07/22	
Day 4	Day 10	28/07/22	
Day 3	Day 11	29/07/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	30/07/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	31/07/22	
	Day 14	01/08/22	Precautionary onset of clinical signs.
	Day 15	02/08/22	Owner first noticed 2 hens appeared unwell
	Day 16	03/08/22	11 hens found dead. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/141). Restrictions served.
	Day 17	04/08/22	Avian Influenza H5N1 confirmed by CVO based on PCR results with case reference AIV2022 54
	Day 18	05/08/22	VFEI investigation
	Day 19	06/08/22	Preliminary C&D completed
	Day 20	07/08/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

39 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-25,000 birds.

0 premises holding both pigs and poultry.

SZ (3-10 km)

241 premises with poultry were reported to be within 3-10 km of the IP holding between 1-18,000 birds.

28 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The birds were free ranging providing scope for contact with wild birds. There had been no movements of birds on to the property and there were no known links to other poultry premises.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/55 Near Cullompton, Mid Devon, Devon, England

Description of the premises

Overview of the premises and the wider business

This was an independently owned commercial duck laying enterprise comprising two sheds (12 and 13) and a total of 2,200 mature laying ducks. This unit was part of a larger business which was under the same management and run across two sites. The other site held many more groups of poultry (12,000 ducks and quail) and was initially considered as a Dangerous Contact premises before it became a report case and was subsequently confirmed as AIV 2022/56.

In addition to the duck enterprise, there were several other independently owned businesses operating from the same site, but no other poultry.

Species and number of each present

There were 1,000 ducks in shed 12 and 1,200 ducks in shed 13.

Description of the housing

The sheds were new and constructed of concrete and steel with a solid back wall, meshed side walls and a netted front above steel access gates. Between the two sheds, there was a low wall and a shared air space.

Plan of the infected premises

Figure 406: Plan of AIV 2022/55



Overview of biosecurity

Staff had dedicated boots for each shed but there were no disinfectant boot dips or other biosecurity measures in place.

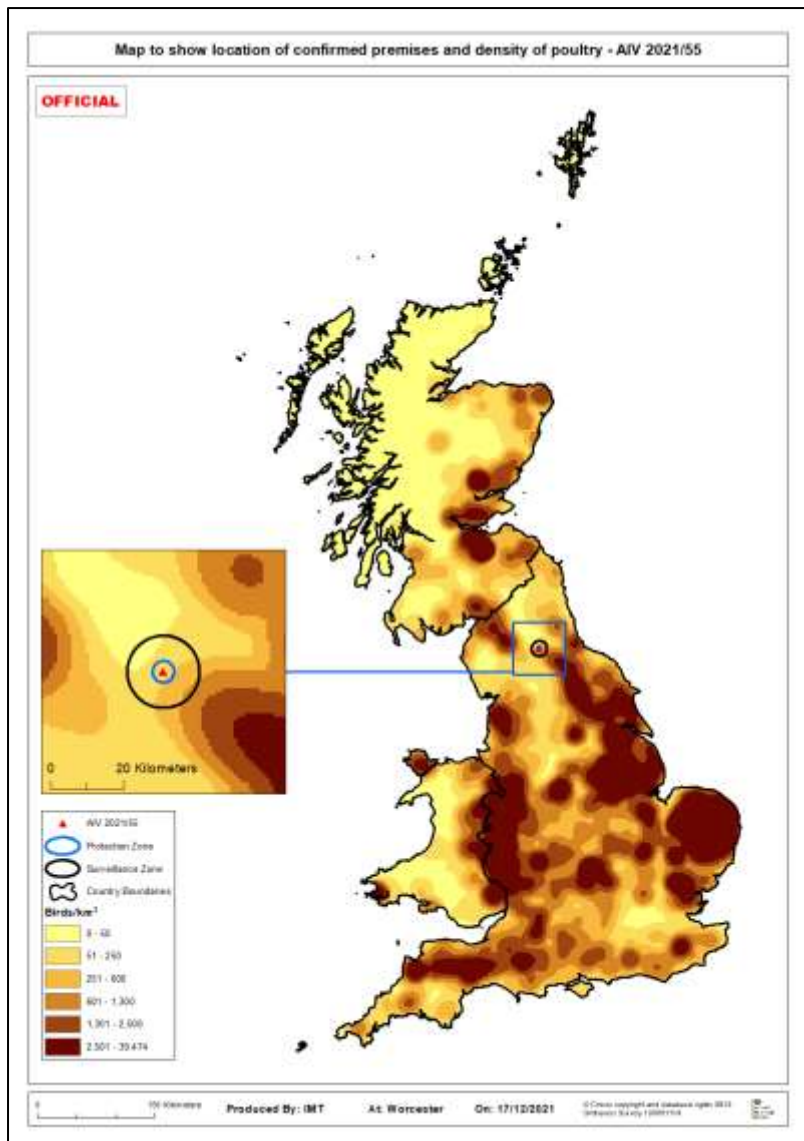
As previously mentioned, there was a linked main premises and staff, equipment, vehicles, animal by products, feed and eggs regularly moved between the two sites.

There was a gap between the netting at the front of the shed and the roof which would have permitted wild bird access.

Straw for bedding was recently harvested and would have been accessible to wild birds.

Map with location in Great Britain and poultry density

Figure 407: Location of IP and poultry density



Overview of the surrounding area

There were no other livestock on the premises but there was a water reservoir approximately 100 metres away and a series of fishing lakes. The keepers rented the duck houses at this location. On the wider site there were other businesses including a poultry shed cleaning company, a thatching company and fish feed storage.

Ornithological assessment:

Desktop assessment: The key wild bird behaviours through this time of year were probably the fledging and development/exploration of a new cohort of gull and corvid young of the year. This would have led to a virtual doubling of the population of immunologically naïve birds, with frequent direct contact with their parents, and the consequent release of the parents from continuous attendance at the nest. In short there were more individuals of the key bridge species beginning to wander away from their largely coastal breeding sites (gulls) and range further inland. This Devon IP was likely to be too far from the coast to be directly and continually subject to birds focused on the coast, but sufficiently close to receive exploring gulls and the landscape appeared favourable to corvids. The site was sufficiently close to the River Culm and associated waterbodies to suggest an influence from these, focussed on pressure produced by gulls and corvids.

Another consideration was the beginning of the 'resident' wader migration away from their upland breeding sites and down towards the coast. Although it was early for this to occur it was possible that the exceptionally dry weather provoked some movement by these risk species as their usual foraging locations had become unusably dry and hard. We also speculated that gulls and corvids (major invertebrate feeders of pasture) might have also diversified towards more anthropogenic food sources.

Local intelligence: Wild birds were not sighted regularly around the property but ducks and herons did visit the fishing ponds 1 km away.

Clinical picture

05/08/2022 – two birds found dead.

06/08/2022 – two birds found dead.

07/08/2022 – 20 birds died in shed 13 and suspicion of notifiable avian disease was reported. The keeper also reported that there had been a 90% decrease in egg production since 01/08/2022.

At the APHA investigation the same day, a review of the production records confirmed that feed intake had declined by 50% and egg production had started to decline on 27/07/2022 in House 13 and on 02/08/2022 in House 12.

On inspection of the ducks a small number were found to be lethargic, but no other clinical signs were observed. Post-mortem examination was unremarkable. Samples were submitted.

08/08/2022 – mortality continued to increase with 20 birds dying and the keeper reported that birds were more lethargic with some respiratory signs.

Timeline

Tracings windows

Source tracings window:

High-risk: 24/07/2022 to 26/07/2022

Likely: 13/07/2022 to 23/07/2022
 Precautionary: Not applicable as after the likely source window.
Spread tracings window:

High-risk: 25/07/20/22 to 06/08/2022
 Likely: 14/07/2022 to 24/07/2022
 Precautionary: Not applicable as after the likely spread window.

Most likely date of infection: 24/07/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 408: Source and spread timeline for AIV 2022/55

Source Tracing Window	Spread Tracing Window	Date	
Day 14		13/07/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	14/07/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	15/07/22	
Day 11	Day 3	16/07/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 10	Day 4	17/07/22	Start of precautionary spread tracing window (source + 24h).
Day 9	Day 5	18/07/22	
Day 8	Day 6	19/07/22	
Day 7	Day 7	20/07/22	
Day 6	Day 8	21/07/22	
Day 5	Day 9	22/07/22	
Day 4	Day 10	23/07/22	
Day 3	Day 11	24/07/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	25/07/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	26/07/22	
	Day 14	27/07/22	Precautionary onset of clinical signs. Egg drop first noticed
	Day 15	28/07/22	
	Day 16	29/07/22	
	Day 17	30/07/22	
	Day 18	31/07/22	
	Day 19	01/08/22	
	Day 20	02/08/22	
	Day 21	03/08/22	
	Day 22	04/08/22	2 ducks found dead
	Day 23	05/08/22	2 ducks found dead
	Day 24	06/08/22	20 ducks found dead. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/143). Restrictions served.
	Day 25	07/08/22	Avian Influenza H5N1 confirmed by CVO based on PCR results with case reference AIV2022 55
	Day 26	08/08/22	VFEI investigation
	Day 27	09/08/22	Cull and preliminary C&D completed
	Day 28	10/08/22	Preliminary CD considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

45 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-50,000 birds (7 premises with 50 or more birds).

1 premises holding both pigs and poultry.

SZ (3-10 km)

242 premises with poultry were reported to be within 3-10 km of the IP holding between 1-155,000 birds (52 premises with 50 or more birds).

25 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were raised for the linked premises, egg and ABP collections, feed deliveries, eight workers, the private vet who carried out post-mortem examinations at the linked premises and the owner of the poultry shed cleaning business on the same site.

Two of the workers and the owner of the poultry shed cleaning business had birds of their own and visits were undertaken to carry out clinical inspections. The poultry shed cleaner had also visited several other bird premises within the high-risk window and this generated another four inspection visits.

All tracing visits were completed and closed, with no further signs of disease found other than the linked premises as previously mentioned.

Source investigations: Hypothesis for the source

The most likely source identified was indirect or direct contact with wild birds.

Assessment and evidence base for the likely source

The evidence base for this assessment was:

Possible wild bird access through gap between mesh and roof,

Poor biosecurity protocols – no foot dips or barriers at shed entrances,

Straw bedding recently harvested.

Spread investigations: Assessment of potential and likelihood of spread

The likelihood of spread to the linked premises was assessed as high and it was identified as a dangerous contact. At the subsequent APHA visit, clinical signs were noted, and it became a report case and was then confirmed as AIV 2022/56.

Onward transmission through wildlife: risk not higher than the background risk.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/56, Near Cullompton, Mid Devon, Devon, England

Description of the premises

Overview of the premises and the wider business

This unit was part of a larger business which was under the same management and run across two sites. This site was a rented farm producing duck table-eggs, replacement laying ducks and laying quails. The other site became IP AIV 2022/55 and given the epidemiological links; this premises was restricted as a dangerous contact shortly before becoming a report case.

Species and number of each present

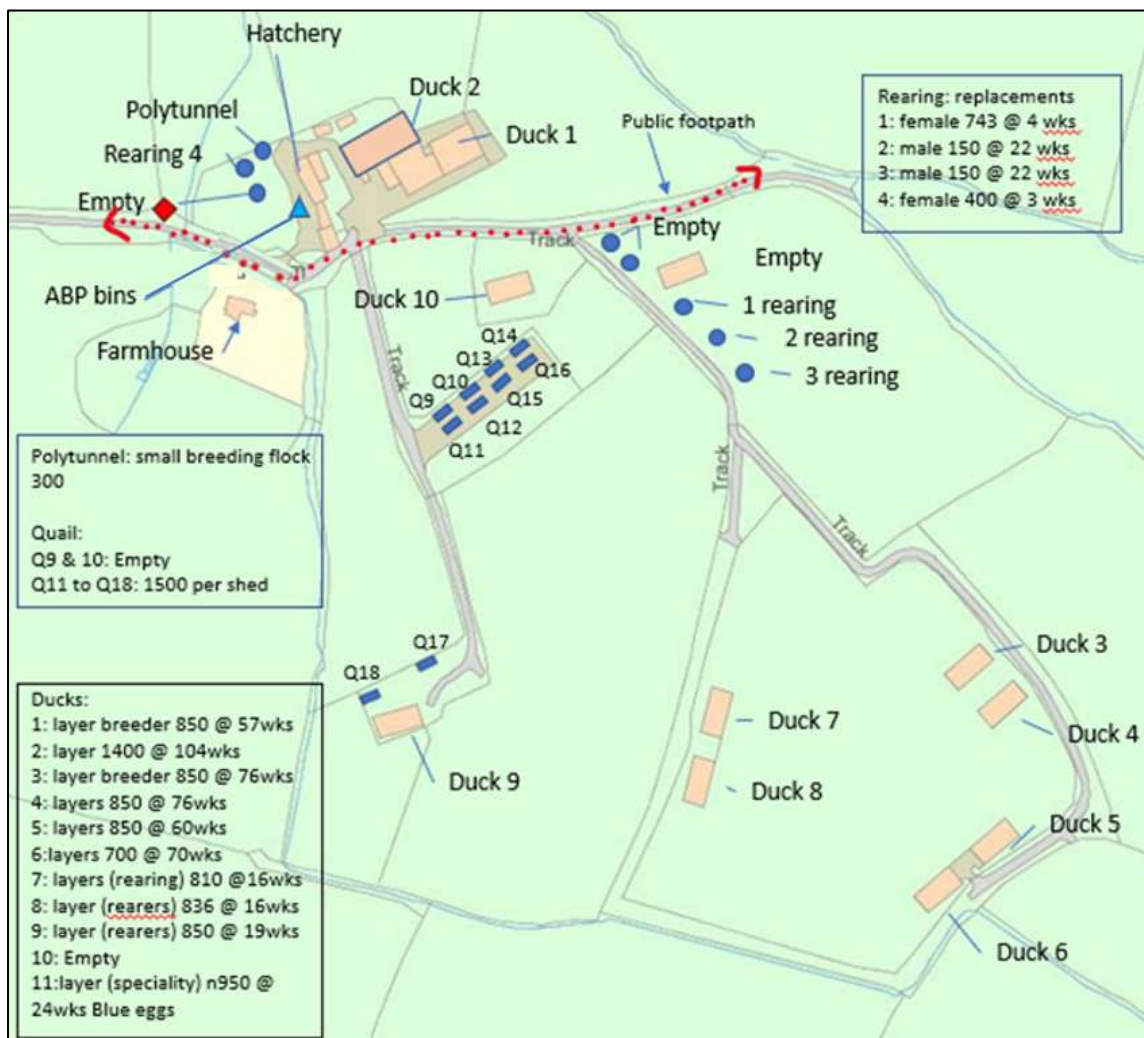
There were approximately 5600 laying ducks, 1150 breeding ducks, 4000 laying duck replacements and 12,000 quails. All ducks were Cherry Valley breed. There were 46 fattening cattle.

Description of the housing

The ducks were kept in 15 different groups in agricultural buildings, mobile units or polytunnels. The groups were located on a sloping grassland site. The quail were housed in eight mobile units. There was a hatchery on site that was used for the IP's birds only.

Plan of the infected premises

Figure 409: Plan of AIV 2022/56

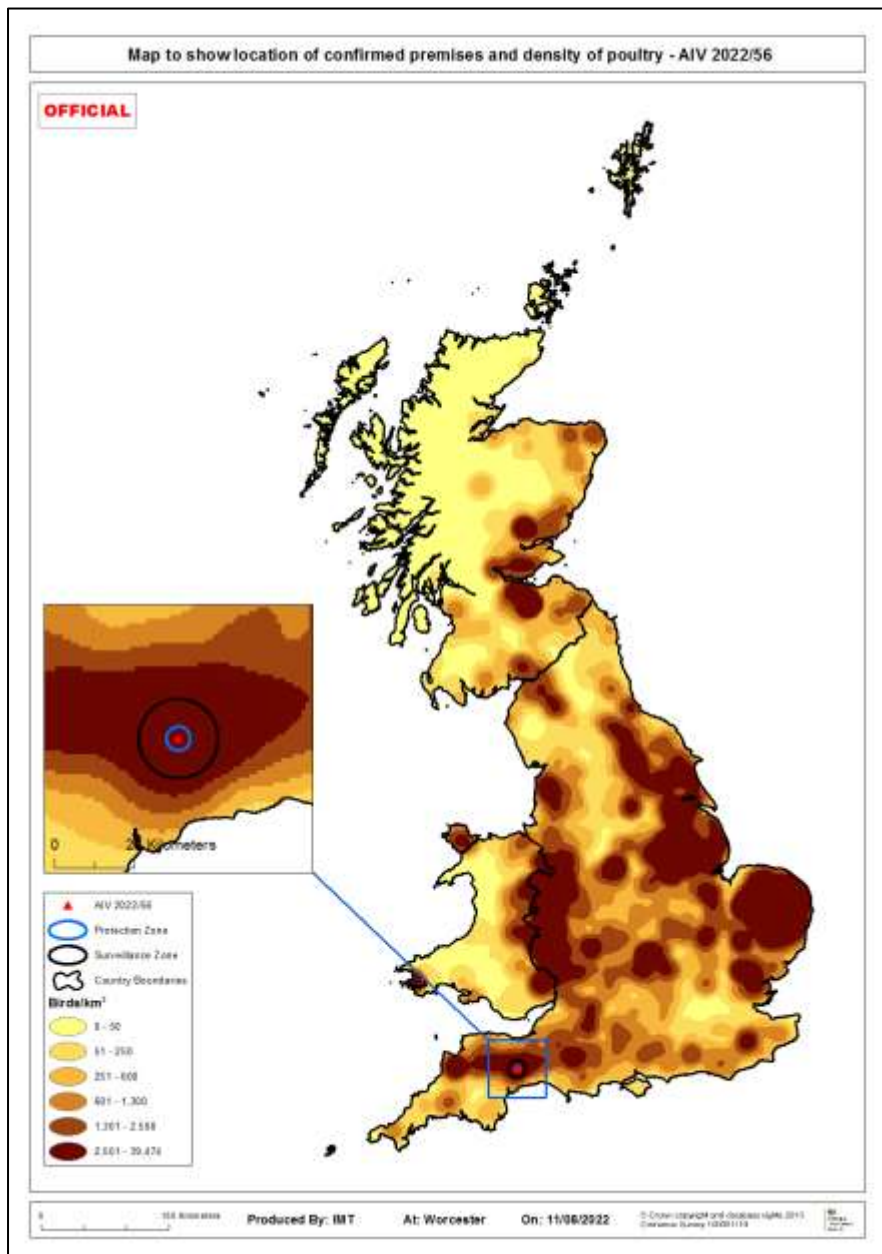


Overview of biosecurity

Biosecurity overall was low and very low between this premises and the infected linked premises. All buildings were secure against large wild birds but there were various gaps that could allow small and medium birds access. Footwear was changed between groups but clothing/overalls were not. Only one person had access to the hatchery. Feed hoppers were filled by hand. Staff, equipment, vehicles, animal by products, feed and eggs were moved freely between this site and the linked premises AIV 2022/55.

Map with location in Great Britain and poultry density

Figure 410: Location of IP and poultry density



Overview of the surrounding area

The premises lay on the sloping ground to the west of Blackborough Forest. Soil was free draining and fields to the North, West and South were largely arable. Fields to the East were permanent grassland.

Ornithological assessment:

Desktop assessment: The key wild bird behaviours through this time of year were probably the fledging and development/exploration of a new cohort of gull and corvid young of the year. This would have led to a virtual doubling of the population of immunologically naïve birds, with frequent direct contact with their parents, and the

consequent release of the parents from continuous attendance at the nest. In short there were more individuals of the key bridge species beginning to wander away from their largely coastal breeding sites (gulls) and range further inland. This Devon IP was likely to be too far from the coast to be directly and continually subject to birds focused on the coast, but sufficiently close to receive exploring gulls and the landscape appeared favourable to corvids. The site was sufficiently close to the river Culm and associated waterbodies to suggest an influence from these, focussed on pressure produced by gulls and corvids.

Another consideration was the beginning of the 'resident' wader migration away from their upland breeding sites and down towards the coast. Although it was early for this to occur it was possible that the exceptionally dry weather provoked some movement by these risk species as their usual foraging locations had become unusably dry and hard. We also speculated that gulls and corvids (major invertebrate feeders of pasture) might have also diversified towards more anthropogenic food sources.

Local intelligence: Nothing further to add.

Clinical picture

08/08/2022 – the keeper reported a 20% drop in egg production in house 1. Following analysis of production data, it was likely that the drop in production began on 06/08/22. The quails remained unaffected clinically and sampling showed no positive cases.

09/08/2022 – house 1 had a further marked drop in egg and feed intake but only one death. House 2 had an 80% egg drop and 50% feed intake drop with two dead.

Timeline

Tracings windows

Source tracings window:

High-risk:	03/08/2022 to 05/08/2022
Likely:	23/07/2022 to 02/08/2022
Precautionary:	18/07/2022 to 24/07/2022

Spread tracings window:

High-risk:	04/08/2022 to 08/08/2022
Likely:	24/07/2022 to 03/08/2022
Precautionary:	19/07/2022 to 23/07/2022

Most likely date of infection: 03/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 411: Source and spread timeline for AIV 2022/56

Source Tracing Window	Spread Tracing Window	Date	
Day 19		18/07/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		19/07/22	Start of precautionary spread tracing window (source + 24h).
Day 17		20/07/22	
Day 16		21/07/22	
Day 15		22/07/22	
Day 14	Day 1	23/07/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 2	24/07/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 3	25/07/22	
Day 11	Day 4	26/07/22	
Day 10	Day 5	27/07/22	
Day 9	Day 6	28/07/22	
Day 8	Day 7	29/07/22	
Day 7	Day 8	30/07/22	
Day 6	Day 9	31/07/22	
Day 5	Day 10	01/08/22	
Day 4	Day 11	02/08/22	
Day 3	Day 12	03/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 13	04/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 14	05/08/22	
	Day 15	06/08/22	Precautionary onset of clinical signs. Based on production data, egg production dropped over evening of 6th-7th.
	Day 16	07/08/22	
	Day 17	08/08/22	Egg drop first noticed; notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/144). Restrictions served.
	Day 18	09/08/22	
	Day 19	10/08/22	
	Day 20	11/08/22	Cull completed
	Day 21	12/08/22	Preliminary C&D completed
	Day 22	13/08/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

46 premises with poultry holding between 1-50,000 birds. 8 premises with >50 birds.

0 Premises with poultry and pigs

SZ (3-10 km)

238 premises with poultry holding between 1 and 155,000 birds. 44 premises with >50 birds.

30 premises with pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for movements of eggs off the IP, the private vet, several staff members and an ABP collection. Tracing investigations were also linked to AIV 2022/55 which had already become an IP with its own tracing investigations. Three tracing visits were required following initial telephone tracings

into all the lines of enquiries. Two were in relation to staff members who owned their own poultry at home. Both visits were assessed as very low risk, requiring no further actions and the tracings were closed. One visit was in relation to a poultry premises visited on the egg collection route prior to visiting this IP. This visit was also assessed as very low risk, no further actions were required, and the tracing was closed.

Source investigations: Hypothesis for the source

Two highly likely pathways were identified: indirect contact with wild birds or indirect introduction from AIV 2022/55.

Assessment and evidence base for the likely source

Biosecurity was poor and there were multiple areas where indirect contact with wild birds could have occurred. This premises was one mile from AIV 2022/55 and so was likely to have been exposed to the same level of local background infection.

Poor biosecurity between this premises and AIV 2022/55 during the high-risk source period meant that staff, equipment or animal by-products could also led to virus incursion and this premises had been identified as a dangerous contact. Following the drop in egg production, it became a report case and was then confirmed as AIV 2022/56.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: risk not higher than the background risk.

Spread to AIV 2022/55 was unlikely as there was seven days between the most-likely date of infection for these IPs.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

Uncertainty remains about the exact route of introduction.

AIV 2022/57, Near Tiverton, Mid Devon, Devon, England

Description of the premises

Overview of the premises and the wider business

The IP was a smallholder-type backyard flock at a residential care home. A number of poultry species were kept on the premises, as well as other livestock. One resident was responsible for the management of the poultry. A small number of eggs were sold via an honesty box located at the entrance of the premises, but there were no records of who bought them.

Species and number of each present

21 geese, 26 ducks, 44 chickens, three sheep, one goat and five pigs

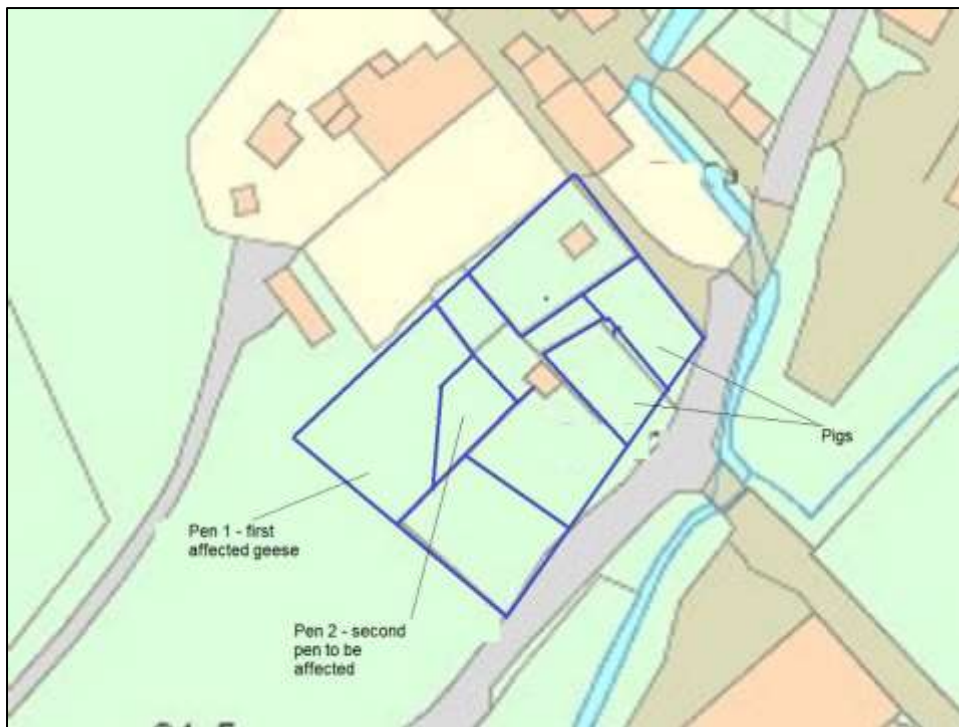
Description of the housing

The poultry were kept in a variety of pens varying from modern chicken houses to adapted pig arcs. The houses were kept open for birds to roost at night and range in their pens by day. The pens were uncovered and separated from each other by chicken wire. Feed and water troughs were accessible to wild birds. Pens 1 and 2 held geese and ducks.

There were five pigs housed near the poultry but separated from them by a double fence and a strip of grass. Direct contact was not possible but indirect contact took place when poultry litter was spread in the pig pens in the weeks prior to the outbreak. The pigs were sampled with negative results for HPAI H5N1.

Plan of the infected premises

Figure 412: Plan of AIV 2022/57



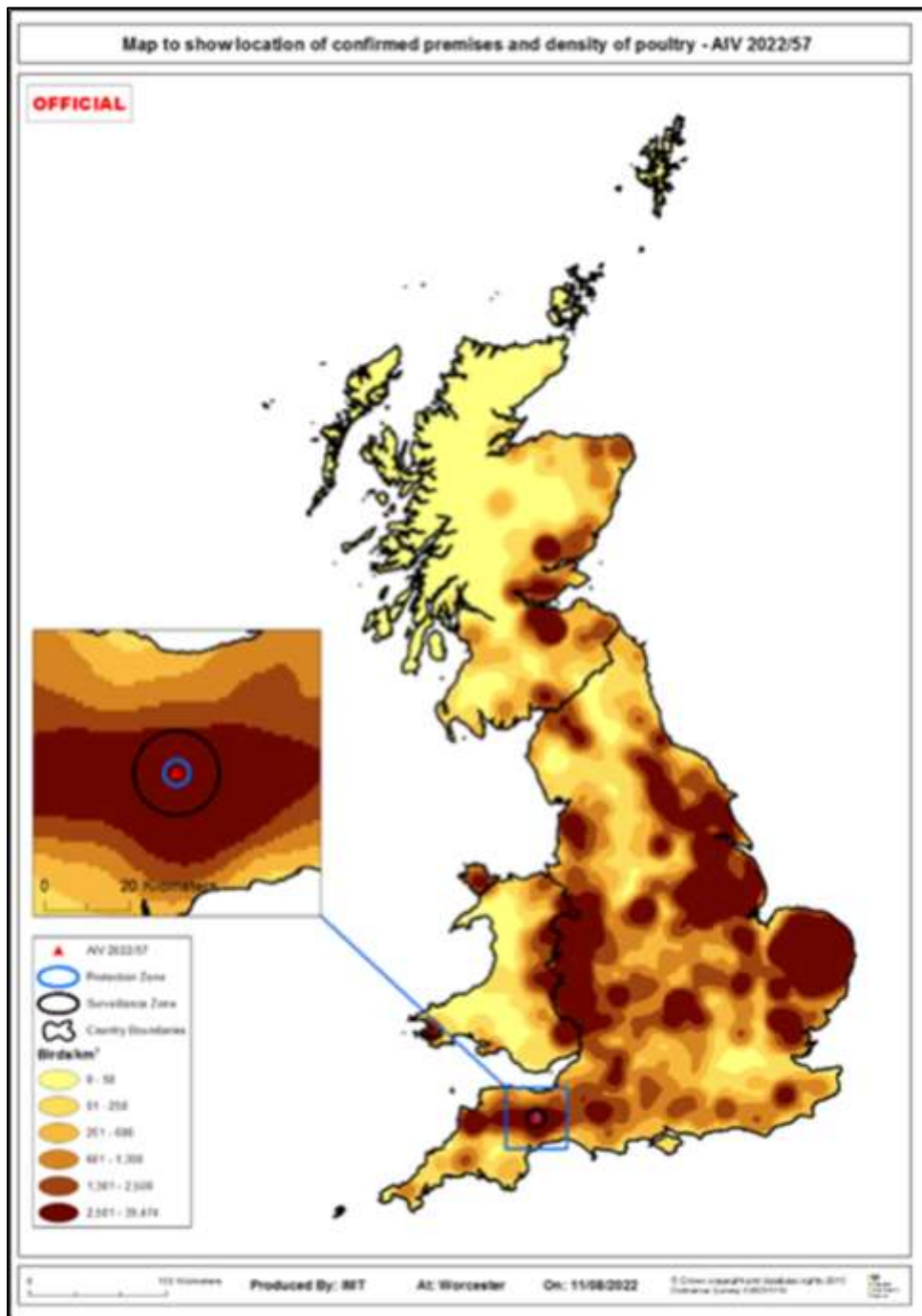
Overview of biosecurity

No routine biosecurity measures were taken by the residents or staff when tending to the birds. Vermin control was through regular baiting and no evidence of vermin

activity was seen. Food was kept in bins in a feedstore but the food and water were accessible to wild birds once placed in the runs.

Map with location in Great Britain and poultry density

Figure 413: Location of IP and poultry density



Overview of the surrounding area

The property was located a river and a canal with a caravan park to the north and the M5 to the south. The region was largely arable farming with some cattle and sheep but very few large poultry enterprises.

Ornithological assessment:

Desktop assessment: The ornithological assessment for AIV 2022/55 is relevant to this IP. The key wild bird behaviours at the time of the outbreak were probably the fledging and development/exploration of a new cohort of gull and covid young, with a virtual doubling of the population. The young would have been immunologically naïve, with frequent direct contact with their parents. Both parents and young of the key bridge species would be moving away from the largely coastal breeding sites to range further inland. The IP was sufficiently close to the coast to receive exploring gulls and was in landscape which appeared favourable to corvids.

Local intelligence: The IP was within the SZ of two very recent other IPs (AIV 2022/55 and AIV 2022/56).

Clinical picture

08/08/2022 – Two geese in pen 1 were lethargic and apathetic and subsequently died.

09/08/2022 – A further three geese in pen 1 died overnight and suspicion of avian notifiable disease was reported.

10/08/2022 A further two geese in pen 1 died after showing signs of head shaking and lethargy

11/08/2022 One more goose in pen 1 and one in the next door pen (pen 2) were found dead. Another goose in pen 2 was showing head tremor, disorientation and recumbency. The ducks in pens 1 and 2 appeared clinically normal.

Timeline

Tracings windows

Source tracings window:

High-risk:	04/08/2022 to 06/08/2022
Likely:	24/07/2022 to 03/08/2022
Precautionary:	19/07/2022 to 23/08/2022

Spread tracings window:

High-risk:	05/08/2022 to 09/08/2022
Likely:	25/07/2022 to 04/08/2022
Precautionary:	20/07/2022 to 24/08/2022

Most likely date of infection: 04/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 414: Source and spread timeline for AIV 2022/57

Source Tracing Window	Spread Tracing Window	Date	
		18/07/22	
Day 19		19/07/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18	Day 1	20/07/22	Start of precautionary spread tracing window (source + 24h).
Day 17	Day 2	21/07/22	
Day 16	Day 3	22/07/22	
Day 15	Day 4	23/07/22	
Day 14	Day 5	24/07/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 6	25/07/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 7	26/07/22	
Day 11	Day 8	27/07/22	
Day 10	Day 9	28/07/22	
Day 9	Day 10	29/07/22	
Day 8	Day 11	30/07/22	
Day 7	Day 12	31/07/22	
Day 6	Day 13	01/08/22	
Day 5	Day 14	02/08/22	
Day 4	Day 15	03/08/22	
Day 3	Day 16	04/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 17	05/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 18	06/08/22	
	Day 19	07/08/22	Precautionary onset of clinical signs.
	Day 20	08/08/22	Two geese found dead
	Day 21	09/08/22	Three dead geese. Apathetic, head shaking. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/143). Restrictions served.
	Day 22	10/08/22	Avian Influenza H5N1 confirmed by CVO based on PCR results with case reference AIV2022 55
	Day 23	11/08/22	
	Day 24	12/08/22	Culling and preliminary C&D completed
	Day 25	13/08/22	Preliminary C&D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

55 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-59,000 birds.

3 premises holding both pigs and poultry.

SZ (3-10 km)

193 premises with poultry were reported to be within 10 km of the IP holding between 1-700,000 birds.

25 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The property was within the SZ of AIV 2022/55 and AIV 2022/56 which had active infection at the same time indicating active infection in wild birds in the area.

Biosecurity was poor and there were many opportunities for infected wild birds to access the site.

Feed and water troughs were outside and feed storage areas were not secure.

The property was situated near two water courses attracting wild birds.

There were no links to other poultry premises.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/58 Near Newlyn, St. Ives, Cornwall, England

Description of the premises

Overview of the premises and the wider business

This was a charitable wild bird hospital, which rehabilitated herring gulls, pigeons, garden birds and corvids with a view to releasing them back into the wild. All of the birds on the premises were categorised as “other captive birds”, accordingly this premises has been classed as a special category premises.

Species and number of each present

107 Herring Gull, Greater and Lesser Black Back Gull,

43 pigeons,

13 Jackdaws Magpies, Rooks and Crows,

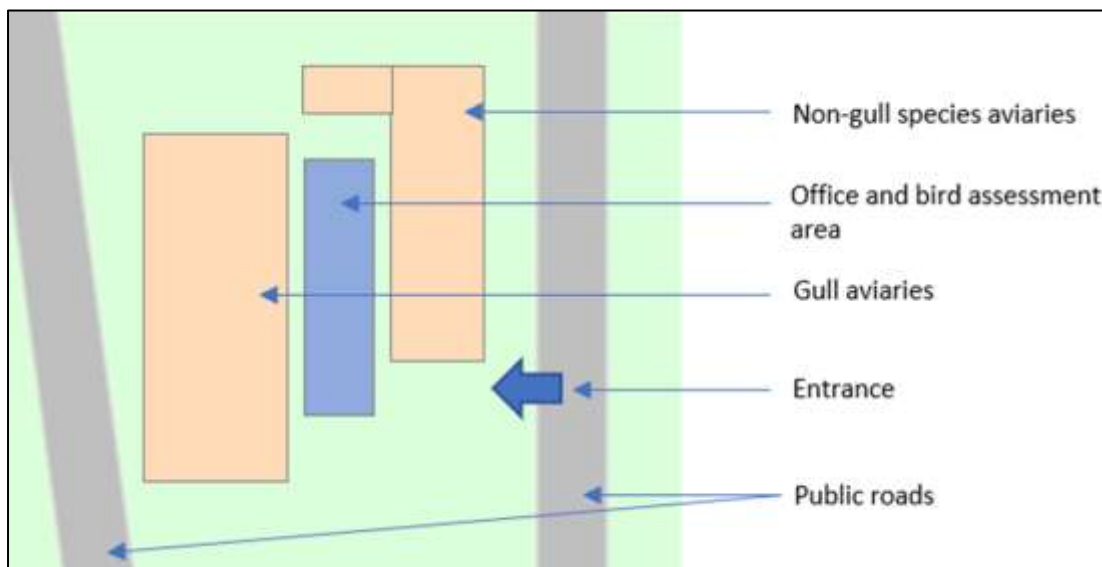
One each of goldfinch, starling, swift and blackbird.

Description of the housing

The herring gulls were kept in two outdoor enclosures made of wood and wire mesh. These were located opposite each other and divided by a pathway. Other species of birds were kept in similar outdoor enclosures made of mesh with Perspex roofs. Sick birds were kept in an office building at one end of the premises.

Plan of the infected premises

Figure 415: Plan of AIV 2022/58

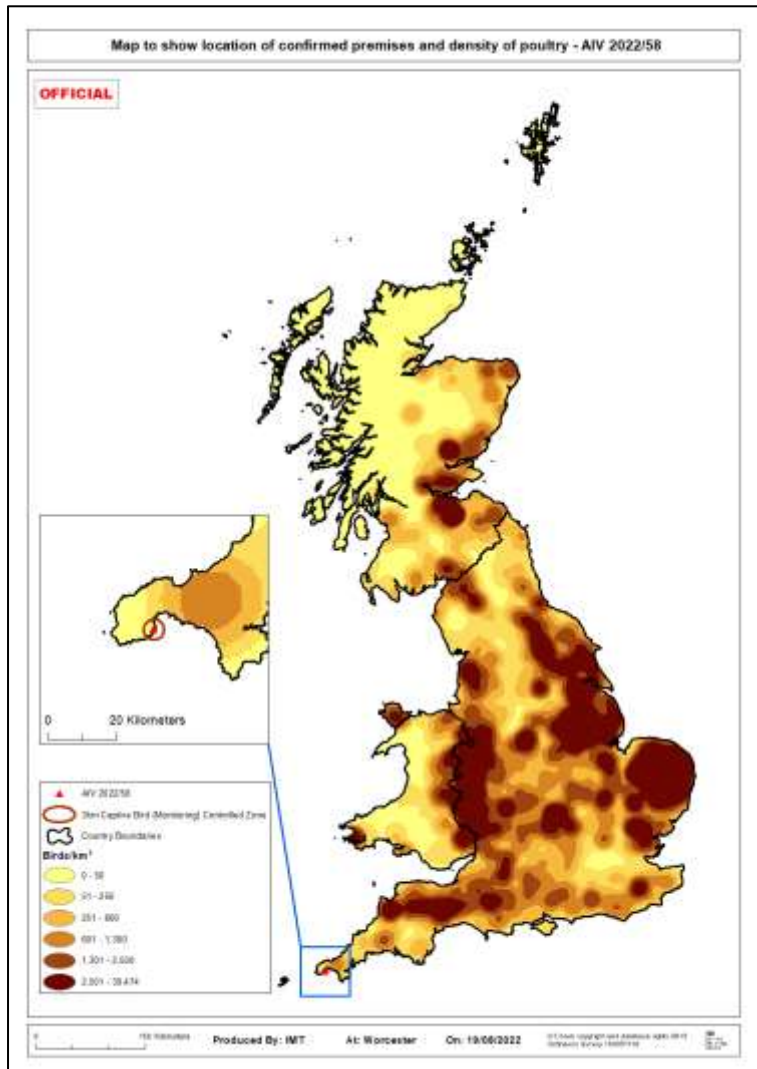


Overview of biosecurity

Staff did not wear personal protective equipment (PPE) or change their clothing or footwear. To access the office, staff had to walk past the other enclosures. There were foot dips using DEFRA approved disinfectant at the entrance to the office and outside each enclosure but none at the entrance of the walkway.

Map with location in Great Britain and poultry density

Figure 416: Location of IP and poultry density



Overview of the surrounding area

Multiple wild seagulls which live in the area surrounding the hospital and the affected gulls were able to have direct and indirect contact with these and other wild birds.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: A number of wild bird deaths had been reported on the surrounding beaches in the 24 to 48 hours prior to the first deaths occurring at this IP. Some gulls with clinical signs were admitted to the hospital.

Clinical picture

13-16/08/2022 – Nine Herring gulls with respiratory and/or neurological clinical signs were assessed in the hospital. Three of these were euthanased and six were admitted.

17/08/2022 – Other gulls on site were seen to be anorexic and subdued and 15 birds died during the day. The remaining birds started showing neurological signs including disorientation ataxia and blindness, a number showed facial swelling especially around the eyes, birds were observed panting and staying in sternal recumbency, diarrhoea was also seen.

18/08/2022 – A further 32 birds died or were euthanised as a result of deteriorating health. Suspicion of notifiable avian disease was reported. Only gulls were clinically affected.

Timeline

Tracings windows

Source tracings window:

High-risk:	13/08/2022 to 16/08/2022
Likely:	02/08/2022 to 12/08/2022
Precautionary:	28/07/2022 to 01/08/2022

Spread tracings window:

High-risk:	14/08/2022 to 18/08/2022
Likely:	03/08/2022 to 17/08/2022
Precautionary:	29/07/2022 to 02/08/2022

Most likely date of infection: 13/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 417: Source and spread timeline for AIV 2022/58

Source Tracing Window	Spread Tracing Window	Date	
Day 19		28/07/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		29/07/22	Start of precautionary spread tracing window (source + 24h).
Day 17		30/07/22	
Day 16		31/07/22	
Day 15		01/08/22	
Day 14		02/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	03/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	04/08/22	
Day 11	Day 3	05/08/22	
Day 10	Day 4	06/08/22	
Day 9	Day 5	07/08/22	
Day 8	Day 6	08/08/22	
Day 7	Day 7	09/08/22	
Day 6	Day 8	10/08/22	
Day 5	Day 9	11/08/22	
Day 4	Day 10	12/08/22	
Day 3	Day 11	13/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	14/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	15/08/22	
	Day 14	16/08/22	Precautionary onset of clinical signs.
	Day 15	17/08/22	Gulls subdued and anorexic. 15 gulls died.
	Day 16	18/08/22	Notification of suspicion of disease to APHA. Initial APHA investigation (DPR 2022/147). Restrictions served. Further 32 gulls died/euthanased.
	Day 17	19/08/22	Further gulls died/euthanased. HPAI H5N1 confirmed on PCR results (AIV 2022/58).
	Day 18	20/08/22	Culling commenced and completed.
	Day 19	21/08/22	Preliminary C&D completed.
	Day 20	22/08/22	Preliminary C&D considered effective.
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

Figure 418: Surveillance activity associated with AIV 2022/58

Zones	Number of premises with poultry	Number of premises with 50 or more birds	Number of premises holding both poultry and pigs
*CBMCZ (0 – 3 km)	6	0	3

*A captive bird monitoring control zone was put in place on 19/08/2022

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were raised for this IP for seven members of staff, an animal by-product (ABP) drop off and for three sets of bird movements off the premises. These were a buzzard moving to another wildlife centre, four quail moving to a staff

member's home and wild birds presented at the local veterinary practice for treatment. Visits were completed to the wild buzzard and quail receiving premises. Samples were taken from both with negative results. All tracings were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct and/or indirect contact with wild birds.

Assessment and evidence base for the likely source

During the high-risk source tracing window, nine gulls with respiratory and neurological clinical signs were assessed in the hospital. Three of these were euthanased and six were admitted.

Biosecurity was poor and there were frequent deliveries of rescued (injured and ill) wild birds by members of the public.

A number of sea birds wild bird deaths had been reported on surrounding beaches in the 24-48 hrs prior to the first deaths occurring on the IP.

There were many wild gulls in the area surrounding the IP. They often perched on the bird enclosures so direct and/or indirect contact of wild gulls and other wild birds with birds on the IP was very likely.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife was not considered higher than the background risk.

Tracings investigations found all other potential spread pathways to be negligible or low likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/59 Near Gayton, King's Lynn and West Norfolk, Norfolk, England

Description of the premises

Overview of the premises and the wider business

This infected premises was a commercial free-range outdoor fattening unit of geese. It was part of a large integrated poultry production company which received three-week-old geese from other company-owned brooding units which reared them from day-old until three weeks of age. On this premises they would be reared until being consigned to slaughter (end of November each year) at a company-owned slaughterhouse.

The current flock, aged between 11-16 weeks old at the time of the report case investigation, had been placed in batches between 18/05/2022 and 22/06/2022. There had been no movement of poultry onto or off the farm since the last birds were placed.

The premises occupied 60 acres and there were 22 pens in total, each measuring 100 m x 100 m and holding approximately 750 birds.

There were two-foot dips on site. One by main farm gate and another one outside the office.

Species and number of each present

The geese were originally placed in pens as below:

1. Pens 1 – 3 2500 females,
2. Pens 4 – 6 2500 males,
3. Pens 7 -11 3120 males,
4. Pens 12 -14 3120 females,
5. Pens 15 -1 3120 males,
6. Pens 19 – 22 3120 females.

Approximately 15400 birds remained at the time of the APHA investigation.

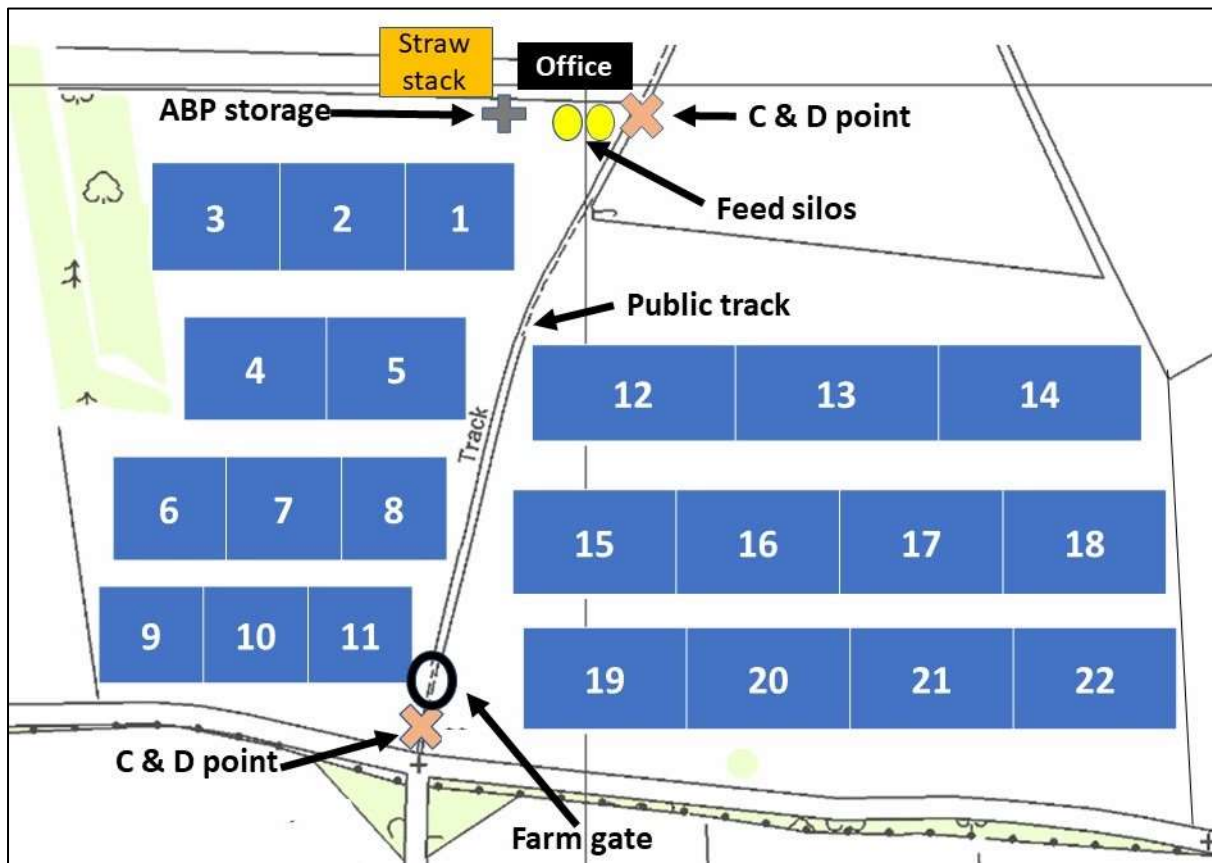
Description of the housing

The geese were enclosed in open-topped mesh wire pens with open feeding and water troughs in each one of them. Between the rows of pens there were crops of maize.

The two fields comprising the site were divided by a public track road which also provided vehicle access to the farm office, feed silos, straw stack and ABP storage area.

Plan of the infected premises

Figure 419: Plan of AIV 2022/59



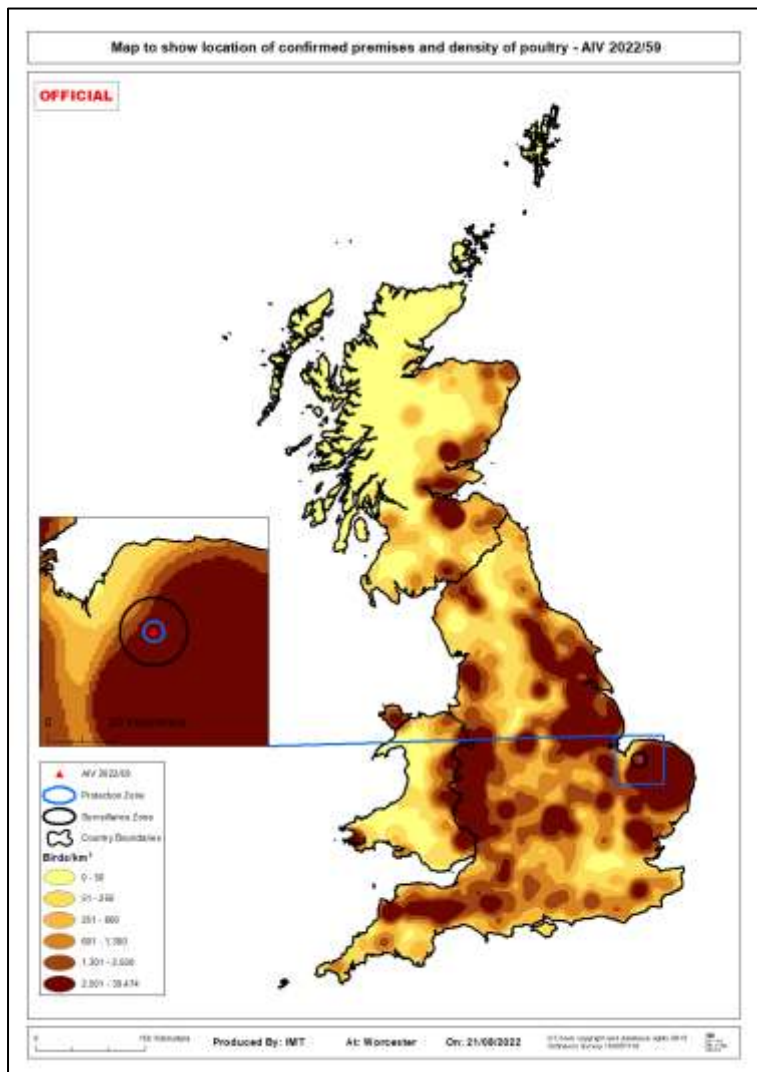
Overview of biosecurity

The farm gate was kept closed at night. There were disinfectant foot dips in place at the farm gate and by the office and staff used site specific wellingtons and wore disposable paper overalls.

Wheels of vehicles needing to drive through the site (such as feed deliveries and ABP collections) were cleansed and disinfected at the farm gate.

Map with location in Great Britain and poultry density

Figure 420: Location of IP and poultry density



Overview of the surrounding area

The IP was located in an area of high poultry density. It was also in an area close to recognised wild bird high-risk areas and several confirmed wild bird positive findings had been detected in the surrounding area during the current HPAI season.

Ornithological assessment:

Desktop assessment: This IP was too far inland to have an obvious coastal influence (>15 km) and whilst several waterbodies (or clusters of lakes and pools) in this landscape were likely to host moderate aggregations of waterbirds, none were close. The larger aggregations were about 10 km distant (lakes close to Bawsey/Leziate and East Winch), with smaller less influential waterbodies associated with the river Wensum (also about 10 km away) and Nar (as close as 6 km) with these later probably considered the most likely source of infection for this case.

Local intelligence: Wild birds and vermin could have entered the pens and had been seen accessing the feed and water troughs.

Clinical picture

08 and 11/08/2022 – the PVS performed several post-mortem examinations following signs of illness. Initial diagnoses were heat stress on 08/08/2022 (in birds from pens 4, 5 and 6) and E. coli infection on 11/08/2022 (in birds from pens 1 and 12). Appropriate treatments were started.

19/08/2022 – following increasing mortality, first in pens 5 and 4, and then in pens 12, 1, 15 and latterly in pen 8, suspicion of notifiable avian disease was reported.

20/08/2022 – at the APHA investigation, approximately 5% of birds in the worst affected pens (8 and 15) were showing neurological signs. Birds in unaffected pens (19 – 22) were found to be bright and alert. Sample were submitted.

Based on analysis of production data the precautionary likely onset of clinical signs in the different groups was estimated as:

Pens 4 – 6	02/08/22
Pens 12 -14	06/08/22
Pens 1 – 3	12/08/22
Pens 15 -18	13/08/22
Pens 7 -11	15/08/22
Pens 19 – 22	22/08/22

Additional epidemiological sampling at the time of culling was undertaken with the aim of better understanding the disease kinetics on this premises, in this species, and to reduce uncertainty around the date of onset of clinical signs. Swabs and blood samples were collected from birds in pens 4, 5, 8, 15, 21 and 22.

The results of this additional sampling supported the findings from analysis of production data and the observed order of spread of disease around the site:

Group A (pens 4 and 5): first group to display clinical signs. 0/92 were PCR positive to HP H5. 88 /92 were seropositive.

Group B (pens 8 and 15): started to display clinical signs after pens 4 and 5. 8/92 positive to HP H5 PCR; 92/112 were seropositive.

Group C (pens 21 and 22): disease free at the time of the original report case visit but exhibiting signs of disease at the time of culling. 16/20 were HP H5 PCR positive; 2/18 were seropositive.

These results did not alter the original disease timeline and confirmed that pens 4 and 5 were infected before pens 8 and 15. Pens 21 and 22 were behind in the infection timeline given that molecular prevalence was very high but only a small percentage of birds had started to seroconvert.

Timeline

Tracings windows

Source tracings window:

High-risk:	30/07/2022 to 01/08/2022
Likely:	19/07/2022 to 29/07/2022

Spread tracings window:

High-risk:	31/07/2022 to 20/08/2022
Likely:	20/07/2022 to 30/07/2022

N.B. Precautionary windows have been omitted due to them falling between the high-risk and likely windows.

Most likely date of infection: 02/08/2022. (Start of high-risk source tracing window)

Timeline chart

Figure 421: Source and spread timeline for AIV 2022/59

Source Tracing Window	Spread Tracing Window	Date	
Day 14		19/07/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	20/07/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	21/07/22	
Day 11	Day 3	22/07/22	
Day 10	Day 4	23/07/22	
Day 9	Day 5	24/07/22	
Day 8	Day 6	25/07/22	
Day 7	Day 7	26/07/22	
Day 6	Day 8	27/07/22	
Day 5	Day 9	28/07/22	
Day 4	Day 10	29/07/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 3	Day 11	30/07/22	Start of precautionary spread tracing window (source + 24h). Start of high risk source tracing window (3d). Most likely infection date for this outbreak.
Day 2	Day 12	31/07/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	01/08/22	
	Day 14	02/08/22	Precautionary onset of clinical signs based on production records.
	Day 15	03/08/22	
	Day 16	04/08/22	
	Day 17	05/08/22	
	Day 18	06/08/22	
	Day 19	07/08/22	
	Day 20	08/08/22	
	Day 21	09/08/22	
	Day 22	10/08/22	
	Day 23	11/08/22	
	Day 24	12/08/22	
	Day 25	13/08/22	
	Day 26	14/08/22	
	Day 27	15/08/22	
	Day 28	16/08/22	
	Day 29	17/08/22	
	Day 30	18/08/22	
	Day 31	19/08/22	Notification of suspicion of disease to APHA (DPR 2022/148). Verbal restrictions served.
	Day 32	20/08/22	Initial APHA investigation and sampling. Restrictions served.
	Day 33	21/08/22	HPAI H5N1 confirmed on PCR results (AIV 2022/59).
	Day 34	22/08/22	
	Day 35	23/08/22	Culling commenced. Epidemiological sampling at culling in pens 4 & 5.
	Day 36	24/08/22	Epidemiological sampling at culling in pens 8 & 15 and pens 21 & 22.
	Day 37	25/08/22	
	Day 38	26/08/22	Culling completed.
	Day 39	27/08/22	Preliminary C&D completed.
	Day 40	28/08/22	Preliminary C&D considered effective.
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

11 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-32,753 birds (1 premises with 50 or more birds).

0 premises holding both pigs and poultry

SZ (3-10 km)

113 premises with poultry were reported to be within 3-10 km of the IP holding between 1-410,000 birds (30 premises with 50 or more birds).

7 premises holding both pigs and poultry (no change).

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were raised for two feed deliveries, several ABP collections, a straw (bedding) delivery, carcasses moving to the private veterinary practice on two occasions and an area manager who made regular visits. The feed deliveries generated two spread tracing visits to premises that had been visited immediately after the IP on two different dates. All tracings were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The geese pens at this free-range fattening unit were open. Wild birds and vermin could enter and had been seen accessing the feed and water troughs.

The location was close to recognised high-risk wild bird areas and there had been several wild birds testing positive for HPAI in the area during the current HPAI season. There was no pest control programme in place and straw bedding was stored uncovered outside.

Spread investigations: Assessment of potential and likelihood of spread

The potential for onward transmission via wildlife was assessed to have medium likelihood with low uncertainty. Whilst wild birds were most likely to have initially introduced infection the size of the flock and prolonged presence of infection on the site would be likely to have allowed amplification of virus to contaminate the environment along with the fact that wild birds and other vermin could directly contact the geese and access their feed, water and bedding supplies.

All other potential spread pathways were assessed as ranging between low to negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/60 Near Cullompton, Mid Devon, Devon, England

Description of the premises

Overview of the premises and the wider business

The Infected Premises was an independent commercial mixed-species farm. It reared free-range turkeys for the Christmas market. There were no links to other commercial poultry premises.

Species and number of each present

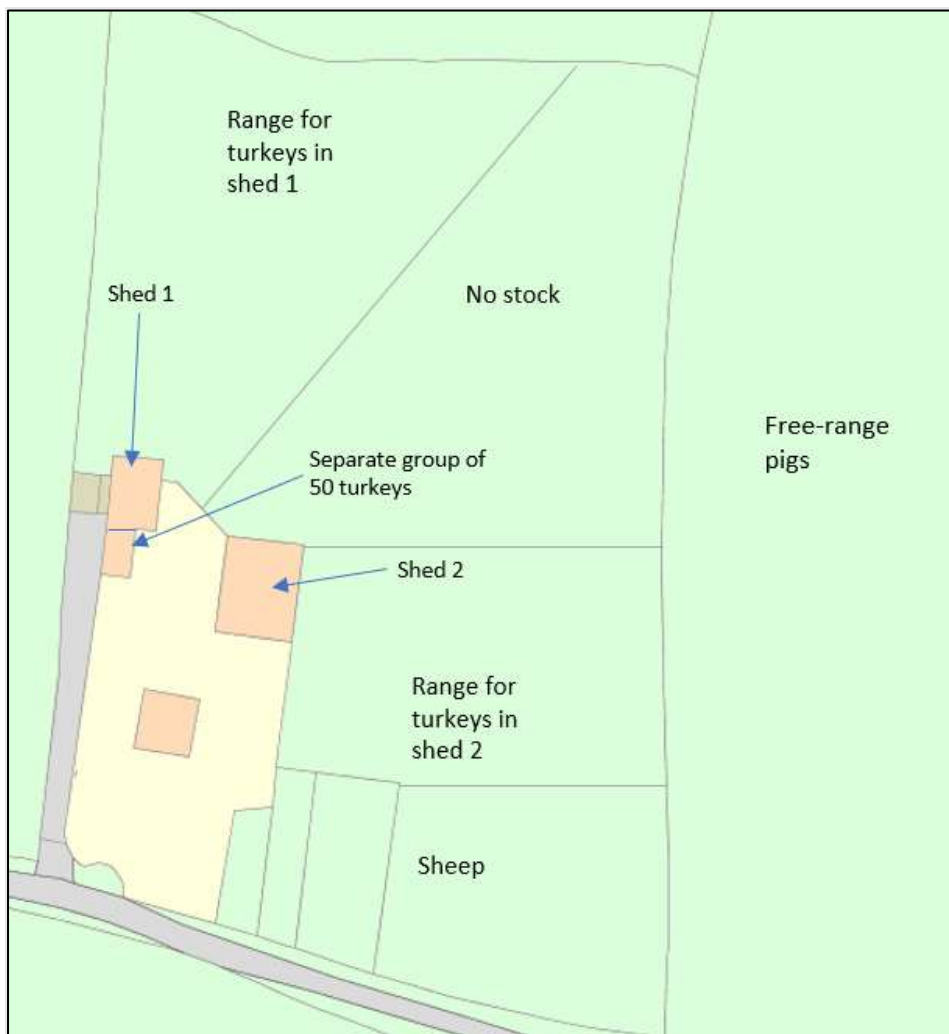
There were 850 turkeys, 450 free-range pigs, 250 sheep and 41 cattle.

Description of the housing

The turkeys had access to the free-range until 07/08/2022 when PZ restrictions around AIV 2022/55 and 56 led to mandatory housing. From that point they were housed in two groups in semi-open wooden sheds. The sheds were not wild bird proof. The yard area was concreted and tidy.

Plan of the infected premises

Figure 422: Plan of AIV 2022/60

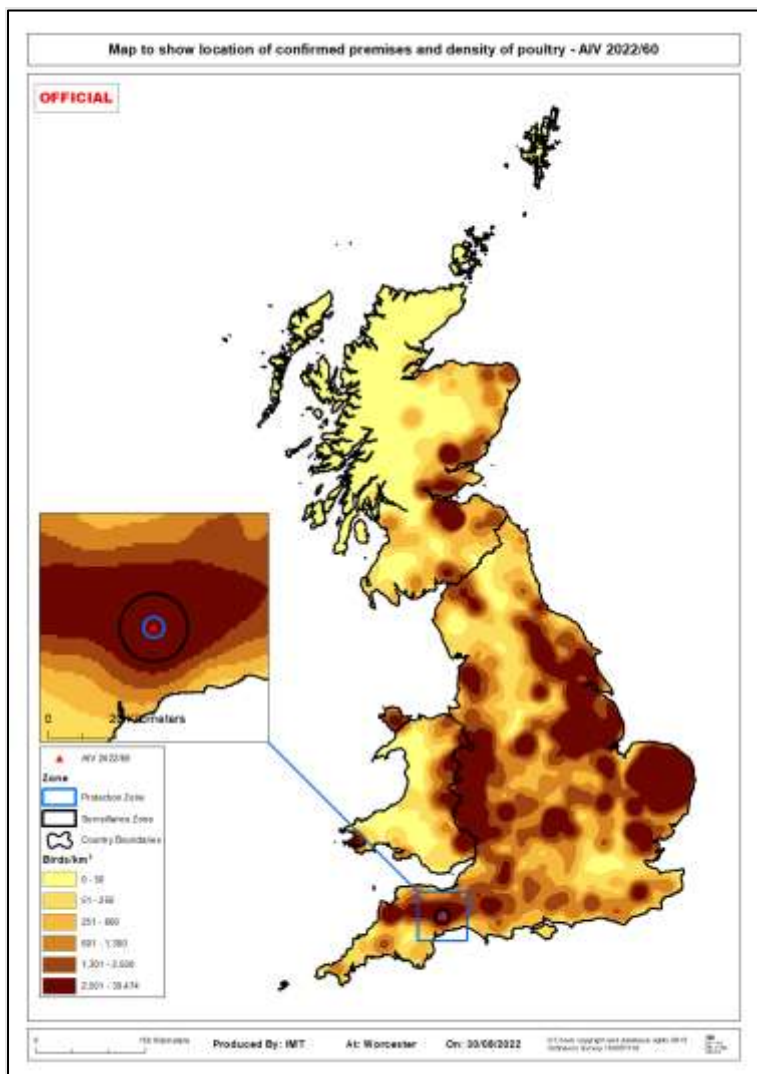


Overview of biosecurity

Biosecurity was poor. There was no vehicle C and D point nor was there any signage or visitor protocols. Turkeys were fed pelleted feed and un-processed sugar-beet tops. The sugar beet was recently harvested and stored poorly so it could have carried infected wild bird faeces. The buildings were not biosecure and there were multiple gaps for wild bird access. Straw bedding was used and was not stored bio securely, nor was it disinfected before being used in sheds. There was no vermin control.

Map with location in Great Britain and poultry density

Figure 423: Location of IP and poultry density



Overview of the surrounding area

The farm was located in a rural area with no contiguous poultry premises. There were no notable water bodies nearby. The land surrounding the farm was predominantly used for livestock grazing.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Corvids and gulls were observed at the APHA visit and the keeper confirmed that they regularly visited the premises. No measures were in place to deter wild birds from the premises. The premises fell within the PZ of IPs AIV 2022/55 & AIV 2022/56 from 07/08/2022.

Clinical picture

17/08/2022 – three birds were found dead and two more were subdued. As no other clinical signs were reported notifiable avian disease was negated by APHA.

21/08/2022 – 10 birds died over the weekend and six more were lethargic. Advice from the private veterinary surgeon was sought and treatment.

24/08/2022 – the keeper contacted APHA to report that 50% of the turkeys in shed 1 were now showing neurological signs (circling and unable to stand).

25/08/2022 – at the APHA investigation, 40% of the birds in house 1 were affected and 130 had died. Samples were taken.

26/08/2022 – the pigs were sampled with negative results.

Timeline

Tracings windows

Source tracings window:

High-risk:	14/08/2022 to 16/08/2022
Likely:	03/08/2022 to 13/08/2022
Precautionary:	fell within the likely source window

Spread tracings window:

High-risk:	15/08/2022 to 24/08/2022
Likely:	04/08/2022 to 14/08/22
Precautionary:	fell within the likely spread window

Most likely date of infection: 14/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 424: Source and spread timeline for AIV 2022/60

Source Tracing Window	Spread Tracing Window	Date	
Day 14		03/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA). Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	04/08/22	Start of precautionary spread tracing window (source + 24h). Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	05/08/22	
Day 11	Day 3	06/08/22	
Day 10	Day 4	07/08/22	
Day 9	Day 5	08/08/22	
Day 8	Day 6	09/08/22	
Day 7	Day 7	10/08/22	
Day 6	Day 8	11/08/22	
Day 5	Day 9	12/08/22	
Day 4	Day 10	13/08/22	
Day 3	Day 11	14/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	15/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	16/08/22	
	Day 14	17/08/22	Precautionary onset of clinical signs. Three turkeys died.
	Day 15	18/08/22	
	Day 16	19/08/22	
	Day 17	20/08/22	
	Day 18	21/08/22	A further 20 turkeys dead.
	Day 19	22/08/22	Treatment started for enteritis.
	Day 20	23/08/22	
	Day 21	24/08/22	Notification of suspicion of disease to APHA and called DPR 2022/153. Restrictions served.
	Day 22	25/08/22	APHA investigation and sampling.
	Day 23	26/08/22	Cull completed
	Day 24	27/08/22	Preliminary C&D completed
	Day 25	28/08/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

56 premises with poultry, excluding the IP, holding between 1 and 109,000 birds. 10 premises with >50 birds.

1 premises with pigs and poultry

SZ (3-10 km)

298 premises with poultry holding between 1 and 155,000 birds. 46 premises with >50 birds.

35 premises with pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for a private vet, an APHA vet, one staff worker and several ABP collections within the high-risk tracing windows. The staff worker

was found to have a few poultry at his home premises and a tracing visit was completed. This was assessed as very low very risk of disease transmission and the tracing was closed. All other tracing investigations were also assessed as very low or negligible risk, no further actions were required, and the tracings were all closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The lack of effective biosecurity, known wild bird activity and the lack of links to other premises supported the assessment of a wild bird source.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/61 Near Bridlington, East Riding of Yorkshire, Yorkshire

Description of the premises

Overview of the premises and the wider business

This was a commercial turkey fattening unit contracted to a larger company. It was located on a predominantly arable farm and comprised four sheds, two were fully housed and two were free range.

It was located approximately 3.5 km from the coast and a large sea bird nesting colony but had no immediately adjacent poultry premises.

Species and number of each present

The two free range sheds (1&2), each contained 5,500 Bronze turkeys and the two fully housed sheds (3&4) each contained 8,000 Premiere White turkeys.

Shed 4 was the first to become affected.

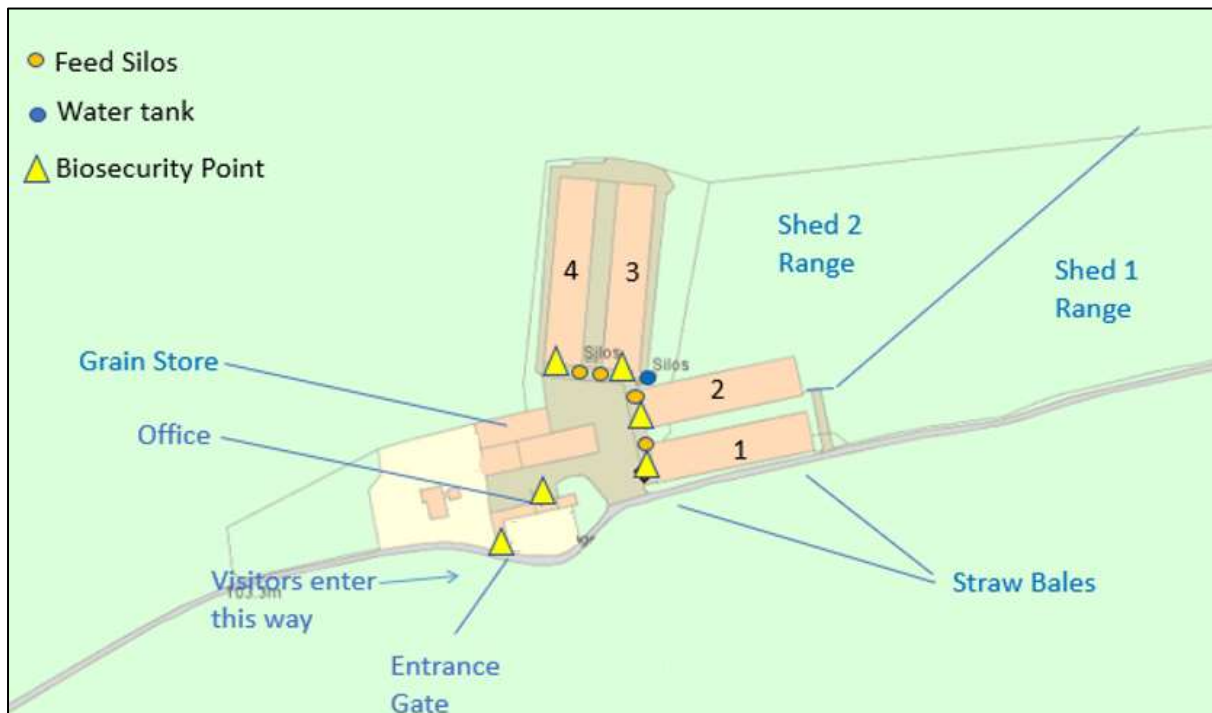
Description of the housing

The sheds were of steel and wood construction and in a good state of repair with natural stacked ventilation. Management was in the process of adding screens to inlets and outlets; the inlets for Houses 1 and 2, and the outlets for Houses 3 and 4 were uncovered, therefore allowing potential access by wild birds.

The premises were generally clean and tidy; however, the yard area was used for arable vehicles, machinery and equipment.

Plan of the infected premises

Figure 425: Plan of AIV 2022/61



Overview of biosecurity

The biosecurity was generally good.

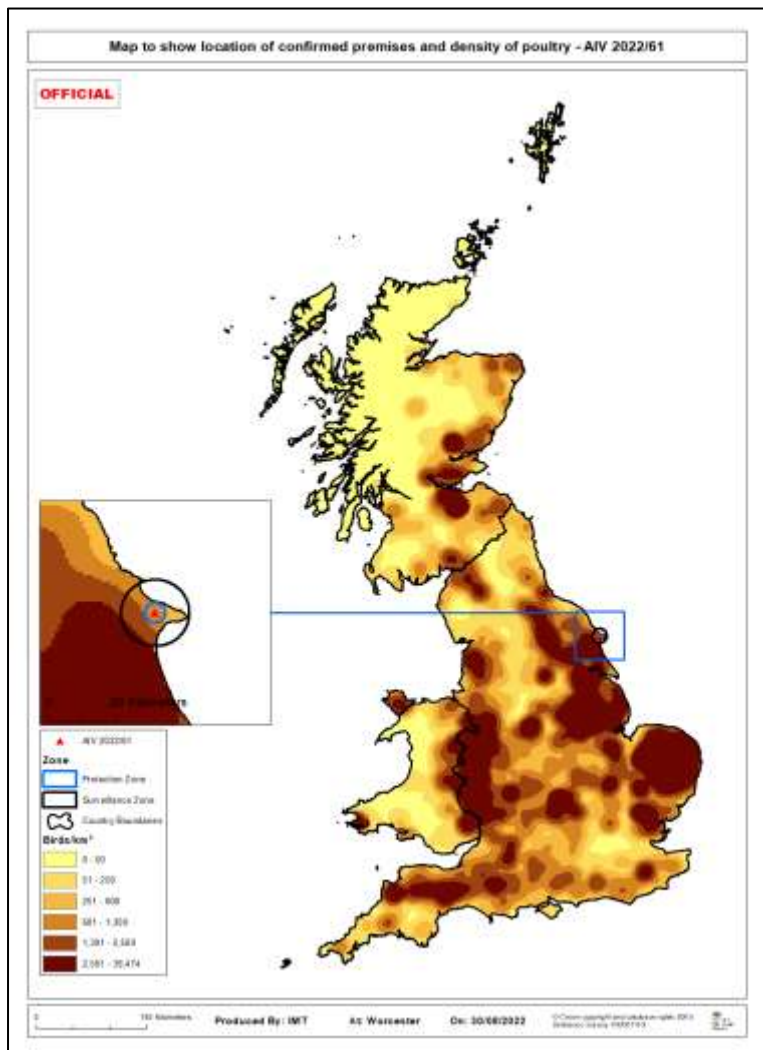
The entrance was gated and there were biosecurity points at the farm entrance. A bird free period was required for staff and visitors.

There was a covered foot dip at the entrance to the office and single pedestrian entrance to each poultry shed with covered foot dips and a swing-over barrier with dedicated boots/covers for each shed. However, the overalls were not house specific.

Overall, the site appeared clean and tidy. Wild birds were actively discouraged and vermin control was in place. However, top-up straw bedding was added 3-4 times per week.

Map with location in Great Britain and poultry density

Figure 426: Location of IP and poultry density



Overview of the surrounding area

The surrounding area was relatively flat and was predominantly arable land. The site was bordered on the west by a main road, to the east by the North Sea and there was a small town to the south. There was a very large sea bird colony approximately 3.5 km from the IP and there had been recent HPAI H5N1 positive wild birds in this area.

Ornithological assessment:

Desktop assessment: Substantial infection pressure was assumed to occur at the coast given the considerable mortality of cliff-nesting species observed here as well as the continued presence of their carcasses.

In combination, the IP and its neighbourhood was likely to have had substantial traffic from abundant passerine and gull populations visiting the ranges to exploit either the farm (livestock and their food) or their ranges.

The passerines might have included those using coastal habitats and may have produced infection pathways of their own (contributing some infection pressure), but the gulls in this landscape were assumed to be exposed to HPAIV where it was present on the coast and alone were assumed to produce a substantial infection pressure.

Background infection pressure at this site was therefore likely to be considerable.

Local intelligence: Bedding was stored outside in stacks which were accessible to wild birds. This was used to top up the bedding in the houses 3-4 times per week

The field adjacent to House 4 (the first infected house) was harvested on 20/8/2022 (within the likely source window). This activity could have attracted wild birds and disturbed contaminated organic matter which could have entered the bird housing.

Ventilation inlets and outlets were accessible for wild birds although none were seen in the houses.

Clinical picture

26/08/2022 – 20 birds were found dead in House 4 during the morning, with a further 100 birds dead by lunch time and 383 dead by the evening. Feed and water consumption had decreased drastically and approximately 70% of the birds appeared depressed, recumbent and presenting with respiratory signs and diarrhoea. Mortality was normal in the other three houses. The private veterinary surgeon (PVS) visited the premises to examine the birds and performed a post-mortem and reported suspicion of notifiable avian disease.

27/08/2022 – at the APHA investigation, morbidity in House 4 had risen to 90% and there had been deaths off up to 1,500 birds. Houses 1, 2 and 3 did not present with clinical signs or elevated mortality. Samples were taken.

28/08/2022 – birds in House 3 started to display clinical signs compatible with NAD.

Timeline

Tracings windows

Source tracings window:

High-risk:	22/08/2022 to 24/08/2022
Likely:	11/08/2022 to 21/08/2022
Precautionary:	04/08/2022 to 10/08/2022

Spread tracings window:

High-risk:	23/08/2022 to 26/08/2022
Likely:	12/08/2022 to 22/08/2022
Precautionary:	05/08/2022 to 11/08/2022

Most likely date of infection: 22/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 427: Source and spread timeline for AIV 2022/61

Source Tracing Window	Spread Tracing Window	Date	
Day 21		04/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 20		05/08/22	Start of precautionary spread tracing window (source + 24h).
Day 19		06/08/22	
Day 18		07/08/22	
Day 17		08/08/22	
Day 16		09/08/22	
Day 15		10/08/22	
Day 14		11/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/08/22	
Day 11	Day 3	14/08/22	
Day 10	Day 4	15/08/22	
Day 9	Day 5	16/08/22	
Day 8	Day 6	17/08/22	
Day 7	Day 7	18/08/22	
Day 6	Day 8	19/08/22	
Day 5	Day 9	20/08/22	
Day 4	Day 10	21/08/22	
Day 3	Day 11	22/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	24/08/22	
	Day 14	25/08/22	Precautionary onset of clinical signs (increased mortality over night).
	Day 15	26/08/22	Birds found dead on morning inspection. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/156). Restrictions served.
	Day 16	27/08/22	DCVO decision to slaughter on suspicion, reference number SOS AIV 2022 12
	Day 17	28/08/22	HPAI H5N1 confirmed by DCVO with case reference AIV 2022 61
	Day 18	29/08/22	Culling commenced
	Day 19	30/08/22	
	Day 20	31/08/22	
	Day 21	01/09/22	Culling and preliminary C&D completed
	Day 22	02/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

34 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-27,000 birds (3 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

79 premises with poultry were reported to be within 10 km of the IP holding between 1-71,000 birds (11 premises with 50 or more birds).

5 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were initiated for two feed deliveries, an ABP collection, a pest controller visit, a worker and two private vets who visited during the high-risk window.

A source tracing visit was instructed and completed for a premises that had been visited immediately prior to the IP by the pest controller. All tracings were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The likelihood of a direct wild bird source was assessed as medium and for indirect was assessed as high. The evidence base was:

Positive wild bird cases in the local area.

The field adjacent to the affected shed was harvested during the high-risk source period and would have attracted wild birds,

Straw bedding was stored outside and added every 1-2 days,

Wild birds could have accessed the shed via the ventilation inlets/outlets.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/62 Near Paignton, Torbay, Devon, England

Description of the premises

Overview of the premises and the wider business

This site was a licenced zoological collection open to the public. It was run by a Trust that managed several other national nature reserves and co-ordinated conservation and research projects in the UK and abroad.

It contained an internationally important collection involved in breeding programmes, education and zoological research. At the time of the disease report it had more than 2000 animals on site with over 440 birds across 80 species including some of the highest IUCN conservation categories.

The site was 32 hectares (80 acres) of woodland and parkland surrounded by urban housing and commerce. It was 1500 m from the sea and a stream flowed through the site feeding various water-based enclosures used to house some of the captive birds.

Following an epidemiological investigation, the infected premises (IP) was limited to a series of lakes that were fed by a stream running through the site where birds were assessed to have had either direct contact with the infected captive bird via beak to beak contact or indirect access through the flow of water from an affected pen to a non-affected pen.

Species and number of each present

The designated IP contained the following species and numbers that were spared from culling following an assessment by APHA and an appeal to the Secretary of State.

Table 18: List of species and number present in the designated infected premise that were spared from culling

Species	Number	Original location	Isolation location
Marabou Stork	2	Marabou enclosure	Isolation pen in situ
Marbled Teal	4	Lakeside Aviary	Isolation pen in situ
Braer's Pochard	13	Lakeside Aviary	Isolation pen in situ
White Faced Whistling Duck	2	Lakeside Aviary	Isolation pen in situ
Ringed Teal	1	Lakeside Aviary	Isolation pen in situ
Red Crowned Crane	2	Upper Lake	Isolation pen in situ
Sarus Crane	1	Main Lake	Balai quarantine unit
Dalmatian Pelicans	6	Main Lake	APHA approved quarantine unit
Grey Lag Geese	2	Main Lake	APHA approved quarantine unit
Black Necked Swan	2	Main Lake	APHA approved quarantine unit

Species	Number	Original location	Isolation location
Barhead Geese	6	Main Lake	APHA approved quarantine unit
Total	41		

Also present on the wider zoo was a group of feral peafowl that were captured and quarantined. These birds were not looked after and lived as wild birds.

Species	Number	Original Location	Quarantine location
Peafowl	19	Feral birds	APHA approved quarantine unit

The remaining captive birds in the designated IP plus any peafowl that could not be caught were culled by the APHA specialist wildlife team.

The birds that were spared culling were all housed in isolation facilities that were inspected by APHA. Birds originating from affected enclosures were housed in APHA approved quarantine facilities whilst birds that were from non-affected enclosures were housed in isolation facilities that were built in situ.

All the spared birds were subjected to two rounds of testing 21 days apart for HPAI H5N1 by PCR and were found to be negative.

All other non-IP enclosures on the wider zoological site were subject to rigorous veterinary surveillance and mortalities were subjected to post-mortem examination and sampled where required for HPAI H5N1 with negative results.

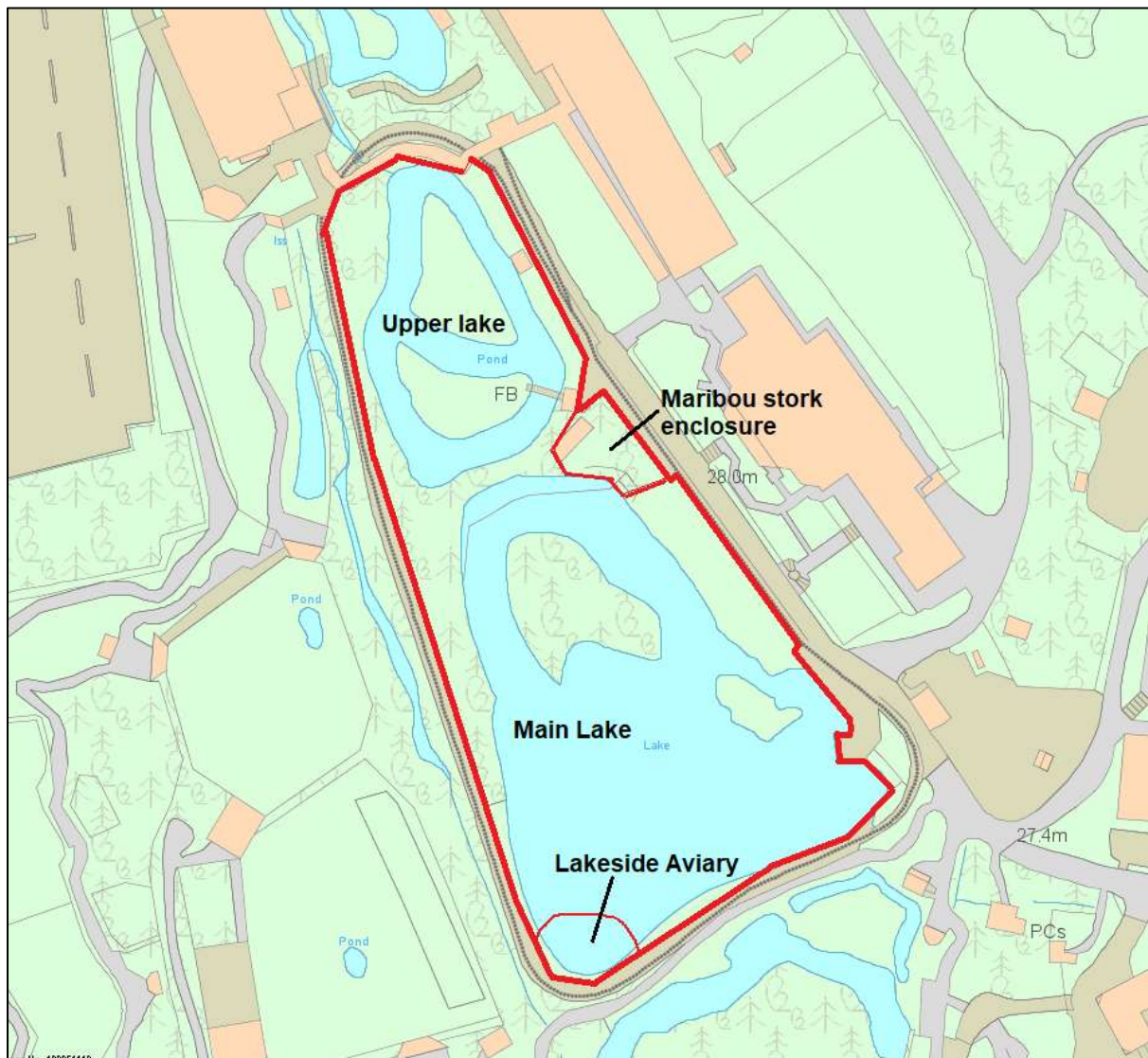
Description of the housing

The designated IP is detailed in figure 1 and was limited to an interconnected series of lakes all fed by water from a stream. These lakes were subdivided into a series of open enclosures that housed captive birds and that were frequented by wild birds.

The enclosures were fenced off so that the public could not gain access, but were open to wild birds. The captive collection was pinioned so they could not escape their enclosure.

Plan of the infected premises

Figure 428: Plan of designated IP following epidemiological investigation.



Overview of biosecurity

Biosecurity of staff movements and public access between enclosures on the zoo site was assessed to be good. Throughout the zoo all avian enclosures had a boot dip at the entrance for the keepers to use with safe 4 solution at 1:10 dilution. The houses with free flying birds had disinfectant mats for public use at the entrance and exit and the main reception centre has disinfectant mats. The central feed store was fully secured from any wild bird or rodent access and had boot dips at the entrances.

Carcases and PME: Animal carcasses on site (including wild animal carcasses that needed to be removed) were double bagged and taken to the post-mortem facility next to the veterinary centre. All kept animals underwent a post-mortem examination (PME). Wild animal carcasses were also examined if it was pertinent to the surveillance activities of the zoo. For each PME the veterinary staff wore overalls and disposable apron. They also used face fitted RPE for non-primate species and

full power hoods for primates. Overalls were used once then immediately hot laundered at over 60 degrees. Disposables were double bagged. The whole post-mortem suite was cleaned and disinfected as routine after every PME. Carcasses or carcass parts were stored double bagged in a freezer pending collection for disposal.

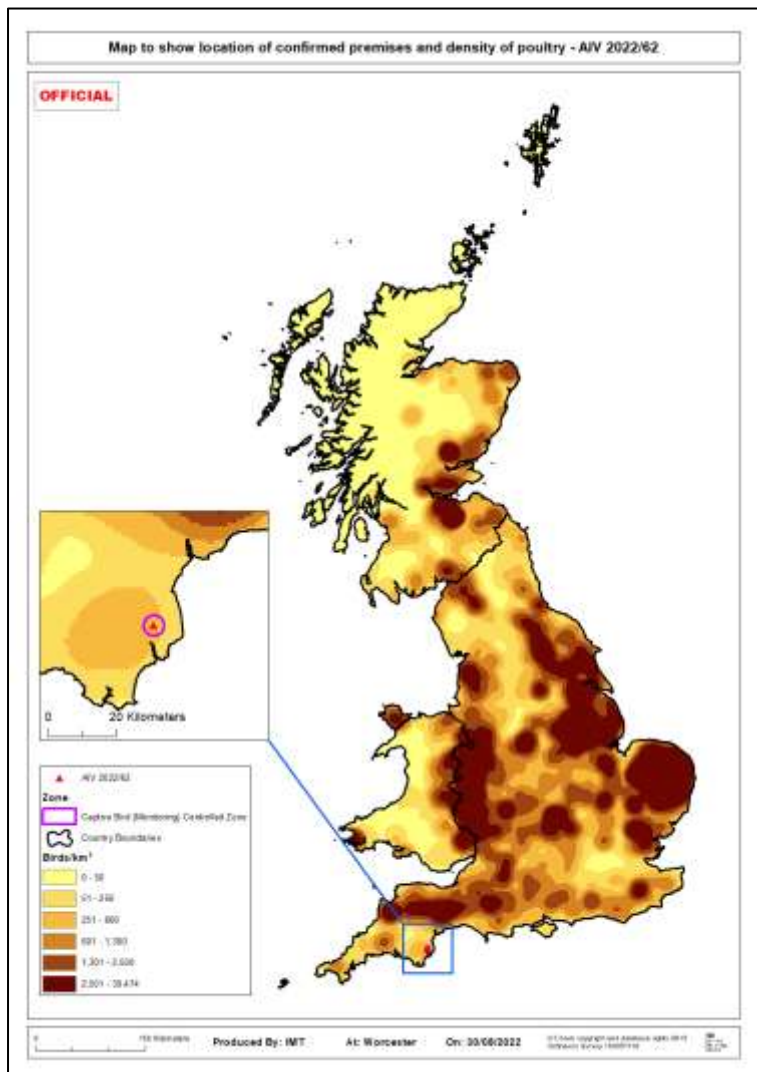
Staff dedication and flow: There was one avian team, nominally divided into two groups but with floating keepers across the two. The store staff dropped off the feed supplies to the avian breeding centre kitchen. Keepers prepared the feed for the birds under their care and it was taken to the enclosures in dedicated buckets or bowls. For the lake species keepers were in waders and disposable overalls. Boots were sprayed with disinfectant before entering at the hard standing. Keepers checked and fed the waterfowl for the main lake and lakeside aviary. They then washed their waders, removed their overalls and sprayed down with disinfectant before moving. Used overalls were stored in a sealed container at the enclosure.

The stores team were dedicated to this task and did not enter animal enclosures nor did they have any contact with discarded feed, animals or carcasses. These were handled by the keepers. Feed buckets were sprayed down before leaving the enclosure and returned to the avian breeding centre to be thoroughly washed and disinfected before use again.

Public contact with birds: There was no public access to any of the birds outdoors. Paths were set back from enclosure edges and fenced to retain separation of the public from the birds.

Map with location in Great Britain and poultry density

Figure 429: Location of IP and poultry density



Overview of the surrounding area

The IP was situated in 32 hectares (80 acres) of woodland and parkland that was surrounded by urban housing and commerce. The wider zoo was 1500 m from the sea and a stream flowed through the site entering at the northern edge by the reception area where it was diverted to fill an open topped, fenced enclosure for Flamingo and waterfowl. Fencing prevented beak to beak contact with birds in the main lake. Outflow from the Flamingo Lake filled the main lake which had two open enclosures. There were also two enclosures at the lakeside edge, separated by mesh but sharing the waters' edge, one with rare waterfowl collection and one for pair of Marabou Stork. From there the stream filled the ponds surrounding Great Apes (where no birds were kept) before flowing out down the gorge to the sea.

Other avian collections were dotted around the zoological site. All other kept birds were in enclosures, largely fully enclosed or meshed except for the large species like

ostrich, emu and cassowary. Large flying species like the wattled crane and Nene geese were pinioned and enclosed but did not have a netted roof.

A population of 20 Common Peafowl were feral across the site and roamed the public areas. They were predominantly on the lawns and play areas near the main lake where there was high footfall and food scavenging potential. They were not pinioned, fed or housed. They could not enter the flamingo or main lake due to the high fencing.

The zoo perimeter was entirely enclosed by fencing for security reasons. There was no potential for direct contact with any other kept livestock. There were no other significant livestock keepers contiguous to the site and there were no livestock units downstream from the zoo. Water flowed through urban parkland to the sea. The zoo, by nature of the density of people, their food and the water attracted a high number of gulls which scavenged the site and the lakes attracted wild waterfowl. The botanical gardens, natural woodland and parkland features provided suitable habitats for a wide variety of resident and transiting avian species.

Ornithological assessment:

Desktop assessment: Not carried out

Local intelligence: Large number of wild birds were known to frequent the main lake where several dead gulls had been collected by the zoo staff and reported to APHA wild bird helpline. These were not sampled due to there having been recent previous positive cases in the surrounding area.

Clinical picture

The zoo vet team documented all morbidity and mortality of the kept animals and mortality of wild animals found on site. They had been witnessing sick gulls for several weeks prior to suspicion of disease in the captive birds.

18/08/2022 – two dead gulls were removed.

19/08/2022 – a further 7 gulls, a Moorhen on 21/08/2022 and 3 gulls on 24/08/2022 were found dead. These were reported to APHA but were not eligible for testing under the wild bird monitoring scheme.

25/08/2022 – a sick feral peafowl was found and euthanised. This bird had a PME and samples were saved for submission.

26/08/2022 – a Dalmatian Pelican housed in the main lake was reportedly inappetent and lethargic. It was isolated and treated with NSAIDs.

27/08/2022 – the pelican had deteriorated and was collapsed with respiratory signs so was euthanised. Samples were submitted and disease confirmed on 28/08/2022 by PCR.

Clinical reports from the keepers were for no further kept bird morbidity or mortality. Clinical inspection by APHA vet on 30/08/2022 at 11:00 am of the flamingo pond, upper lake and main lake showed no indication of further sick kept birds.

Further dead gulls were found on site on 30/08/2022 and 31/08/2022.

Retrospective analysis of the sample retained from the feral peafowl was shown to be PCR positive for HPAI H5N1.

Timeline

Tracings windows

Source tracings window:

High-risk:	21/08/2022 to 23/08/2022
Likely:	10/08/2022 to 20/08/2022
Precautionary:	07/08/2022 to 09/08/2022

Spread tracings window:

High-risk:	22/08/2022 to 28/08/2022
Likely:	11/08/2022 to 21/08/2022
Precautionary:	08/08/2022 to 10/08/2022

Most likely date of infection: 21/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 430: Source and spread timeline for AIV 2022/62

Source Tracing Window	Spread Tracing Window	Date	
Day 17		07/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		08/08/22	Start of precautionary spread tracing window (source + 24h).
Day 15		09/08/22	
Day 14		10/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	11/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	12/08/22	
Day 11	Day 3	13/08/22	
Day 10	Day 4	14/08/22	
Day 9	Day 5	15/08/22	
Day 8	Day 6	16/08/22	
Day 7	Day 7	17/08/22	
Day 6	Day 8	18/08/22	
Day 5	Day 9	19/08/22	
Day 4	Day 10	20/08/22	
Day 3	Day 11	21/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	22/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	23/08/22	
	Day 14	24/08/22	Precautionary onset of clinical signs: peacock noted to be ill
	Day 15	25/08/22	Peacock euthanased; Retrospective assessment is that PME findings suggestive of NAD. PCR +ve H5N1
	Day 16	26/08/22	Pelican noted to be ill. Treated.
	Day 17	27/08/22	
	Day 18	28/08/22	Notification of suspicion of disease to APHA. Pelican euthanased. Suspicion of NAD reported to APHA APHA investigation and sampling of Pelican (DPR 2022/157). Restrictions served.
	Day 19	29/08/22	HPAI H5N1 Confirmed by CVO following positive PCR results and designated AIV2022/62.
	Day 20	30/08/22	
	Day 21	31/08/22	
	Day 22	01/09/22	
	Day 23	02/09/22	
	Day 24	03/09/22	
	Day 25	04/09/22	
	Day 26	05/09/22	
	Day 27	06/09/22	
	Day 28	07/09/22	Cull completed at 11:30and preliminary C&D completed 15:45
	Day29	08/09/22	Preliminary C&D considered effective 15:45
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

CBMZ (0-3 km)

126 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-100 birds (123 premises with 0-49 birds, 3 premises with 50-999 birds, 0 premises with >1000 birds).

1 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for two private vets and several other zoo workers within the high-risk tracing windows. This resulted in three tracing visits being completed to the zoo workers who were identified as having other poultry

contacts. Two of these visits were assessed as having a negligible risk of disease transmission, no further actions were required, and the tracings were closed. A further 21-day post contact tracing visit was required for one of the workers poultry which resulted in a very low risk assessment, no further actions were required, and the tracing was closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Numerous dead gulls were identified in the main lake prior to disease being suspected in the captive collection. These birds were not eligible for sampling by APHA due to earlier wild bird submission confirming HPAI H5N1 in the local wild bird population.

Spread investigations: Assessment of potential and likelihood of spread

All tracing activity was closed with no further H5N1 HPAI cases being disclosed and enhanced veterinary surveillance on the wider zoological collection site did not disclose additional cases.

The likelihood of spread by wild birds that utilised the zoological grounds was assessed as being medium with medium uncertainty however this would be dwarfed by the infection pressure that already existed in the surrounding wild bird population.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/63 Near Constantine, Camborne and Redruth Cornwall

Description of the premises

Overview of the premises and the wider business

This was a smallholder free-range flock of approximately 100 laying hens.

The flock was purchased at point of lay in January 2022 and housed as a single group. There have been no further movements of poultry on since then. Eggs were sold to a local restaurant or through farm gate sales of which no records were kept.

Species and number of each present

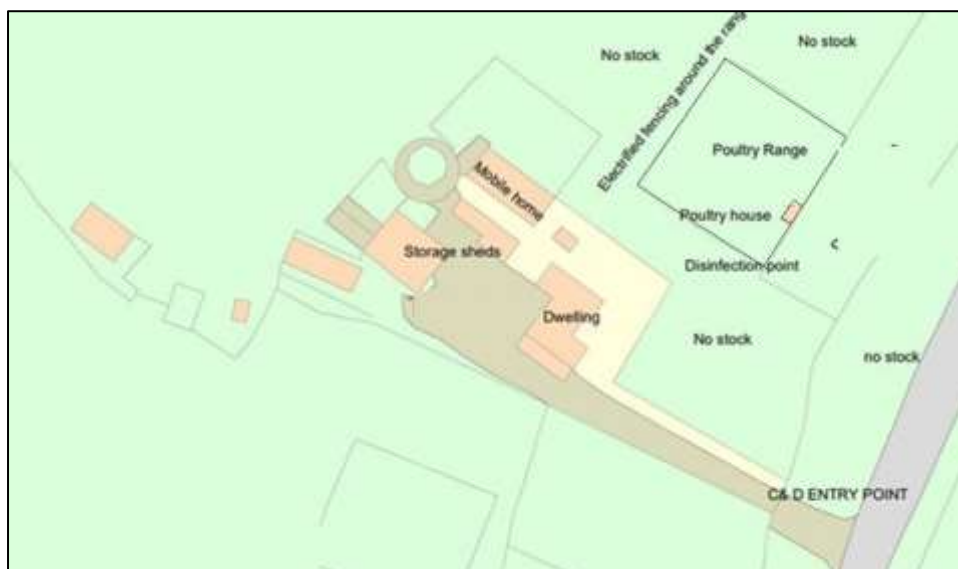
100 chickens.

Description of the housing

The birds were housed in 3 by 4 metre wooden poultry shed with an apex roof, a solid wooden floor and a solid wooden door. It had side vents covered with 2.5 cm square metal mesh with nest boxes beneath. The birds were fed in the house and on the outside range which was ring-fenced with metal mesh fencing and electrified poultry netting. The range was uncovered and so accessible to wild birds.

Plan of the infected premises

Figure 431: Plan of AIV 2022/63



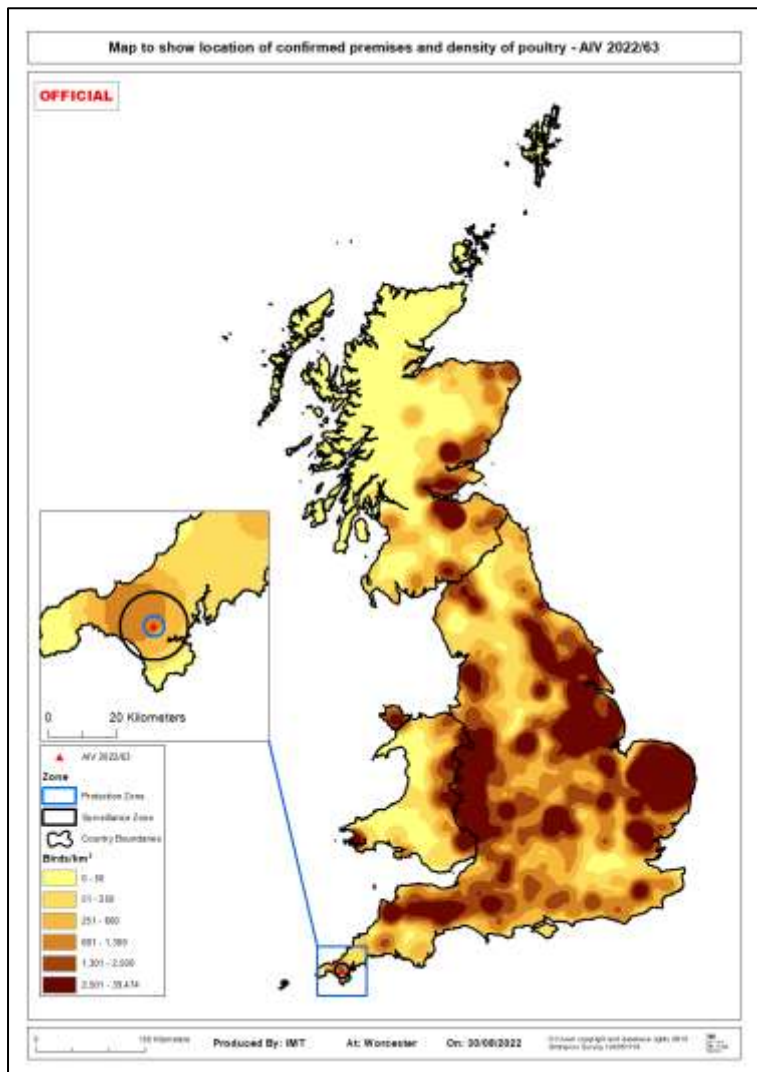
Overview of biosecurity

The keeper was the only person attending to the birds and there was a clean and in use bio-security point at the entrance to the poultry unit/range with a foot dip with approved disinfectant at the appropriate dilution and a brush. Clean paper trays were present to hold any collected eggs. Feeders and drinkers were clean and appropriately filled with a mains water supply. Overall, the level of biosecurity was

considered reasonable for a smallholder enterprise of this nature. However, the range was open and accessible to wild birds.

Map with location in Great Britain and poultry density

Figure 432: Location of IP and poultry density



Overview of the surrounding area

There were some small ponds within 300-500 metres of the premises and the coast was about 8 km away and a river and estuary within 5 km.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Sea birds were common in the area but had not been seen on the poultry range. However, the keeper did report seeing two seagulls perched on the poultry house throughout the day of 25/08/2022 which he considered to be an unusual event. There were gamebird premises within the PZ of the IP but the keeper

was not aware of any free-living gamebirds accessing his premises. There had been a high number of wild bird mortalities in the area.

Clinical picture

28/08/2022 – Three chickens were found dead with congested feet and combs. The rest of the flock was subdued and not eating or drinking so the keeper reported suspicion of notifiable avian disease. 12 more chickens died during the day.

29/08/2022 – 40 birds died overnight and a further 17 died during the day.

Timeline

Tracings windows

Source tracings window:

High-risk:	24/08/2022 to 26/08/2022
Likely:	13/08/2022 to 23/08/2022
Precautionary:	07/08/2022 to 12/08/2022

Spread tracings window:

High-risk:	25/08/2022 to 28/08/2022
Likely:	14/08/2022 to 24/08/2022
Precautionary:	08/08/2022 to 13/08/2022

Most likely date of infection 24/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 433: Source and spread timeline for AIV 2022/63

Source Tracing Window	Spread Tracing Window	Date	
Day 20		07/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		08/08/22	Start of precautionary spread tracing window (source + 24h).
Day 18		09/08/22	
Day 17		10/08/22	
Day 16		11/08/22	
Day 15		12/08/22	
Day 14		13/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	14/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	15/08/22	
Day 11	Day 3	16/08/22	
Day 10	Day 4	17/08/22	
Day 9	Day 5	18/08/22	
Day 8	Day 6	19/08/22	
Day 7	Day 7	20/08/22	
Day 6	Day 8	21/08/22	
Day 5	Day 9	22/08/22	
Day 4	Day 10	23/08/22	
Day 3	Day 11	24/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	25/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	26/08/22	
	Day 14	27/08/22	Precautionary onset of clinical signs
	Day 15	28/08/22	Notification of suspicion of disease to APHA. Three birds found dead on morning inspection. APHA investigation and sampling (DPR 2022/159). 12 more hens died prior to and during investigation. Restrictions served.
	Day 16	29/08/22	Further 40 died overnight and 17 more before 15:00 today. (72 in total dead and 100% morbidity). HPAI H5N1 confirmed on PCR results (AIV 2022/63).
	Day 17	30/08/22	Cull and preliminary C&D completed
	Day 18	31/08/22	C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

23 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 2-183 birds.

6 premises holding both pigs and poultry.

SZ (3-10 km)

230 premises with poultry are reported to be within 3-10 km of the IP holding between 1-161,000 birds.

98 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

The hens were free range where they could have had direct or indirect contact with wild birds.

Proximity to the coast with frequent sightings of wild seabirds, and unusual sighting of seagulls perching on the poultry house on 25/08/2022 which was within the high-risk source window.

No movements of live birds on or off the site since January 2022

Only the keeper was tending to the birds and he had no contact with other poultry or poultry units.

No high-risk source tracings were identified.

Spread investigations: Assessment of potential and likelihood of spread

Some table eggs were sold to a restaurant on 25/08/2022 but these had all been used. All other sales were from the farm gate to the public, but no records were available for these

These tracings were assessed as very low or negligible risk.

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/64, Near South Molton, North Devon, Devon, England

Description of the premises

Overview of the premises and the wider business

This was a pheasant release pen of approximately 14 acres. It was part of a wider sporting business that had seven pheasant release pens and four partridge pens.

Species and number of each present

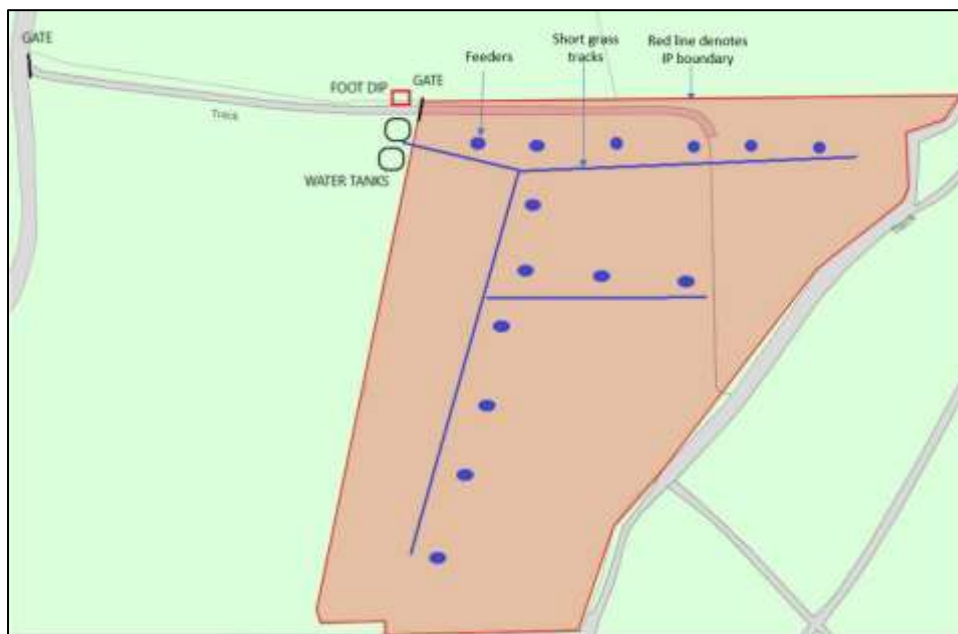
The IP was effectively an area of fenced woodland and so calculating an exact number of birds present was difficult. Approximately 8,000 pheasants were placed in early August.

Description of the housing

The IP had no infrastructure. It was an area of woodland and scrub fenced with a 2.5 meter high fabric fence with no roof. There were a number of 'lobster-pot' pop-holes that allowed the birds to re-enter the pen if they flew out. Drinkers and feeders were placed throughout.

Plan of the infected premises

Figure 434: Plan of AIV 2022/64

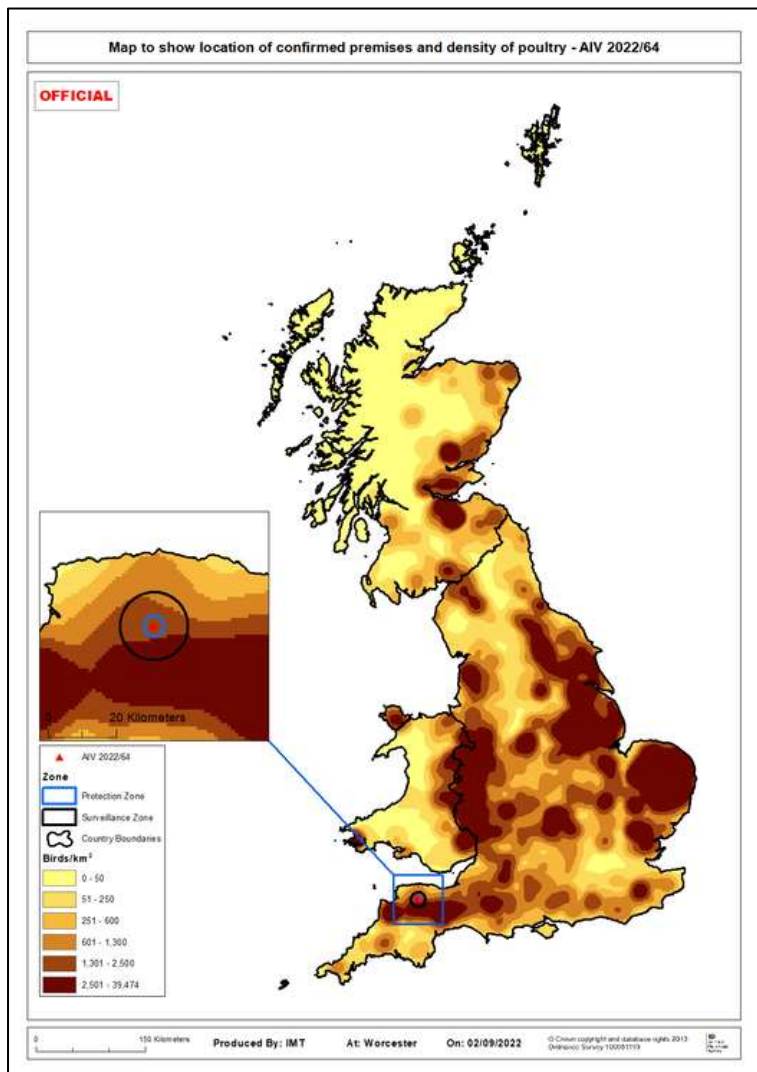


Overview of biosecurity

Biosecurity was poor. There was ample opportunity for wild birds to mingle with the pheasants. There was a foot dip at the entry but no vehicle C and D point.

Map with location in Great Britain and poultry density

Figure 435: Location of IP and poultry density



Overview of the surrounding area

The area around the IP was permanent grassland or arable crops. No large water bodies were nearby, but there was a river than ran along the eastern boundary.

Ornithological assessment:

Desktop assessment: Whilst passerines (including starling), corvids and woodpigeon were likely to be abundant, none would have assumed their winter aggregation behaviour and only corvids suggested a likely infection pathway where individual wild birds scavenged on carcasses present elsewhere as well as visiting the IP. Considering that many wild species would mix with pheasants where they were fed, direct and/or indirect infection from wild birds was probable. Further, as pheasants could leave the pen and re-enter, infection may have been picked up elsewhere and carried back to the pen.

Clinical picture

16/08/2022 – clinical signs of corneal opacity, neurological signs and reduction in feed were seen.

26/08/2022 – an increase in mortality was noted with large piles of dead birds found among the trees. It was estimated that approximately 4000 birds had died by 30/08/2022

Timeline

Tracings windows

Source tracings window:

High-risk:	13/08/2022 to 15/08/2022
Likely:	02/08/2022 to 12/08/2022
Precautionary:	within the likely source window

Spread tracings window:

High-risk:	14/08/2022 to 31/08/2022
Likely:	03/08/2022 to 13/08/2022
Precautionary:	within the likely spread window

Most likely date of infection; 13/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 436: Source and spread timeline for AIV 2022/64

Source Tracing Window	Spread Tracing Window	Date	
Day 14		02/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	03/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	04/08/22	
Day 11	Day 3	05/08/22	
Day 10	Day 4	06/08/22	
Day 9	Day 5	07/08/22	
Day 8	Day 6	08/08/22	
Day 7	Day 7	09/08/22	
Day 6	Day 8	10/08/22	
Day 5	Day 9	11/08/22	
Day 4	Day 10	12/08/22	
Day 3	Day 11	13/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	14/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	15/08/22	
	Day 14	16/08/22	Precautionary onset of clinical signs.
	Day 15	17/08/22	
	Day 16	18/08/22	
	Day 17	19/08/22	
	Day 18	20/08/22	
	Day 19	21/08/22	
	Day 20	22/08/22	
	Day 21	23/08/22	
	Day 22	24/08/22	
	Day 23	25/08/22	
	Day 24	26/08/22	Reported to APHA by PVS but negated. Mortality reported to be 25%. Classified as wild birds so no further action from APHA.
	Day 25	27/08/22	
	Day 26	28/08/22	Increase in mortality to over 50% and clinical signs in most birds.
	Day 27	29/08/22	
	Day 28	30/08/22	
	Day 29	31/08/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/162). Restrictions served.
	Day 30	01/09/22	
	Day 31	02/09/22	
	Day 32	03/09/22	
	Day 33	04/09/22	
	Day 34	05/09/22	Cull completed
	Day 35	06/09/22	Preliminary C&D completed
	Day 36	07/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on

Surveillance activity

PZ (0-3 km)

9 premises with poultry, excluding the IP, holding between 3 and 37,527 birds. 3 premises with >50 birds.

0 premises with pigs and poultry.

SZ (3-10 km)

57 premises with poultry holding between 1 and 100,000 birds, 20 premises with >50 birds.

13 premises with pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for two staff members and the private vet, who conducted post-mortem examinations on several birds from the IP, within the high-risk tracing windows. This resulted in two tracings visits being required. One was to another poultry premises the private vet had visited after completing the post-mortems. The other visit was in relation to one staff member visiting another potential poultry premises.

All tracings were risk assessed as negligible or very low likelihood of disease transmission, no further actions were required and the tracings were closed.

Source investigations:

Hypothesis for the source

The most likely source identified was direct and/or indirect contact with wild birds

Assessment and evidence base for the likely source

Biosecurity was poor with high likelihood of contact with wild birds. The only mitigation in place was a foot dip, which in this outdoor set-up was likely to be highly ineffective. There was no pest control and it was likely that the availability of feed and shelter made this site attractive to many wild birds. Whilst this IP was part of a wider business, there was no viable source pathway from other kept birds.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/65, Near Holt, North Norfolk, Norfolk, England

Description of the premises

Overview of the premises and the wider business

This was a hobby flock kept on an arable farm which also had a holiday cottage enterprise. No other livestock were kept on the premises, but 500 pheasants had been released on the IP one month ago and feral peacocks roamed in the area. The keepers used to provide eggs to the guests in the holiday cottages but had not done so for three weeks prior to the outbreak. They kept the rest of the eggs for their own consumption.

Species and number of each present

26 chickens, 15 ducks and one turkey.

Feral peacocks and released pheasant were also in the area.

Description of the housing

The birds were kept in a fenced orchard which could be accessed by wild birds and was approximately 6 metres away from a pond with wild mallards. The birds were generally unhoused with nesting boxes in which to lay.

Plan of the infected premises

Figure 437: Plan of AIV 2022/65

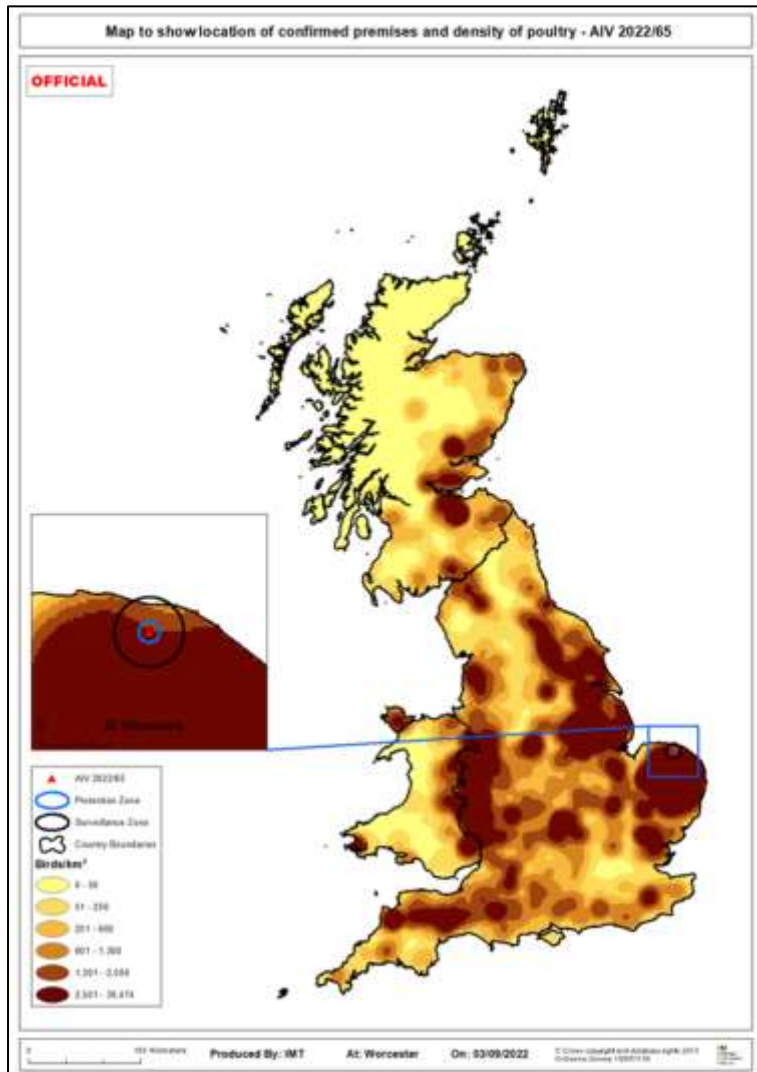


Overview of biosecurity

The keeper had set up a disinfection point at the entrance to the orchard, but overall, there was minimal biosecurity.

Map with location in Great Britain and poultry density

Figure 438: Location of IP and poultry density



Overview of the surrounding area

This was a rural area- mainly arable with some grazing plus many small, wooded areas across the area. The premises was about 8 km from the coast and there were no contiguous poultry premises.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: There were many wild birds in the area including wildfowl on the nearby ponds and released pheasants.

Clinical picture

29/08/2022 – three chickens were found dead.

01/0/2022 – five more chickens died and a peacock was found dead.

02/09/2022 – two more died. Some of the flock were lethargic with swollen heads, cyanotic combs and ocular and nasal discharge. The ducks were not affected.

There had been no change in food or water intake or egg production.

Timeline

Tracings windows

Source tracings window:

High-risk: 26/08/2022 to 28/08/2022

Likely: 15/08/2022 to 25/08/2022

Precautionary: 12/08/2022 to 14/08/2022

Spread tracings window:

High-risk: 27/08/2022 to 02/09/2022

Likely: 06/08/2022 to 26/08/2022

Precautionary: 13/08/2022 to 15/08/2022

Most likely date of infection: 26/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 439: Source and spread timeline for AIV 2022/65

Source Tracing Window	Spread Tracing Window	Date	
Day 17		12/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		13/08/22	Start of precautionary spread tracing window (source + 24h).
Day 15		14/08/22	
Day 14		15/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	16/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	17/08/22	
Day 11	Day 3	18/08/22	
Day 10	Day 4	19/08/22	
Day 9	Day 5	20/08/22	
Day 8	Day 6	21/08/22	
Day 7	Day 7	22/08/22	
Day 6	Day 8	23/08/22	
Day 5	Day 9	24/08/22	
Day 4	Day 10	25/08/22	
Day 3	Day 11	26/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	27/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	28/08/22	
	Day 14	29/08/22	Precautionary onset of clinical signs.
	Day 15	30/08/22	
	Day 16	31/08/22	Reported as 2022/163, restrictions applied.
	Day 17	01/09/22	
	Day 18	02/09/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/164). Restrictions served.
	Day 19	03/09/22	
	Day 20	04/09/22	
	Day 21	05/09/22	
	Day 22	06/09/22	Culling and preliminary C&D completed
	Day 23	07/09/22	Preliminary C&D effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

12 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 6-16,000 birds.

2 premises holding both pigs and poultry.

SZ (3-10 km)

91 premises with poultry were reported to be within 3-10 km of the IP holding between 1-300,000 birds.

24 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds

Assessment and evidence base for the likely source

The premises had no biosecurity measures in place, wild birds had access to the feeders and drinkers and the birds shared the orchard with wild birds.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood

Remaining uncertainty

No remaining uncertainty.

AIV 2022/66, Near Arthog, Gwynedd, Wales

Description of the premises

Overview of the premises and the wider business

The IP was a small holding with a small backyard flock of chickens and ducks. The main business was bee keeping, selling honey and wax products. There were also two holiday cottages.

The chicken and duck eggs were used for home consumption and the surplus sold at the gate with an honesty box. However, no eggs had been sold for the past two months.

The ducks were also used for meat for home consumption.

Species and number of each present

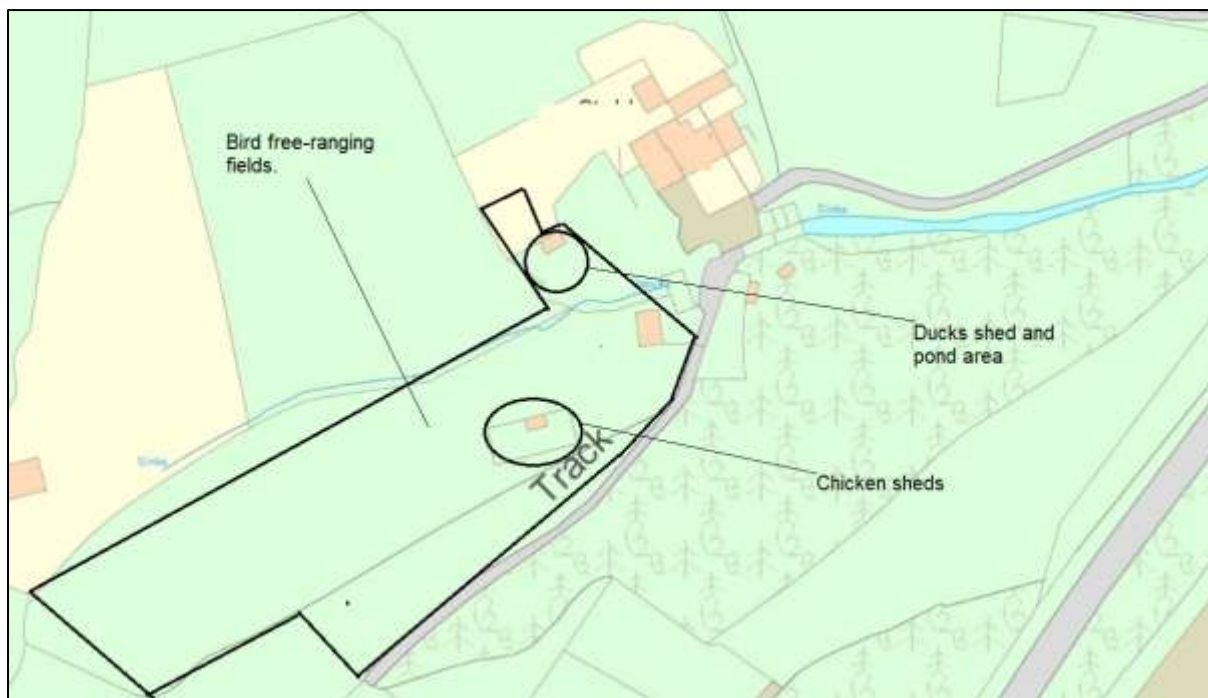
33 chickens (12 of which were chicks) and 2 ducks.

Description of the housing

The ducks were free ranging in a field and had access to a pond. The chickens were kept in runs in a netted area of a large field but were also allowed to roam freely and mingle with the ducks. Wild birds had access to the range and feeders and drinkers.

Plan of the infected premises

Figure 440: Plan of AIV 2022/66

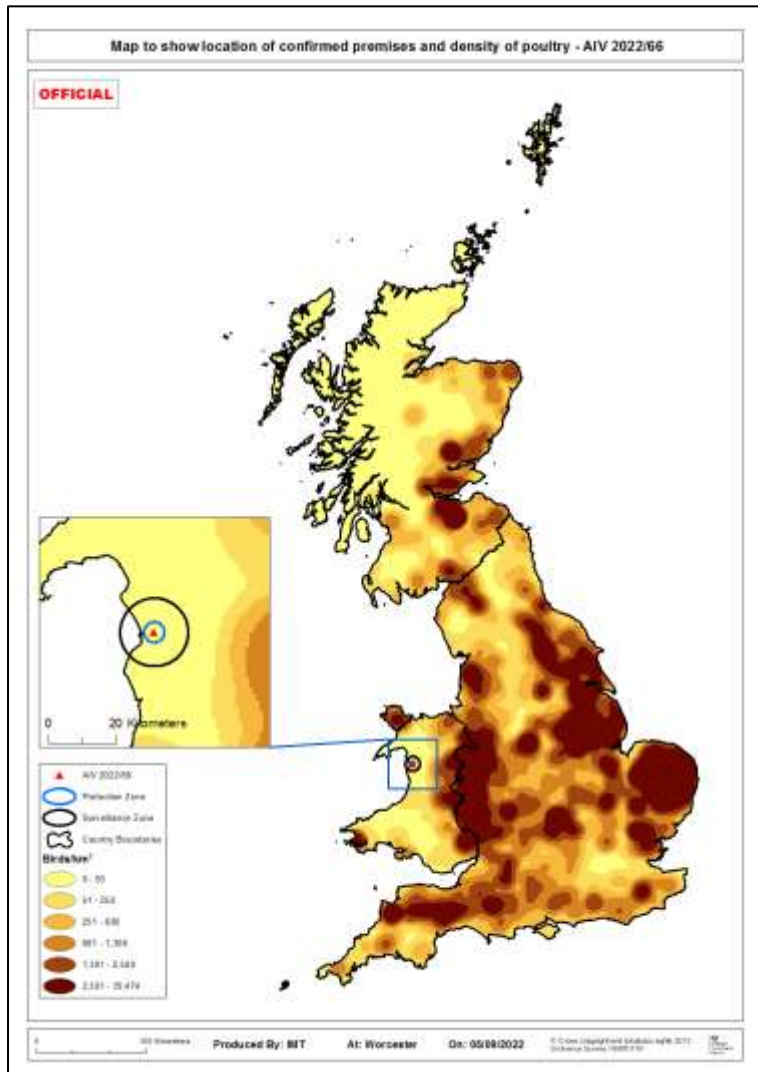


Overview of biosecurity

No biosecurity measures were in place apart from the use of dedicated boots in the birds' fields.

Map with location in Great Britain and poultry density

Figure 441: Location of IP and poultry density



Overview of the surrounding area

The premises was approximately 3 km from the coastline and 400 m from a river estuary.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: The holding was surrounded by woodland and 400 m from the river estuary. There was intense wild bird activity on and over the holding and a pond on site which would have attracted wild birds.

Clinical picture

02/09/2022 – Two chickens were seen to be hunched up and lethargic.

03/09/2022 – Three chickens were found dead.

04/09/2022 – Two chickens were found dead and several others were hunched and lethargic. No clinical signs were seen in the ducks. Suspicion of notifiable avian disease was reported.

Timeline

Tracings windows

Source tracings window:

High-risk:	30/08/2022 to 01/09/2022
Likely:	19/08/2022 to 29/08/2022
Precautionary:	16/08/2022 to 18/08/2022

Spread tracings window:

High-risk:	31/08/2022 to 04/09/2022
Likely:	20/08/2022 to 30/08/2022
Precautionary:	17/08/2022 to 19/08/2022

Most likely date of infection: 30/08/2022 (Start of high-risk source tracing window):

Timeline chart

Figure 442: Source and spread timeline for AIV 2022/66

Source Tracing Window	Spread Tracing Window	Date	
Day 18		15/08/22	
Day 17		16/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		17/08/22	Start of precautionary spread tracing window (source + 24h).
Day 15		18/08/22	
Day 14		19/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	20/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	21/08/22	
Day 11	Day 3	22/08/22	
Day 10	Day 4	23/08/22	
Day 9	Day 5	24/08/22	
Day 8	Day 6	25/08/22	
Day 7	Day 7	26/08/22	
Day 6	Day 8	27/08/22	
Day 5	Day 9	28/08/22	
Day 4	Day 10	29/08/22	
Day 3	Day 11	30/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	31/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	01/09/22	
	Day 14	02/09/22	Precautionary onset of clinical signs. Some chickens noticed to be "a little fluffed up"
	Day 15	03/09/22	First mortality, 3 chickens
	Day 16	04/09/22	Continuing mortality in chickens. Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/168). Restrictions served.
	Day 17	05/09/22	HPAI H5N1 confirmed on PCR results (AIV 2022/63).
	Day 18	06/09/22	Culling and preliminary C&D completed
	Day 19	07/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

13 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 1-57 birds (1 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

10 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 3-30 birds (0 premises with 50 or more birds).

2 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for the IP owner who visited another smallholding which had poultry, two visitors who stayed at the house and four visitors to the adjacent holiday cottages.

An immediate tracing visit to inspect the birds and a 21-day post-contact tracing visit were conducted at the contact premises identified via the IP owner. In both visits no sign of notifiable disease was observed and restrictions were lifted as the likelihood of spread was assessed as very low, and tracings closed.

No other poultry contacts were identified for any of the visitors; these tracings were assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct and/or indirect contact with wild birds.

Assessment and evidence base for the likely source

The birds were free ranging and their range and pond could be accessed by wild birds.

The bedding was stored in a building that was accessible to wild birds.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/67, Near Bridlington, East Riding of Yorkshire, Yorkshire England

Description of the premises

Overview of the premises and the wider business

The IP was an independently owned free-range commercial egg laying premises with 40,000 chickens. It was situated within the SZ of AIV 2022/61. The owner also grew arable crops and vegetables as well as running an on-site farm shop and tea rooms. Eggs were packed on site and sold to a large wholesale company as well as through the farm shop and other local retail outlets.

Species and number of each present

The premises contained 40,000 71-week-old laying hens divided between three houses, two of which contained 14,000 birds and one with 12,000 birds.

In addition to the poultry, there was a small petting area with two pigs which were sampled with negative results.

Description of the housing

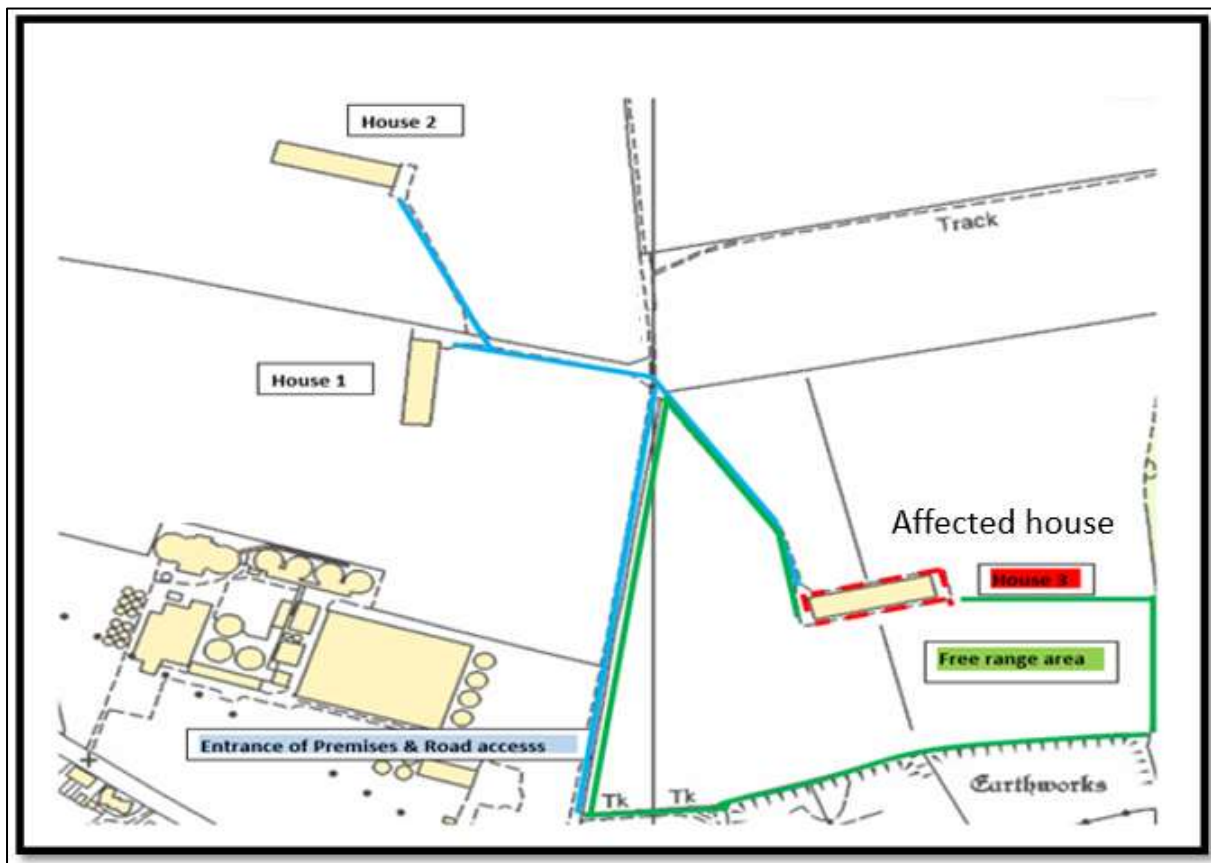
Each house was subdivided into four sections, but birds shared the same air space and had beak to beak contact with birds in the adjoining section.

All houses were made of 50-60 cm of concrete blocks with wood above and their own road access. The houses were well maintained with no moss on the roofs and no holes in the fabric of the buildings. The ventilation was natural with no side-fans. The air flow entered the buildings through the side vents and exited through the top of the roof. These side vents were accessible to wild birds.

At the time of the report case investigation, all birds had been housed for 8 days as there had been another IP in the local area (AIV 2022/61).

Plan of the infected premises

Figure 443: Plan of AIV 2022/67



Overview of biosecurity

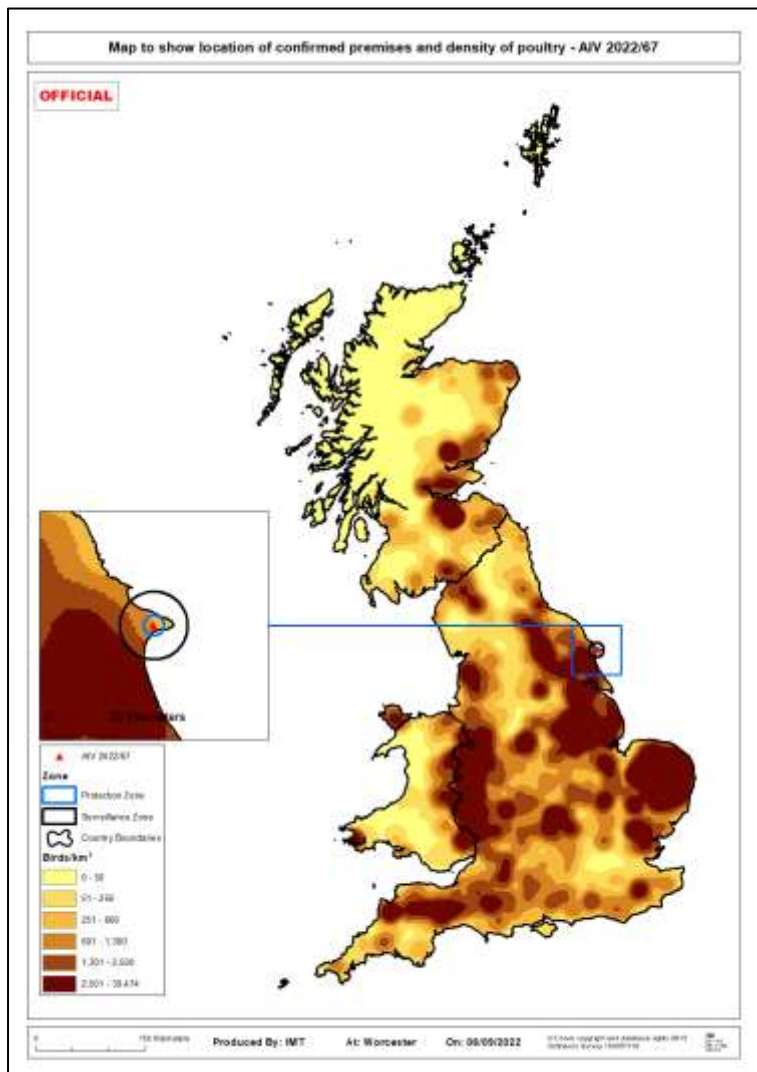
There was a boot dip and knapsack sprayer for vehicle wheels at the main entrance to the site. However, the driveway was composed of hardcore rather than concrete or tarmac so was itself difficult to keep clean. There was no reliable visitor's book on site

There were uncovered foot dips outside each bird shed and the egg packing shed. There was an entrance lobby for each shed with a barrier where boots were changed. Staff wore the same outer clothing between sheds, although they generally worked in just one shed. There were cross overs of staff within this arrangement.

ABP was collected daily and stored in locked refrigerators prior to collection for removal off site.

Map with location in Great Britain and poultry density

Figure 444: Location of IP and poultry density



Overview of the surrounding area

The chicken sheds had their own road access and were surrounded by arable ground with no adjacent poultry units. This IP was just outside a small seaside town and within 2 km of the North Sea coast. AIV 2022/16 was situated 3.5 km to the northeast.

Ornithological assessment:

Desktop assessment: Substantial infection pressure was assumed to occur at the coast given the considerable mortality of cliff-nesting species observed there as well as the continued presence of their carcasses.

In combination, the IP and its neighbourhood was likely to have substantial traffic from abundant passerine and gull populations visiting the ranges to exploit either the farm (livestock and their food) or their ranges.

While the passerines might have included those using coastal habitats which may then have produced infection pathways of their own (contributing some infection pressure), the gulls in this landscape were assumed to be exposed to HPAIV where it was present on the coast and alone they were assumed to produce a substantial infection pressure.

Spread: 'Background' infection pressure at this was site likely to be considerable and probably dwarfed any contributed by livestock or veterinary operations.

Local intelligence: Wild birds had seen on the premises and in the bird ranges.

Clinical picture

01/09/22 – seven deaths in shed 3. No other clinical signs noted.

02/09/22 – 31 deaths. No change in egg production or feed and water consumption.

03/09/22 – 98 dead and the owner contacted the private vet. Perihepatitis and peritonitis were noted at post-mortem examination, but otherwise all normal. Due to the lack of high mortality, the private vet decided to initiate antibiotic treatment.

04/09/22 – 190 birds were found dead. The private vet was called and suspicion of notifiable avian disease was reported.

Timeline

Tracings windows

Source tracings window:

High-risk:	28/08/2022 to 30/08/2022
Likely:	17/08/2022 to 27/08/2022
Precautionary:	14/08/2022 to 16/08/2022

Spread tracings window:

High-risk:	29/08/2022 to 05/09/2022
Likely:	18/08/2022 to 28/09/2022
Precautionary:	15/08/2022 to 17/08/2022

Most likely date of infection: 28/08/2022 (Start of high-risk source tracing window):

Timeline chart

Figure 445: Source and spread timeline for AIV 2022/67

Source Tracing Window	Spread Tracing Window	Date	
Day 17		14/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		15/08/22	Start of precautionary spread tracing window (source + 24h).
Day 15		16/08/22	
Day 14		17/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	18/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	19/08/22	
Day 11	Day 3	20/08/22	
Day 10	Day 4	21/08/22	
Day 9	Day 5	22/08/22	
Day 8	Day 6	23/08/22	
Day 7	Day 7	24/08/22	
Day 6	Day 8	25/08/22	
Day 5	Day 9	26/08/22	
Day 4	Day 10	27/08/22	
Day 3	Day 11	28/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	29/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	30/08/22	
	Day 14	31/08/22	Precautionary onset of clinical signs (increased mortality over night).
	Day 15	01/09/22	4 birds found dead
	Day 16	02/09/22	
	Day 17	03/09/22	
	Day 18	04/09/22	Notification of suspicion of disease to APHA. Increasing mortality and PVS PME carried out. (DPR 2022/169). Restrictions served.
	Day 19	05/09/22	APHA investigation and sampling
	Day 20	06/09/22	
	Day 21	07/09/22	
	Day 22	08/09/22	
	Day 23	09/09/22	
	Day 24	10/09/22	Cull completed
	Day 25	11/09/22	
	Day 26	12/09/22	Preliminary C&D completed
	Day 27	13/09/22	Preliminary C&D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these		

Surveillance activity

PZ (0-3 km)

75 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-208 birds (6 premises with 50 or more birds).

1 premises holding both pigs and poultry.

SZ (3-10 km)

26 premises with poultry were reported to be within 10 km of the IP holding between 1-32,000 birds (7 premises with 50 or more birds).

3 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were raised for the egg packing centre and egg collection lorries, ABP collection, feed deliveries, five staff, carcasses sent to the private veterinary practice and table eggs sent to nine retail premises. Where eggs were still present, these were restricted and destroyed. All tracings were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was wild birds whilst free ranging or after housing on 28/08/2022.

Assessment and evidence base for the likely source

There was substantial infection pressure from the wild waterfowl and gulls present on site and its proximity to known infection on the coast.

Following extensive telephone tracings to all known contacts within the high-risk window, no links to other infected premises were found.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/68, Near Heybridge, Maldon, Essex, Essex, England

Description of the premises

Overview of the premises and the wider business

This was a commercial game bird premises which reared gamebirds for its own shoot. It also held some ornamental species. It was part of an estate that also included a horse menage, local businesses, some residential properties and other outbuildings.

Species and number of each present

Prior to the outbreak, there were 2000 pheasants, 900 French Partridges, 1000 English Partridges, 150 quails and 200 mixed ornamental birds on the premises.

Description of the housing

The birds were kept across several areas.

The building for partridge and quail was a naturally ventilated shed in a good state of repair and cleanliness, with brick walls and meshed sides. It was divided into 14 pens made of plywood and wire net. Each pen had a plywood covered lobby and a netted run in which there were plastic feeders and automatic drinkers supplied by mains header water tanks. It had open doors at either end and the pens only had wire netting above; therefore direct or indirect contact with wild birds was possible.

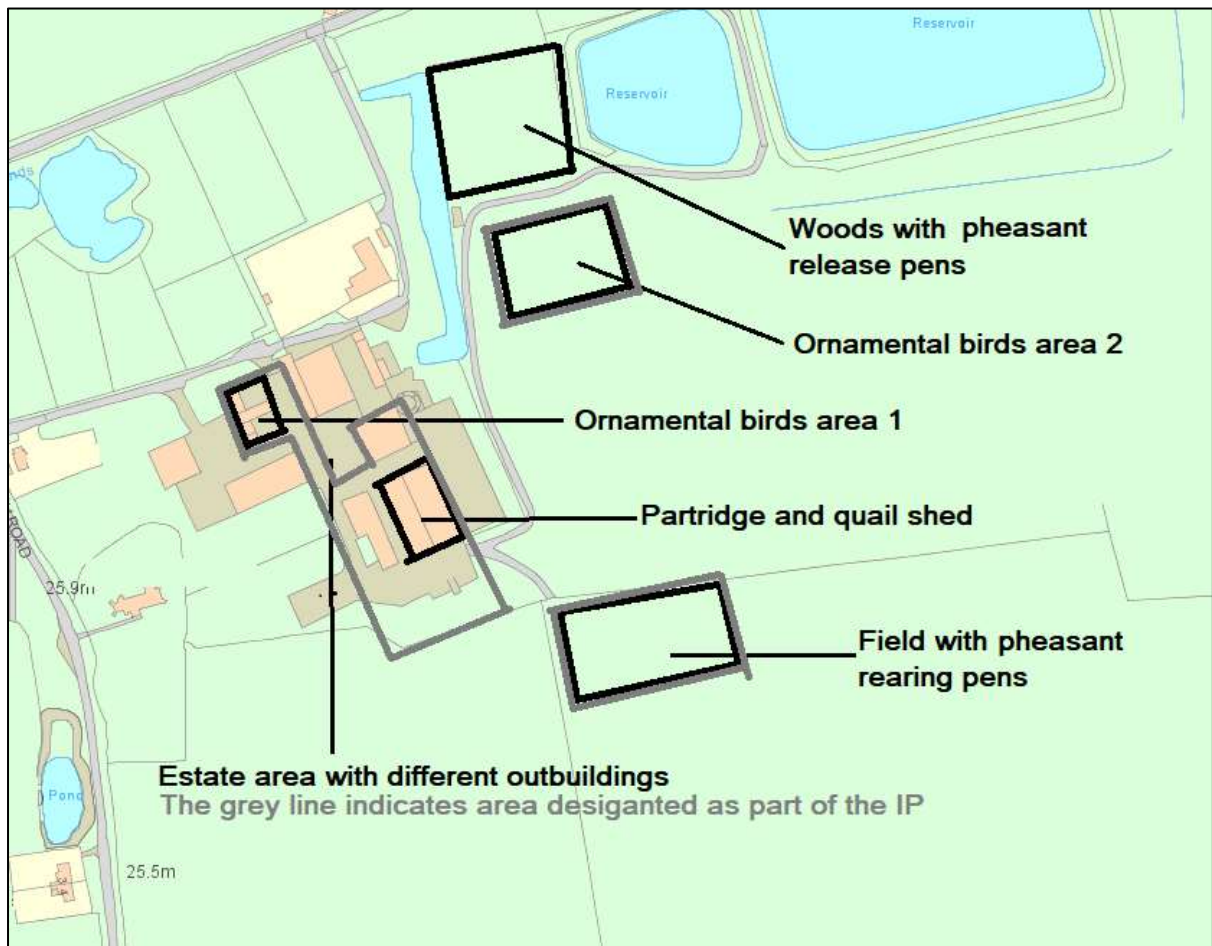
Pheasant rearing was on a field with 9 enclosed pens, each with a wooden hut and a wire netted run. They were also equipped with plastic feeders and automatic drinkers supplied by a mains header water tank. These were in a good state of maintenance.

There were two areas for ornamental birds, with enclosed pens made of wood and wire mesh. The first area was an enclosed aviary located at the entrance to the farmyard, with 14 pens, constructed from wood and wire net. One header tank supplied water for these 14 pens. The second area was in the field next to the pheasant release pen and was divided in 9 pens and 4 raised cages. The raised cages were made of wood and wire net, with a covered nest area. The feeders and drinkers in these pens were replenished manually with a hose pipe.

There were some ancillary storage units outside of this (feed and straw shed, a grain store, two stables, a store barn/carpenter unit and a refrigerated potato unit).

Plan of the infected premises

Figure 446: Plan of AIV 2022/68

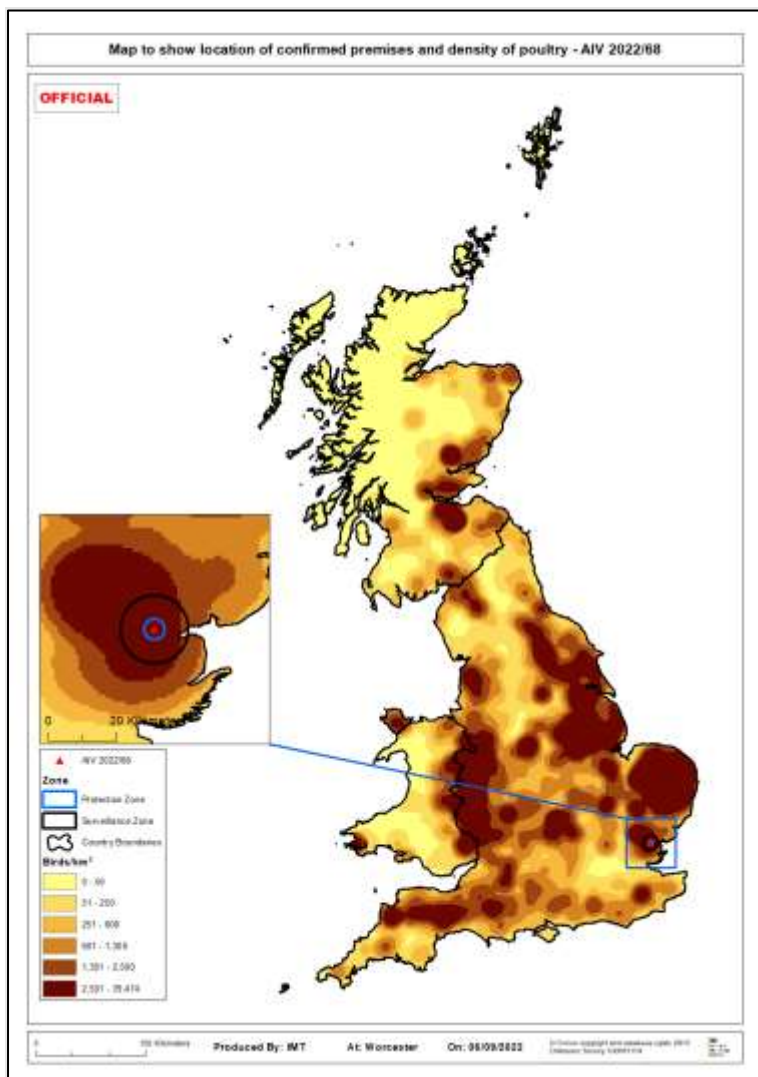


Overview of biosecurity

There were some uncovered foot dips containing Virkon S and a knapsack for spraying wheels, but otherwise biosecurity was minimal.

Map with location in Great Britain and poultry density

Figure 447: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density. It was under 3 km from coast and there were two water reservoirs and a pond and moat on the farm.

The site was surrounded by arable fields growing wheat, barley and potatoes.

Ornithological assessment:

Desktop assessment: This concluded that wild birds represented a substantial source of infection pressure for this IP. The coastal context suggested background infection pressure at this site was likely to have been substantial with traffic of wild birds between features on the farm and the estuary. Released gamebirds on site may have acquired infection in the wild and returned to contaminate surfaces on the IP.

Local intelligence: A large flock of ducks were released in late summer and 400 partridges were released on 29/08/2022.

Clinical picture

02/09/2022 – 12 English partridges were found dead in pen 11.

03/09/2022 – 20 birds were found dead in pen 11 and adjacent pens. The keeper suspected clostridial disease and initiated treatment with amoxicillin.

04/09/2022 – two birds in the shed were found dead as well as five birds in the rearing pens.

05/09/2022 – some birds were displaying torticollis, depression and death shortly after developing clinical signs. Five pheasants were found dead in the rearing pen and 20 birds were found dead in the releasing pen (outside of the IP). The keeper submitted carcasses to the private veterinary surgeon who identified enlarged spleens and hepatic autolysis indicative of viraemia and contacted APHA to report suspicion of notifiable avian disease.

At the APHA investigation the same day, the partridges in affected pens were huddled, with ruffled feathers and listlessness, some presenting ataxia and recumbency, dyspnoea and white diarrhoea around the vent.

Pheasants in the rearing pen were reluctant to walk and were dying whilst being examined with temperatures between 43.3 and 44 degrees Celsius.

In the releasing pen the pheasants were reluctant to walk and sitting in sternal recumbency. Neurological signs were observed as well as white diarrhoea. Samples were submitted. The ornamental birds all appeared to be bright and alert.

Timeline

Tracings windows

Source tracings window:

High-risk:	29/08/2022 to 31/08/2022
Likely:	18/08/2022 to 28/08/2022
Precautionary:	15/08/2022 to 17/08/2022

Spread tracings window:

High-risk:	30/08/2022 to 05/09/2022
Likely:	19/08/2022 to 29/08/2022
Precautionary:	16/08/2022 to 18/08/2022

Most likely date of infection: 29/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 448: Source and spread timeline for AIV 2022/68

Source Tracing Window	Spread Tracing Window	Date	
Day 17		15/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		16/08/22	Start of precautionary spread tracing window (source + 24h).
Day 15		17/08/22	
Day 14		18/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	19/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	20/08/22	
Day 11	Day 3	21/08/22	
Day 10	Day 4	22/08/22	
Day 9	Day 5	23/08/22	
Day 8	Day 6	24/08/22	
Day 7	Day 7	25/08/22	
Day 6	Day 8	26/08/22	
Day 5	Day 9	27/08/22	
Day 4	Day 10	28/08/22	
Day 3	Day 11	29/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	30/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	31/08/22	
	Day 14	01/09/22	Precautionary onset of clinical signs
	Day 15	02/09/22	Initial deaths noted in partridge and pheasants
	Day 16	03/09/22	More deaths in partridge and pheasants
	Day 17	04/09/22	
	Day 18	05/09/22	Notification of suspicion of disease to APHA. 50% of partridges appear affected, (DPR 2022/170. Restrictions served.
	Day 19	06/09/22	
	Day 20	07/09/22	
	Day 21	08/09/22	
	Day 22	09/09/22	Culling and preliminary C&D completed
	Day 23	10/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

45 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-87 birds (41 premises with 1-49 birds, 4 premises with 50-999 birds).

0 premises holding both pigs and poultry

SZ (3-10 km)

227 premises with poultry were reported to be within 10 km of the IP holding between 1-151,000 birds (196 premises with 1-49 birds, 16 premises with 50-999 birds, 15 premise with >1000 birds).

15 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were generated for two IP workers, two carpenters and two tree surgeons all of whom had daily access to the site. Tracings were also raised for a feed delivery, carcasses that went to a private veterinary practice for post-mortem examination and for a linked premises that was visited regularly by the IP owner. The linked premises had game birds present and this resulted in a tracing visit to inspect the birds. All tracings were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Biosecurity was poor. The bird accommodation had open doors at either end and the pheasant cages only had wire netting above – direct or indirect contact with wild birds was possible. Contamination of bedding (straw) by wild birds was possible

Infection pressure to the IP from wild birds was high. The IP was under 3 km from coast and two water reservoirs, and a pond and moat on the farm, with wild birds present. Previously released birds were also observed around the pens.

All other potential source pathways were assessed as very low (or lower) likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/69, Near Torpoint, Southeast Cornwall, Cornwall

Description of the premises

Overview of the premises and the wider business

The premises was a hobby flock in the back garden of a residential dwelling. The owner sold eggs through a farm shop but none had been sold during the high-risk spread window.

Species and number of each present

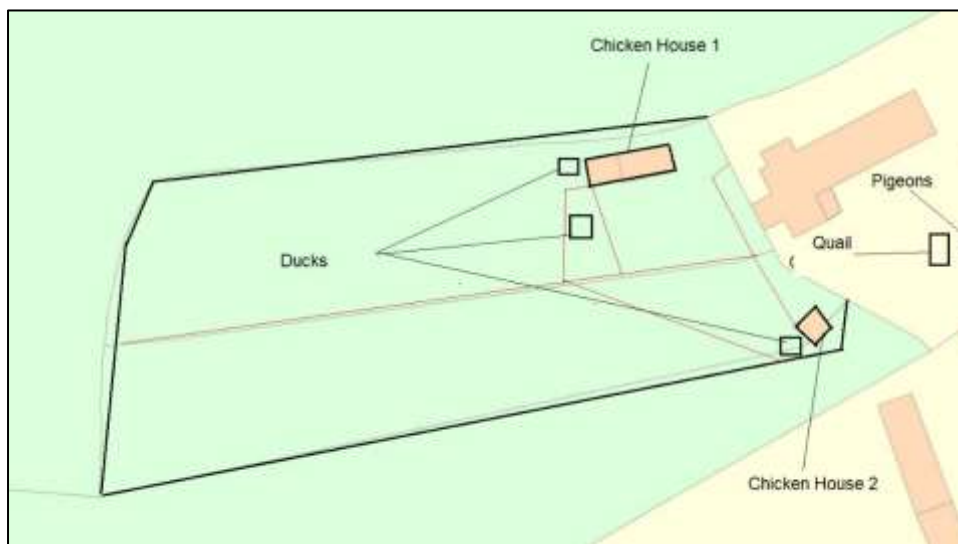
43 chickens, 28 ducks, two quail, eight pigeons and eight canaries.

Description of the housing

The birds were free ranging during the day and housed overnight in wooden sheds of various sizes. The canaries were in cages in Chicken House 1. The groups of ducks were separated by wire fences but beak to beak contact was possible through these.

Plan of the infected premises

Figure 449: Plan of AIV 2022/69

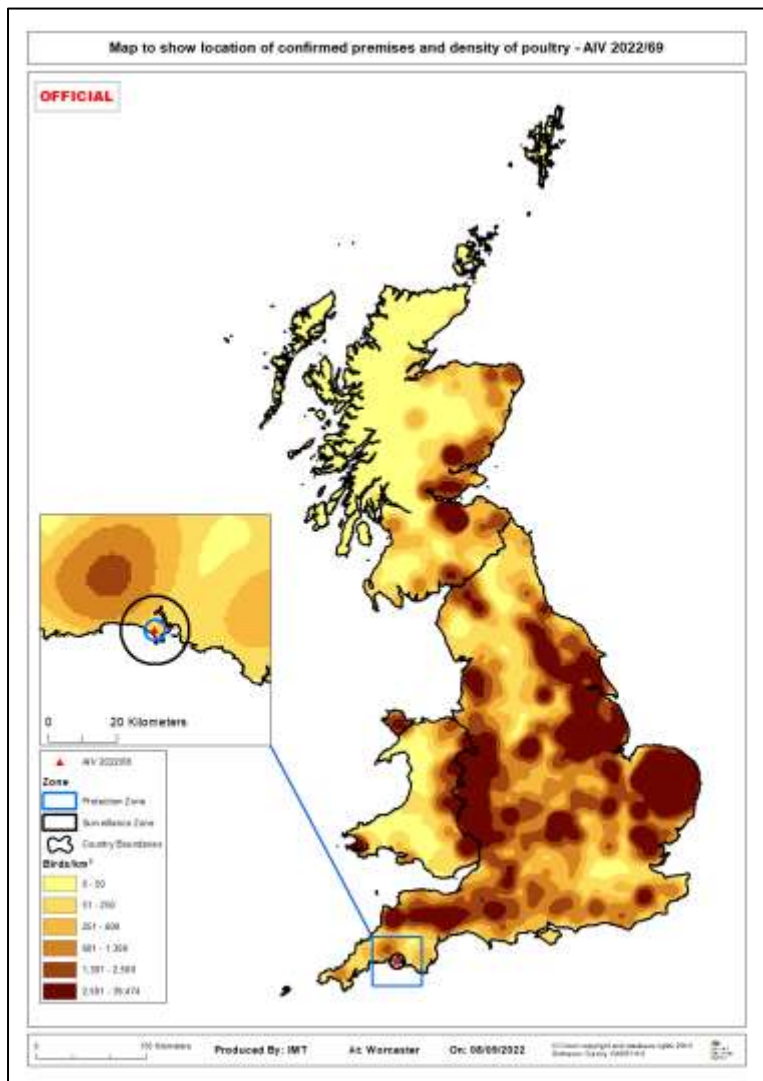


Overview of biosecurity

There were no biosecurity measures in place. There were no obvious signs of rodents and there were no rodent controls in place.

Map with location in Great Britain and poultry density

Figure 450: Location of IP and poultry density



Overview of the surrounding area

The IP was located in an area of medium to low poultry density.

Ornithological assessment:

Desktop assessment: Not conducted

Local intelligence: The IP was located in a wild bird high-risk area and was very close to the coastline. An increased number of gulls had been seen in the free-range area recently.

Clinical picture

06/09/2022 – Chickens in House 1 had reduced appetite, no egg production and appeared depressed. Suspicion of notifiable avian disease was reported. Three chickens died during the day. No clinical signs were seen in any other birds.

Timeline

Tracings windows

Source tracings window:

High-risk:	02/09/2022 to 04/09/2022
Likely:	22/08/2022 to 01/09/2022
Precautionary:	16/08/2022 to 21/08/2022

Spread tracings window:

High-risk:	03/09/2022 to 06/09/2022
Likely:	23/08/2022 to 02/09/2022
Precautionary:	17/08/2022 to 22/08/2022

Most likely date of infection: 02/09/2022. (Start of high-risk source tracing window)

Timeline chart

Figure 451: Source and spread timeline for AIV 2022/69

Source Tracing Window	Spread Tracing Window	Date	
Day 20		16/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		17/08/22	Start of precautionary spread tracing window (source + 24h).
Day 18		18/08/22	
Day 17		19/08/22	
Day 16		20/08/22	
Day 15		21/08/22	
Day 14		22/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	23/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	24/08/22	
Day 11	Day 3	25/08/22	
Day 10	Day 4	26/08/22	
Day 9	Day 5	27/08/22	
Day 8	Day 6	28/08/22	
Day 7	Day 7	29/08/22	
Day 6	Day 8	30/08/22	
Day 5	Day 9	31/08/22	
Day 4	Day 10	01/09/22	
Day 3	Day 11	02/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	03/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	04/09/22	
	Day 14	05/09/22	Precautionary onset of clinical signs.
	Day 15	06/09/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/172). Restrictions served
	Day 16	07/09/22	
	Day 17	08/09/22	HPAI H5N1 confirmed on PCR (AIV 2022/69).
	Day 18	09/09/22	Cull completed
	Day 19	10/09/22	Preliminary C&D completed
	Day 20	11/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

36 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 1-465 birds (2 premises with 50 or more birds).

1 premises holding both pigs and poultry.

SZ (3-10 km)

66 premises with poultry were reported to be within 10 km of the IP with the additional premises holding 1-180 birds (2 premises with 50 or more birds).

13 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

No tracings were identified.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The IP was in a wild bird high-risk area and was very close to the coastline.

HPAI positive herring gulls had been reported in the vicinity during the likely source window. The keeper had recently seen an increase in the number of gulls landing in the chicken paddocks where the birds were free ranging during the day.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

No tracings were identified so all other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/70, Near Milford Haven, Pembrokeshire, Wales

Description of the premises

Overview of the premises and the wider business

This was a commercial organic broiler unit, part of a large fully integrated company producing free range organic chicken broilers and turkeys. It was associated with several other local premises in the area with different CPHs.

The infected premises (IP) consisted of three premises under the same holding number, with the affected birds located in only one of these premises. Co-located with one of the other premises were the main offices, a slaughterhouse, and processing plant.

There were frequent staff, vehicle, equipment and machinery movements between the various premises of the business.

The birds had been free-ranging and were housed on 05/09/2022 in sheds with no access to outside areas. This was carried out following unofficial social media reports of dead wild birds close to this IP.

Species and number of each present

Approximately 132,000 chicken broilers in total.

12,600 were in the affected field and were 66-days old at the time of the investigation.

Description of the housing

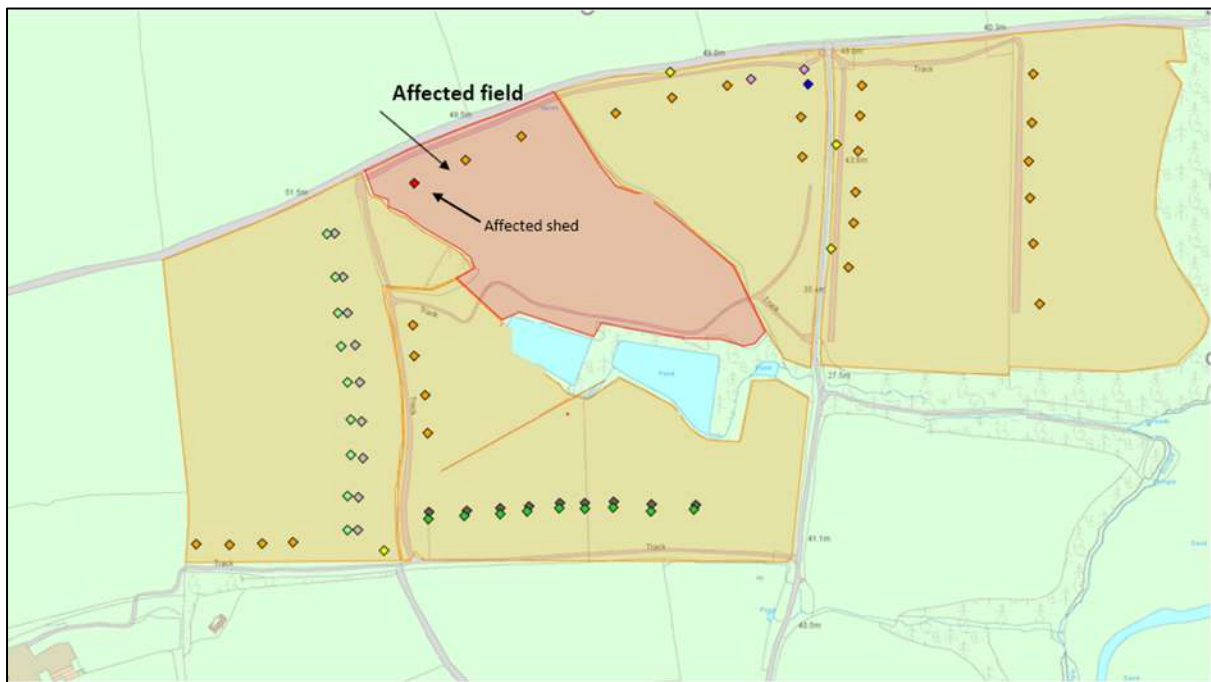
Broilers in the affected premises were kept in three mobile sheds placed in one field. These mobile poultry sheds were installed on the fields as and when needed to house the birds. They were made of corrugated metal sheets and mesh netting which provided natural ventilation. The sheds were old and in poor condition having large gaps in the walls and damaged nets.

Each shed had multiple hanging plastic feeders while drinkers were placed on the floor (plastic and metal). The suspended feeders were replenished manually.

In other locations there were a mixture of new built sheds and old sheds.

Plan of the infected premises

Figure 452: Plan of AIV 2022/70



Overview of biosecurity

Biosecurity on the premises was considered to be poor.

Staff were given textile overalls and boots and were responsible for washing their own overalls at home. Boots were dedicated to the person, not the premises or field. Many staff worked in the different farms, often moving between them.

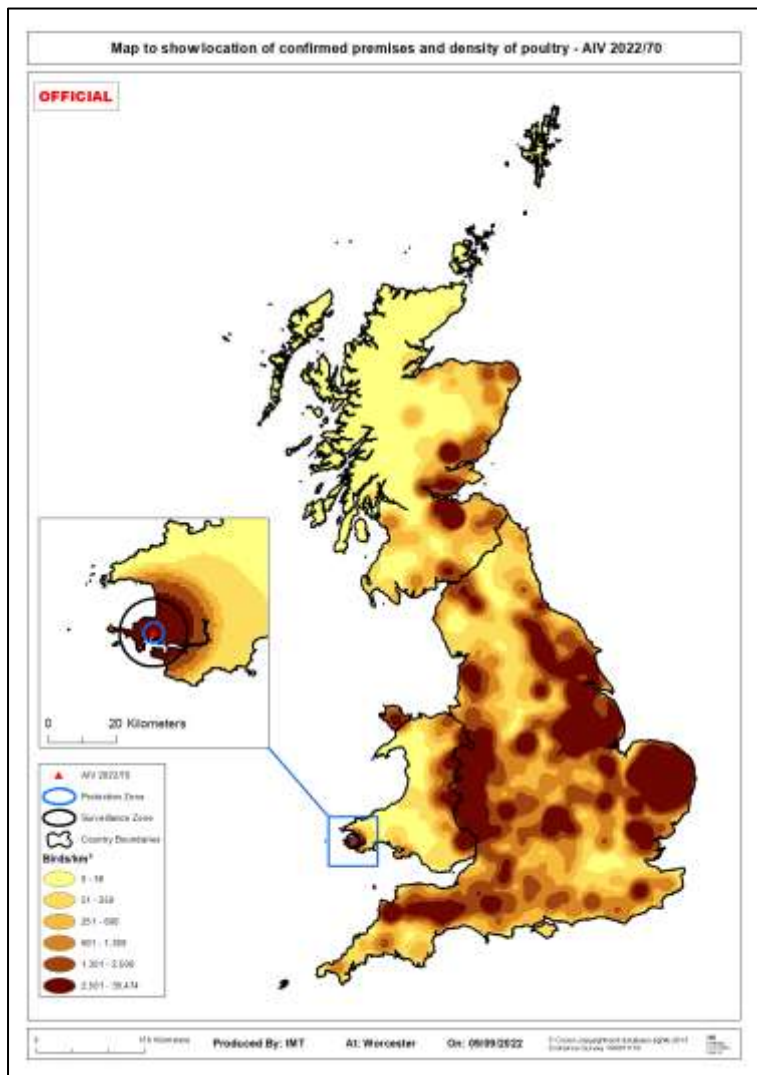
There were no disinfection points between sheds, only between fields (wheels sprays and foot dips).

The sheds were old and in poor condition with respect to maintenance, with large gaps in the walls and damaged netting, which could have allowed access of wild birds, vermin and water ingress.

Wrapped straw bales were stored outside and some had visible damage to the wrapping. This could have potentially led to contamination of the straw from infected wild birds.

Map with location in Great Britain and poultry density

Figure 453: Location of IP and poultry density



Overview of the surrounding area

The IP was in a high poultry density area and was located less than 800 metres from a coastal inlet hence an extensive coastal habitat (sandy beaches and tidal mudflats). In addition, the site included some small freshwater ponds.

Ornithological assessment:

Desktop assessment: This suggested there was a substantial source of infection pressure from wild birds. The coastal location assumed seabirds of all species being locally abundant. It noted the substantial infection pressure produced in coastal contexts during the summer of 2022. This was demonstrated by confirmation of HPAIV in gull and raptor carcasses locally.

The site included some small freshwater ponds, and regular traffic of some coastal waterbirds to these and others might have resulted in ponds becoming

contaminated. There was sufficient woodland close to the IP to consider that there would have been an abundance of passerines and corvids.

Plausible infection pathways were many and included direct or indirect infection by grazing wildfowl, some wader species, as well as from passerines, corvids and gulls.

Local intelligence: At the time of the APHA visit, many crows and seagulls were seen in these fields and around the sheds, and there had been confirmation of positive test results for H5N1 for samples taken from dead gulls from the Pembrokeshire beaches

Clinical picture

07/09/2022 – three birds died.

08/09/2022 – there were 24 further dead birds. Clinical signs included lethargy, dullness, loss of appetite, sudden deaths with no previous symptoms, combs and legs swollen and purple coloured. No neurological signs were observed. Diarrhoea and eye discharge were seen. There had been no change of feed or water source and no recent treatments. Suspicion of notifiable avian disease was reported. Samples were submitted following the APHA investigation the same day.

Timeline

Tracings windows

Source tracings window:

High-risk:	29/08/2022 to 31/08/2022
Likely:	18/08/2022 to 28/08/2022
Precautionary:	18/08/2022 to 28/08/2022

Spread tracings window:

High-risk:	30/08/2022 to 08/09/2022
Likely:	19/08/2022 to 29/08/2022
Precautionary:	19/08/2022 to 29/08/2022

N.B. The precautionary source and spread windows fell within the likely tracing windows

Most likely date of infection 29/08/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 454: Source and spread timeline for AIV 2022/70

Source Tracing Window	Spread Tracing Window	Date	
		17/08/22	
Day 14		18/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs). And Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 13	Day 1	19/08/22	Start of likely spread tracing window (source tracing window +24h). Start of precautionary spread tracing window (source + 24h).
Day 12	Day 2	20/08/22	
Day 11	Day 3	21/08/22	
Day 10	Day 4	22/08/22	
Day 9	Day 5	23/08/22	
Day 8	Day 6	24/08/22	
Day 7	Day 7	25/08/22	
Day 6	Day 8	26/08/22	
Day 5	Day 9	27/08/22	
Day 4	Day 10	28/08/22	
Day 3	Day 11	29/08/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	30/08/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	31/08/22	1 dead
	Day 14	01/09/22	2 dead. Precautionary onset of clinical signs
	Day 15	02/09/22	1 dead
	Day 16	03/09/22	6 dead
	Day 17	04/09/22	2 dead
	Day 18	05/09/22	2 dead # birds to slaughter
	Day 19	06/09/22	3 dead # birds to slaughter
	Day 20	07/09/22	3 dead # birds to slaughter
	Day 21	08/09/22	24 dead # birds to slaughter. Notification of suspicion of disease to APHA. Birds found dead on morning inspection. APHA investigation and sampling (DPR 2022/156). Restrictions served.
	Day 22	09/09/22	HPAI H5N1 confirmed with case reference AIV2022/70
	Day 23	10/09/22	
	Day 24	11/09/22	
	Day 25	12/09/22	Culling started
	Day 26	13/09/22	
	Day 27	14/09/22	
	Day 28	15/09/22	
	Day 29	16/09/22	
	Day 30	17/09/22	
	Day 31	18/09/22	
	Day 32	19/09/22	
	Day 33	20/09/22	
	Day 34	21/09/22	
	Day 35	22/09/22	
	Day 36	23/09/22	
	Day 37	24/09/22	
	Day 38	25/09/22	
	Day 39	26/09/22	
	Day 40	27/09/22	Culling completed
	Day 41	28/09/22	Preliminary C&D completed
	Day 42	29/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

15 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-24,984 birds (2 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

21 premises with poultry were reported to be within 10 km of the IP holding between 1-23,968 birds (9 premises with 50 or more birds).

3 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracings were initiated for a movement of live birds to a slaughterhouse, the movement of chicks to one of the non-affected fields, company workers (including catching gang and cleaning crew), company vehicles and equipment, contractors who were building new sheds in one of the depopulated non-affected fields, muck collections, straw deliveries, feed deliveries and ABP collections.

The slaughterhouse was visited and after their biosecurity arrangements and C&D protocols were assessed, the tracing was assessed as very low risk and closed. The Food Standard Authority (FSA) was notified and a destruction notice was served for the detained meat from the unregulated period.

The poultry premises which supplied the chicks placed in one of the non-affected IP fields was visited and no sign of notifiable disease was observed. The overall risk was assessed as very low and the tracing closed.

In addition, due to the frequent sharing of the staff, equipment and vehicles between the various premises within the business, seven potential contact premises received an immediate and a 21-day post-contact tracing visits. At both visits, no sign of notifiable disease was observed, and the overall risk was assessed as very low, so no further action was required and the tracings closed.

The other tracings (including the transport and equipment associated with the movement of live birds) were investigated with no other poultry contacts identified, assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Tracing investigations had not identified any likely lateral transmission pathways onto this premises. Affected birds were placed early August and since then, there had been no movements of poultry or captive birds onto the field.

Birds were free ranging up to 05/09/2022 (most likely infection date was on 29/08/22) so potential direct contact with wild birds. Corvids and gulls were seen on the infected premises.

Substantial infection pressure from wild birds, nearby coast and wild bird mortalities nearby.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: risk not higher than the background risk (with substantial infection pressure from wild birds).

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/71, Near Crewe, Cheshire East, Cheshire, England

Description of the premises

Overview of the premises and the wider business

The IP was a hobbyist collection of mixed ornamental ducks, geese and other birds, plus a small flock of laying hens.

Species and number of each present

69 ducks, 20 geese, 31 chickens and 1 magpie.

Description of the housing

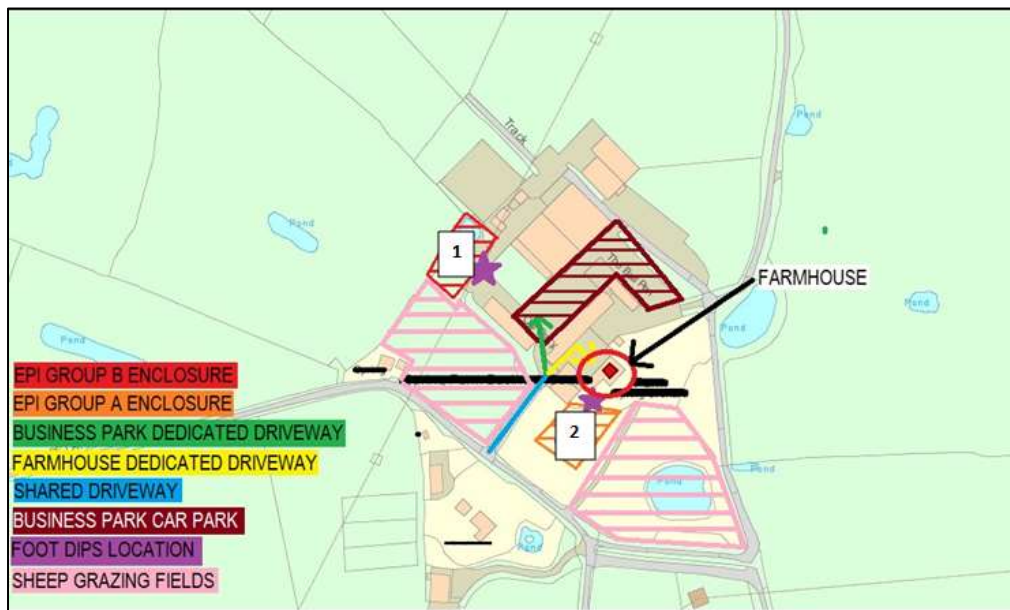
The birds were kept in two groups.

Group A – (the affected group) included 69 ducks, 19 geese, one chicken and one magpie. The magpie was in a cage; the other birds were ranging freely in a fenced but uncovered open enclosure, which included a pond which wildlife had free access to. The surface was not concreted except nearby the pond.

Group B – 30 hens, 1 duck and 1 goose were in a free range fenced enclosure with laying hutches/coops. This was 100 metres away from the farmhouse, behind a business car park. The hens laid eggs and stayed in the wooden coops at night. There were a few bigger and older aviaries not in use at that time. This enclosure also had a natural pond within the fenced perimeter. There was no roof or net covering the area. Feed was kept inside the coops, and was accessible to both wild birds and rodents.

Plan of the infected premises

Figure 455: Plan of AIV 2022/71



Overview of biosecurity

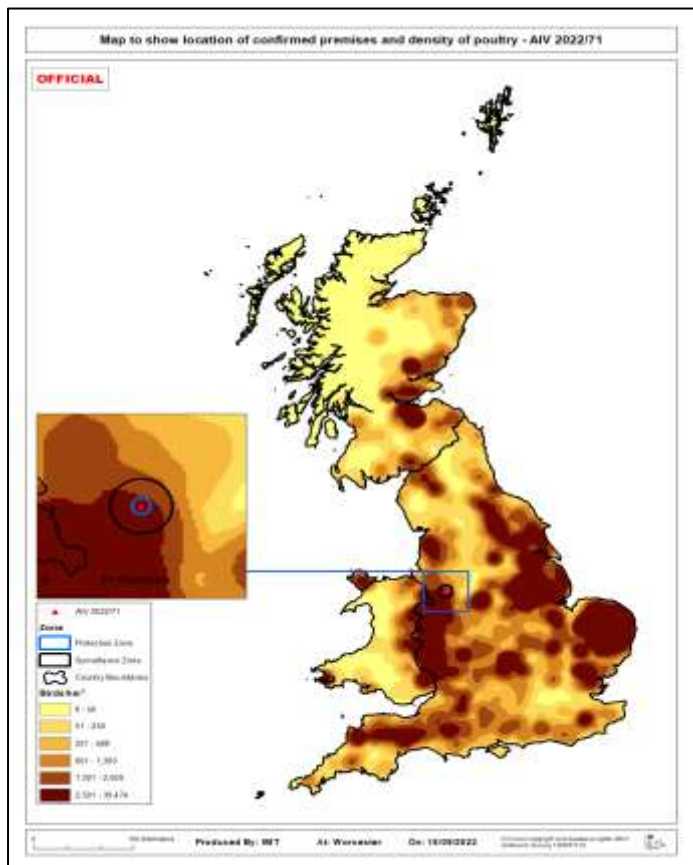
Biosecurity standards were poor and comprised a foot dip with Jeyes fluid before the entrance to the pond and at the hens' enclosure. There were no dedicated clothes.

There was only one person responsible for the birds.

Rodent traps were present on the IP and there no recent rodent activity had been detected.

Map with location in Great Britain and poultry density

Figure 456: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density and was 3.5 km away from Crewe city centre.

Opposite the IP there was a Business Park housing nine different businesses. Only part of the entrance was shared with the IP (access to the farmhouse dedicated car park). The businesses had a different car park.

Opposite the IP entrance there was a farm holding with poultry and sheep. A tracing visit was carried out, as a dangerous contact, and assessed as being low risk.

Ornithological assessment:

Desktop assessment: Not carried out

Local intelligence: Several ponds were accessible and likely to attract wild birds. Many wild birds (geese) were often spotted flying over the pond, and pigeons were seen on the IP at the time of the investigation.

Clinical picture

12/09/2022 – the first clinical signs and behaviour changes were noted, with ducks and geese being dull and less noisy.

13/09/2022 – two geese died.

14/09/2022 – one goose and one duck were found dead with no other clinical signs noted. Suspicion of notifiable avian disease was reported.

At the APHA investigation the same day, two ducks and one goose showed neurological signs (ataxia, head tremors) and diarrhoea, poor body condition, and high temperatures. The rest of the flock was dull and quiet. No clinical signs were reported in the hens. Samples were taken and submitted for testing.

Timeline

Tracings windows

Source tracings window:

High-risk:	08/09/2022 to 10/09/2022
Likely:	28/08/2022 to 07/09/2022
Precautionary:	24/08/2022 to 27/08/2022

Spread tracings window:

High-risk:	09/09/2022 to 14/09/2022
Likely:	29/08/2022 to 08/09/2022
Precautionary:	25/08/2022 to 28/08/2022

Most likely date of infection: 08/09/2022. (Start of high-risk source tracing window)

Timeline chart

Figure 457: Source and spread timeline for AIV 2022/71

Source Tracing Window	Spread Tracing Window	Date	
Day 18		24/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 17		25/08/22	Start of precautionary spread tracing window (source + 24h).
Day 16		26/08/22	
Day 15		27/08/22	
Day 14		28/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	29/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	30/08/22	
Day 11	Day 3	31/08/22	
Day 10	Day 4	01/09/22	
Day 9	Day 5	02/09/22	
Day 8	Day 6	03/09/22	
Day 7	Day 7	04/09/22	
Day 6	Day 8	05/09/22	
Day 5	Day 9	06/09/22	
Day 4	Day 10	07/09/22	
Day 3	Day 11	08/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	09/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	10/09/22	
	Day 14	11/09/22	Precautionary onset of clinical signs.
	Day 15	12/09/22	Geese and ducks quieter and subdued
	Day 16	13/09/22	First death
	Day 17	14/09/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/180). Restrictions served.
	Day 18	15/09/22	1 more death (sick geese)
	Day 19	16/09/22	H5N1 HPAI confirmed. Epidemiology investigation. 3 more deaths (ducks, 1 sudden and 2 of the sick ones)
	Day 20	17/09/22	
	Day 21	18/09/22	
	Day 22	19/09/22	
	Day 23	20/09/22	Cull and preliminary C&D completed
	Day 24	21/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

56 premises with poultry, excluding the IP, holding between 1 and 402,905 birds. 9 premises with >50 birds.

0 premises with pigs and poultry

SZ (3-10 km)

198 premises with poultry holding between 1 and 58,000 birds. 20 premises with >50 birds.

9 premises with pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Telephone tracings were generated for two members of staff and five family members who visited regularly. As a result, a visit was carried out to poultry belonging to the son of the IP owner. No signs of disease were found and all tracings were assessed as low risk and subsequently closed.

Source investigations

Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

The group of ducks and geese on the IP were free range and free to mingle with wild birds, so direct and indirect contact with wild birds was highly likely.

A high number of wild birds are spotted every day flying over the pond (wild geese). Pigeons were seen on the IP at the time of the official investigation.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/72, Near Bury St Edmunds, West Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

The premises was a livery stable with a backyard flock of laying hens. The eggs were consumed within the household and some eggs were sold via an honesty box until 4 weeks before the outbreak.

Species and number of each present

33 chickens. There were feral chickens in the woodland and village streets which mixed with the birds on the IP.

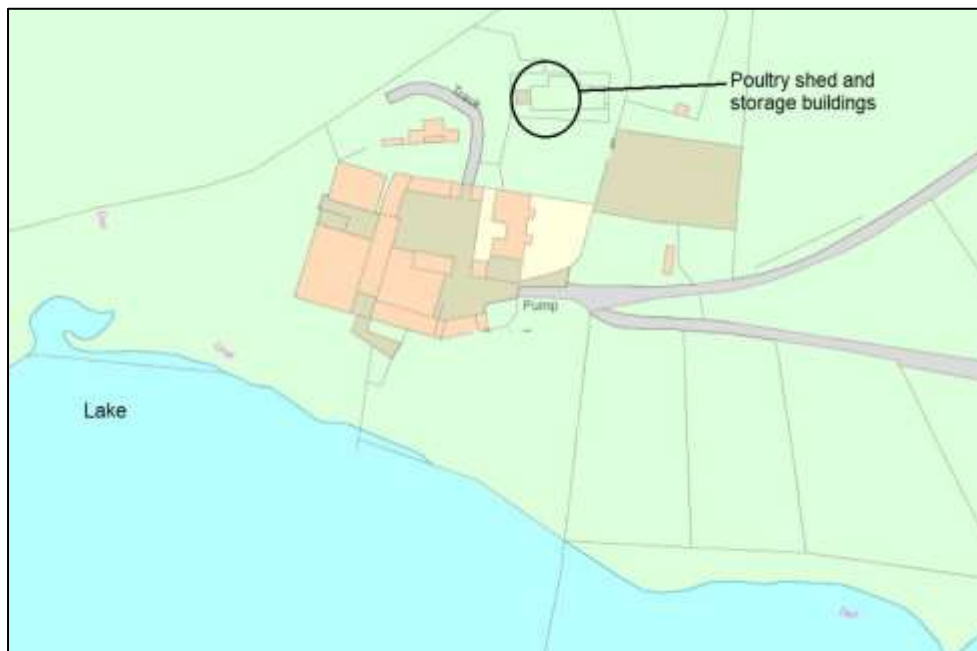
16 horses.

Description of the housing

The laying hens were free ranging but were housed at night in a shed with a netted run. The sheds were poorly maintained permitting wild birds access to the straw, hay and to the chickens when they were inside. There were feral chickens in the woodland next to the premises which could access the runs and mixed with the kept birds. Wild ducks were able to nest in the straw which was then used as bedding for the horses and chickens.

Plan of the infected premises

Figure 458: Plan of AIV 2022/72

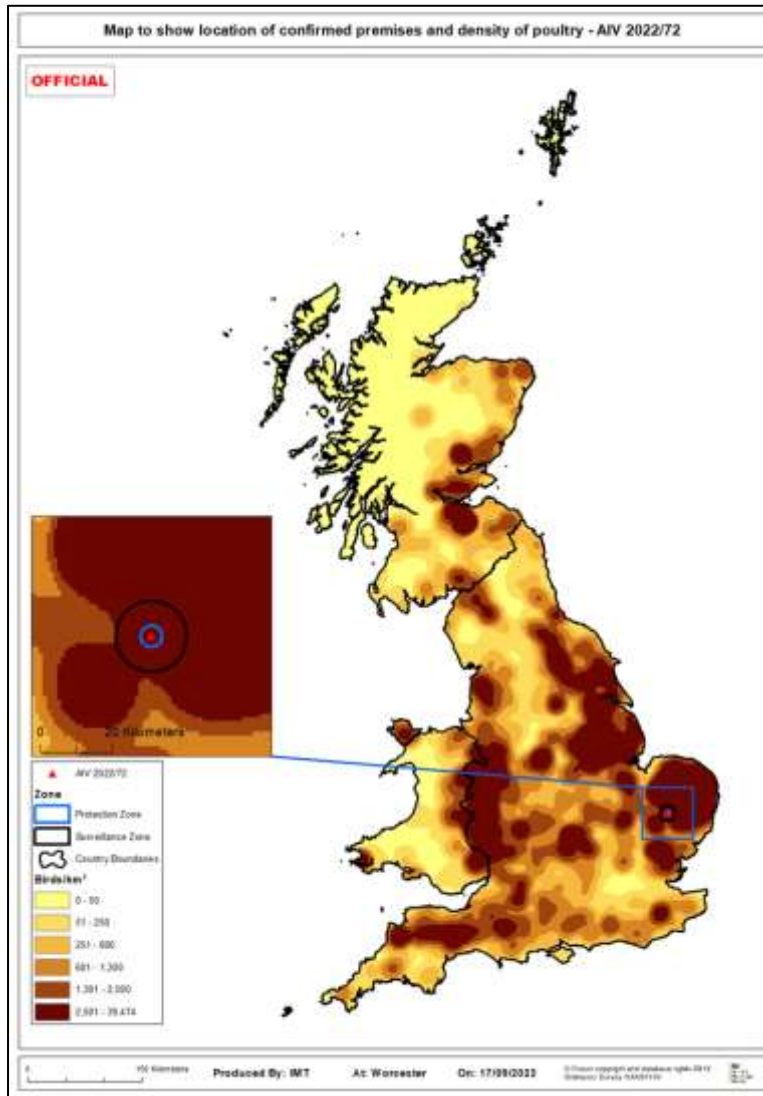


Overview of biosecurity

No records were kept for the chickens and there were no biosecurity procedures in place.

[Map with location in Great Britain and poultry density](#)

Figure 459: Location of IP and poultry density



Overview of the surrounding area

The IP was part of a larger estate in a rural area adjacent to a small village.

There were 3 lakes on the estate which attracted wild ducks and geese. One of these lakes was next to the IP. Most of the surrounding area was grass land with a large housing estate adjacent to the site.

[Ornithological assessment:](#)

Desktop assessment: Not conducted.

Local intelligence: 20 thousand pheasants had been released on contiguous fields over the previous 4 weeks.

There was a woodland nearby where several feral cockerels were living and these would often come onto the IP for food.

Wild ducks and geese had regularly been seen flying overhead and were seen during the investigation.

Clinical picture

09/09/2022 – One chicken was found dead and egg production ceased. A further 10 chickens died between 09/09/2022 and 11/09/2022, however there were also fox attacks on those nights which confounded the picture, so the owner did not suspect notifiable avian disease. 10 more chickens died between 12/09/22 and 16/09/2022. The only clinical sign that was observed was lethargy and congested combs followed by sudden death.

16/09/2022 – Suspicion of notifiable avian disease reported.

Timeline

[Tracings windows](#)

Source tracings window:

High-risk:	05/09/2022 to 07/09/2022
Likely:	25/08/2022 to 04/09/2022
Precautionary:	within likely spread window due to late reporting of disease.

Spread tracings window:

High-risk:	06/09/2022 to 15/09/2022
Likely:	26/08/2022 to 05/09/2022
Precautionary:	25/08/2022 (only 1 day due to late reporting of disease)

Most likely date of infection: 05/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 460: Source and spread timeline for AIV 2022/72

Source Tracing Window	Spread Tracing Window	Date	
Day 14		25/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	26/08/22	Start of likely spread tracing window (source tracing window +24h). Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 12	Day 2	27/08/22	Start of precautionary spread tracing window (source + 24h).
Day 11	Day 3	28/08/22	
Day 10	Day 4	29/08/22	
Day 9	Day 5	30/08/22	
Day 8	Day 6	31/08/22	
Day 7	Day 7	01/09/22	
Day 6	Day 8	02/09/22	
Day 5	Day 9	03/09/22	
Day 4	Day 10	04/09/22	
Day 3	Day 11	05/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	06/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	07/09/22	
	Day 14	08/09/22	Precautionary onset of clinical signs.
	Day 15	09/09/22	First mortality noticed and egg production stopped
	Day 16	10/09/22	
	Day 17	11/09/22	
	Day 18	12/09/22	More chickens started dying
	Day 19	13/09/22	
	Day 20	14/09/22	
	Day 21	15/09/22	
	Day 22	16/09/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/182). Restrictions served.
	Day 23	17/09/22	HPAI H5N1 confirmed on PCR (AIV 2022/72).
	Day 24	18/09/22	Cull and preliminary C&D completed
	Day 25	19/09/22	Preliminary C&D considered effective
	Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.		
	Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.		

Surveillance activity

PZ (0-3 km)

31 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 1-59000 birds (3 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

95 premises with poultry were reported to be within 10 km of the IP with the additional premises holding 1-555500 birds (27 premises with 50 or more birds).

7 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There was large lake and woodland close to the IP in which several species of wild bird were observed.

The chickens were free-ranging and wild birds and feral chickens could access their runs. Ducks had been seen nesting in the straw that was used for the horses and chickens. Wild bird carcasses had been found in the surrounding area.

There was no biosecurity on the premises.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/73, Near Clacton on Sea, Tendring, Essex, England

Description of the premises

Overview of the premises and the wider business

This premises was a backyard flock of 8, 2-year-old, ex-battery hens on a residential property. Eggs were used for personal consumption or given to other family members. None had been given away during the high-risk spread window.

Species and number of each present

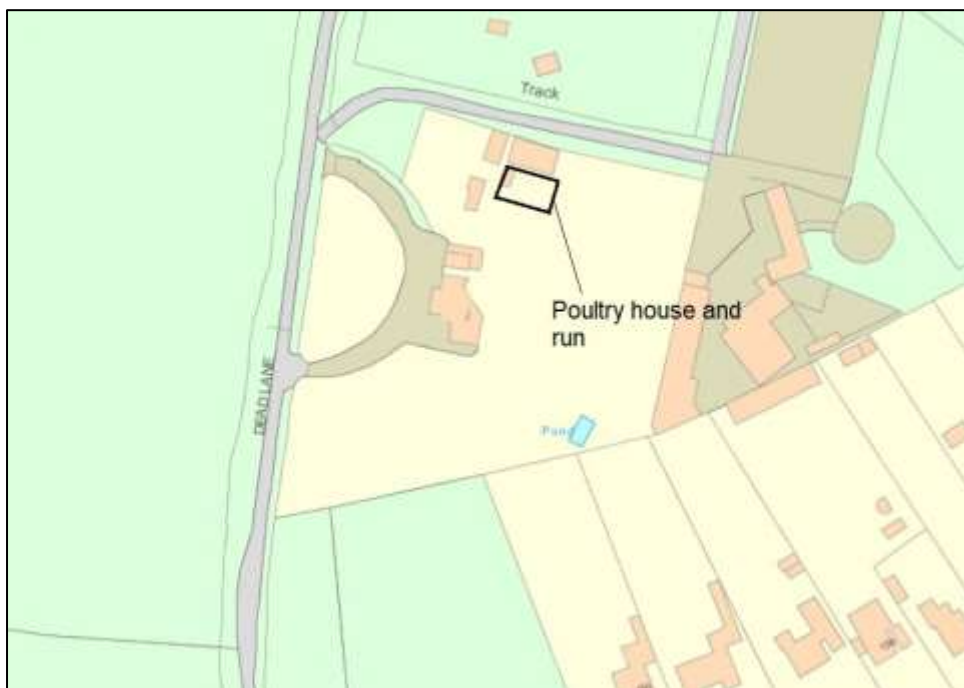
Eight chickens.

Description of the housing

The birds were kept inside a brick building with a small open access to an outdoor space surrounded by a large gauge metal wire and mesh. The top was also meshed with broad enough gaps for possible indirect contact with wildlife. The sides of the mesh (up to bird height) had an extra layer of metal mesh to reduce the size of the gaps to reduce access by wildlife.

Plan of the infected premises

Figure 461: Plan of AIV 2022/73

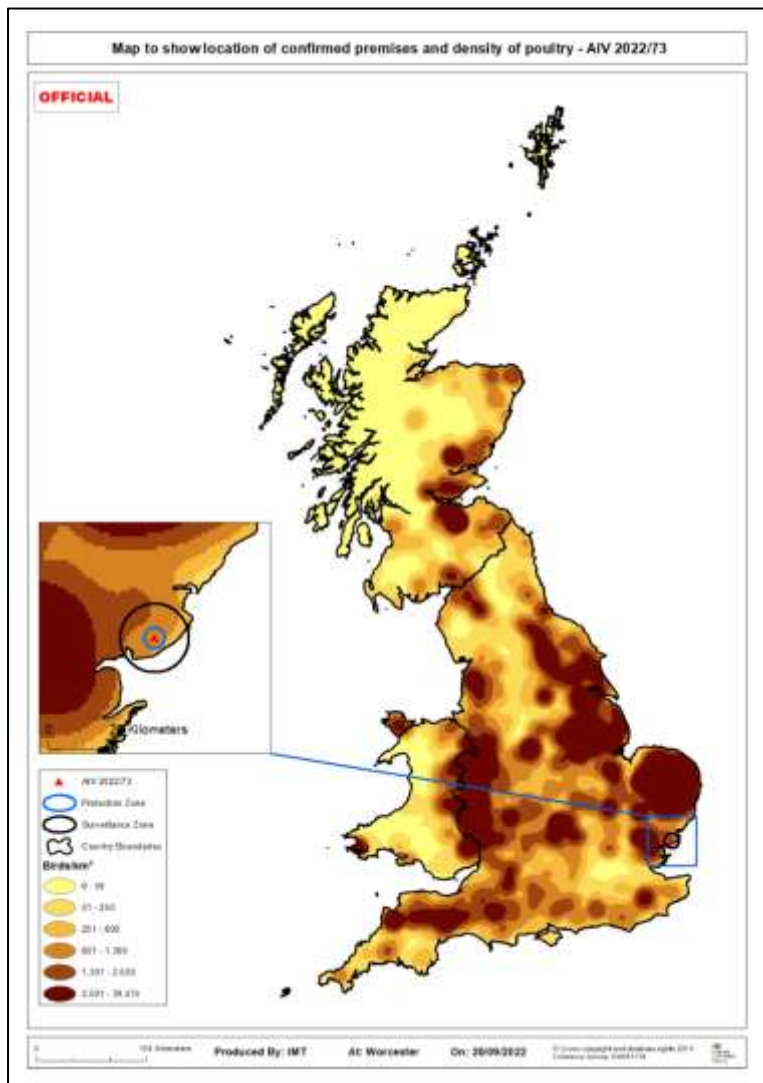


Overview of biosecurity

Biosecurity standards were poor. There were no disinfection points, though the owners used disposable gloves when handling the birds. Only the keeper and his wife handled the birds and had no contact with other poultry.

Map with location in Great Britain and poultry density

Figure 462: Location of IP and poultry density



Overview of the surrounding area

The premises was a private house with workshops and a private garden, limited access, and parking. The property was at the end of a single-track road which continued as access for farm machinery and a footpath only.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: There were no nearby water courses and the premises was approximately 5.4 km from the coast. It was reported that many waterfowl were seen flying over the property.

Clinical picture

16/09/2022 – Clinical signs including oedema of the head, diarrhoea, lethargy and neurological signs were seen and the owner reported suspicion of notifiable avian disease.

17/09/2022 – Three chickens died overnight. Of the remaining five, two were lethargic and one had oedema of the head and pyrexia.

Timeline

Tracings windows

Source tracings window:

High-risk:	12/09/2022 to 14/09/2022
Likely:	01/09/2022 to 11/09/2022
Precautionary:	26/08/2022 to 31/08/2022

Spread tracings window:

High-risk:	13/09/2022 to 16/09/2022
Likely:	02/09/2022 to 12/09/2022
Precautionary:	27/08/2022 to 01/09/2022

Most likely date of infection: 12/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 463: Source and spread timeline for AIV 2022/73

Source Tracing Window	Spread Tracing Window	Date	
Day 20		26/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		27/08/22	Start of precautionary spread tracing window (source + 24h).
Day 18		28/08/22	
Day 17		29/08/22	
Day 16		30/08/22	
Day 15		31/08/22	
Day 14		01/09/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	02/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	03/09/22	
Day 11	Day 3	04/09/22	
Day 10	Day 4	05/09/22	
Day 9	Day 5	06/09/22	
Day 8	Day 6	07/09/22	
Day 7	Day 7	08/09/22	
Day 6	Day 8	09/09/22	
Day 5	Day 9	10/09/22	
Day 4	Day 10	11/09/22	
Day 3	Day 11	12/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	13/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	14/09/22	
	Day 14	15/09/22	Precautionary onset of clinical signs (increased mortality over night).
	Day 15	16/09/22	Notification of suspicion of disease to APHA. Birds found dead on morning inspection. APHA investigation and sampling (DPR 2022/183). Restrictions served.
	Day 16	17/09/22	
	Day 17	18/09/22	Confirmed as H5N1 HPAI by UK CVO
	Day 18	19/09/22	Cull and preliminary C&D completed
	Day 19	20/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

34 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 1-80 birds (2 premises with 50 or more birds).

1 premises holding both pigs and poultry.

SZ (3-10 km)

130 premises with poultry were reported to be within 10 km of the IP with the additional premises holding 1-234000 birds (15 premises with 50 or more birds).

3 premises holding both pigs and poultry.

Investigations on the infected premises

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with wild birds.

Assessment and evidence base for the likely source

The chickens were kept in a wire mesh enclosure but indirect contact with wild birds was likely.

The property was 3.3 miles from the coast and many waterfowl were seen flying overhead.

The biosecurity was poor.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/74 Near Honington, West Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a commercial flock of free-range chickens. It was part of a larger company with layers and broilers across East Anglia and Lincolnshire. The birds were placed on the site at approximately 35 days of age and reared until slaughter at approximately 75 days.

Species and number of each present

39,000 free range 40-65 day-old organic chicken broilers.

Description of the housing

The birds were housed in 29 naturally-ventilated mobile polytunnels. The polytunnels were constructed of stretched canvas with a metal dwarf-wall of approximately 1 m. Several pop-holes were in the metal dwarf-wall. Birds were able to move between the plots and individual houses. Each polytunnel had drinkers which were fed from pipes that led back to the site complex. Mains water was stored in sealed header tanks at the site complex. Feed hoppers at each shed were filled by hand from the main silos at the complex.

Plan of the infected premises

Figure 464: Plan of AIV 2022/74

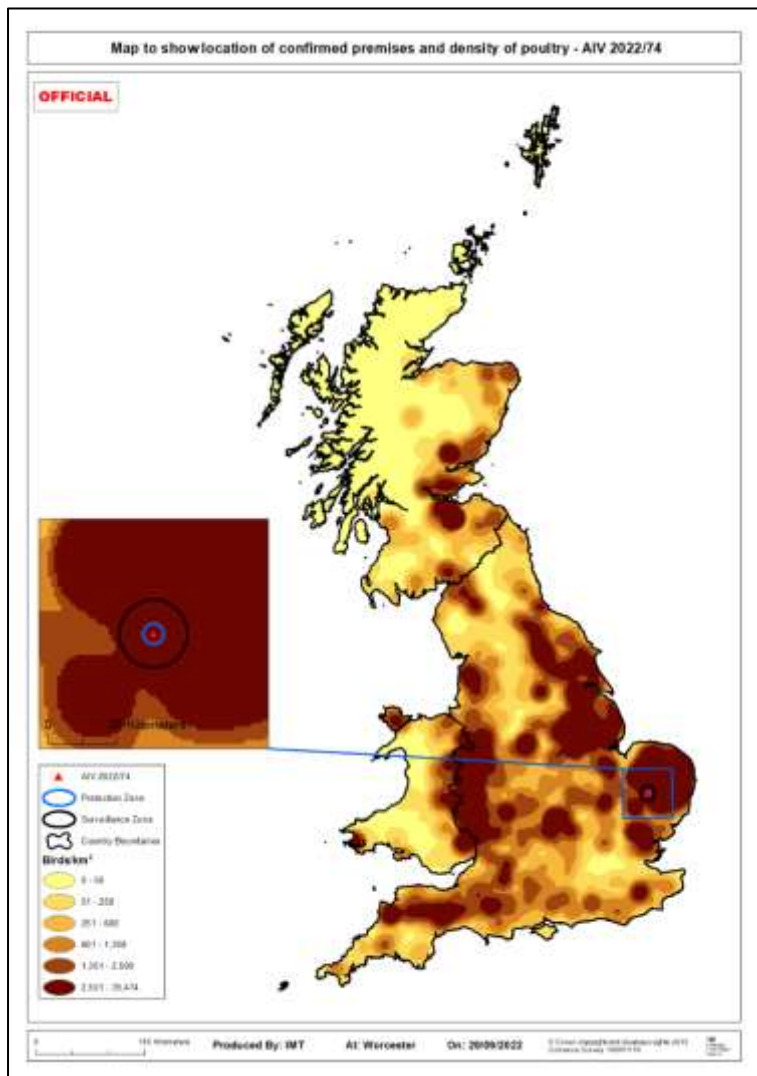


Overview of biosecurity

Vehicles were C&D'd before entering the site. Each plot had a foot dip, but the positive impact of this on an outdoor site is likely to have been minimal. Two high-risks were that the bedding was stored outside and not disinfected before use in the pens and that the birds were free-range, allowing for direct and indirect interactions with wild birds.

Map with location in Great Britain and poultry density

Figure 465: Location of IP and poultry density



Overview of the surrounding area

The land around the IP was predominantly permanent grassland and arable with permanent small-wooded areas scattered across it. There were no contiguous poultry premises. A large military base bordered the southern edge of the IP.

Ornithological assessment:

Desktop assessment: A full ornithological assessment was not conducted but an ornithological expert view was provided as part of the hypothesis meeting discussion. A rapid and remote desktop assessment concluded that wild birds were a likely source of infection pressure:

There was a wooded area to the east of plot A that was known to have wild pheasants. Also significant was the adjacent military airbase which provided an extensive area of grassland (>200 ha).

Significant waterbodies, which might have hosted aggregations of water birds included two reservoirs (each ≈9 ha of open water) within 3 km of the IP. Each was recorded as hosting significant counts of resident wildfowl, waders and gulls which might be considered as sources of infection in this landscape.

Given the likely abundance of gulls, corvids wood pigeons and passerines in this landscape, any might have enabled infection pathways.

Local intelligence: Many pheasants, partridges, gulls, buzzards and kites were seen in the range and flying over it. At the APHA investigation two wild pheasants were sampled and found to be negative for HPAI. A buzzard found on the range was sampled and was positive for HPAI.

Clinical picture

10/09/2022 – Increased mortality was seen on plot B, with 10 dead birds and five being culled.

12/09/2022 – the private veterinary surgeon investigated and dispensed amoxicillin for proventriculitis.

18/09/2022 – birds showed no signs of improvement and mortality was increasing on all plots. Suspicion of notifiable avian disease was reported.

Timeline

Tracings windows

Source tracings window:

High-risk:	06/09/2022 to 08/09/2022
Likely:	26/08/2022 to 05/09/2022
Precautionary:	Falls within likely period

Spread tracings window:

High-risk:	07/09/2022 to 18/09/2022
Likely:	27/08/2022 to 06/09/2022
Precautionary:	Falls within likely period

Most likely date of infection: 06/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 466: Source and spread timeline for AIV 2022/74

Source Tracing Window	Spread Tracing Window	Date	
Day 14		26/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	27/08/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	28/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 11	Day 3	29/08/22	Start of precautionary spread tracing window (source + 24h).
Day 10	Day 4	30/08/22	
Day 9	Day 5	31/08/22	
Day 8	Day 6	01/09/22	
Day 7	Day 7	02/09/22	
Day 6	Day 8	03/09/22	
Day 5	Day 9	04/09/22	
Day 4	Day 10	05/09/22	
Day 3	Day 11	06/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	07/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	08/09/22	
	Day 14	09/09/22	Precautionary onset of clinical signs based on rise in mortality from 10/09/22
	Day 15	10/09/22	First mortalities.
	Day 16	11/09/22	
	Day 17	12/09/22	
	Day 18	13/09/22	
	Day 19	14/09/22	
	Day 20	15/09/22	
	Day 21	16/09/22	
	Day 22	17/09/22	
	Day 23	18/09/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/184). Restrictions served.
	Day 24	19/09/22	HPAI confirmed
	Day 25	20/09/22	
	Day 26	21/09/22	
	Day 27	22/09/22	
	Day 28	23/09/22	Cull and preliminary C&D completed
	Day 29	24/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

11 premises with poultry, excluding the IP, holding between 1 and 32,000 birds. 3 premises with >50 birds.

0 premises with pigs and poultry

SZ (3-10 km)

124 premises with poultry, holding between 1 and 555,500 birds. 33 premises with >50 birds.

10 premises with pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for a private vet completing post-mortems from the premises, feed deliveries, ABP collections, a general waste collection, a used bedding collection and several farm/maintenance workers within the high-risk tracing windows. All tracings were assessed as having a negligible or very low likelihood of disease transmission and all the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There were major biosecurity breaches that allowed for ready direct and indirect contact with wild birds of various species. The IP was 1 km from two backyard IPs, which reflected the local disease pressure at that time.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/75, Near Attleborough, Breckland, Norfolk, England

Description of the premises

Overview of the premises and the wider business

This was a free-range broiler finishing site and part of a large integrated poultry company.

Species and number of each present

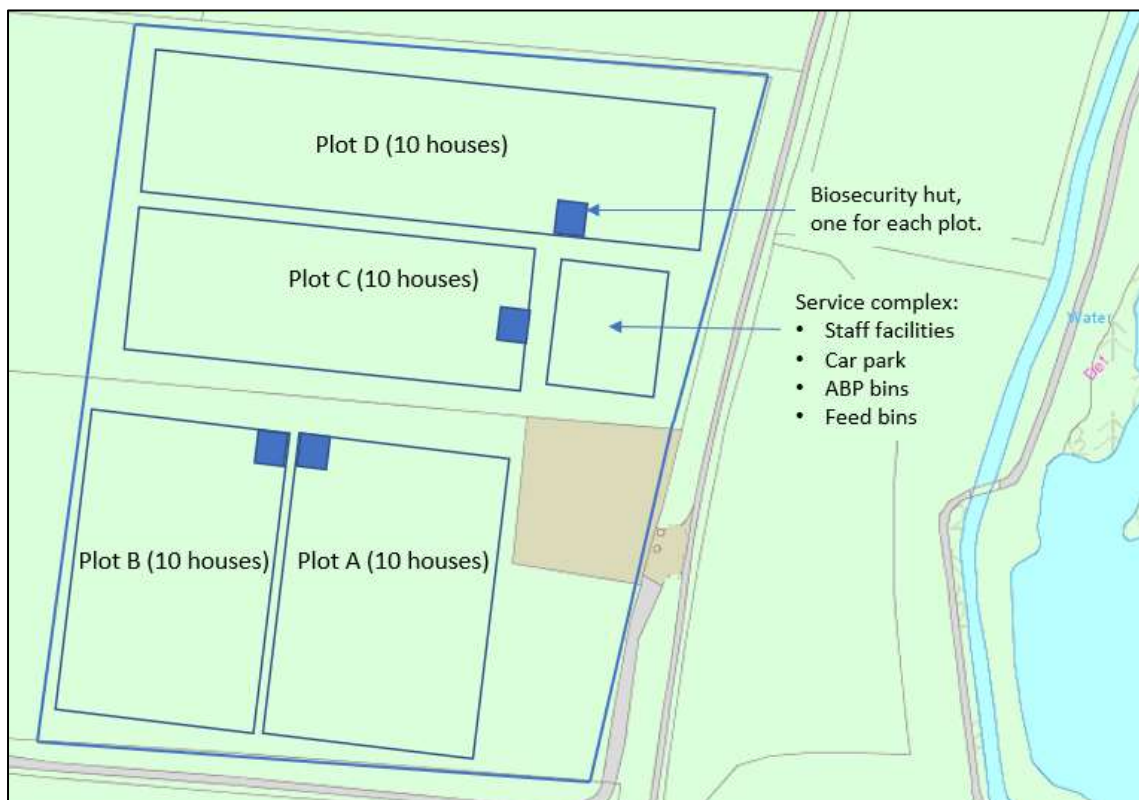
17,000 broilers, 55-60 days old.

Description of the housing

Birds were kept on two of the four ranges on the site. Approximately 9500 were in 10 mobile polytunnels on plot C and 7,500 in plot D. The walls of the mobile units were solid plastic and the roof was thick plastic. Pop holes were shut although some birds were free-ranging. Feed and water were supplied to the birds inside the units. Each plot was approximately 6 hectares.

Plan of the infected premises

Figure 467: Plan of AIV 2022/75

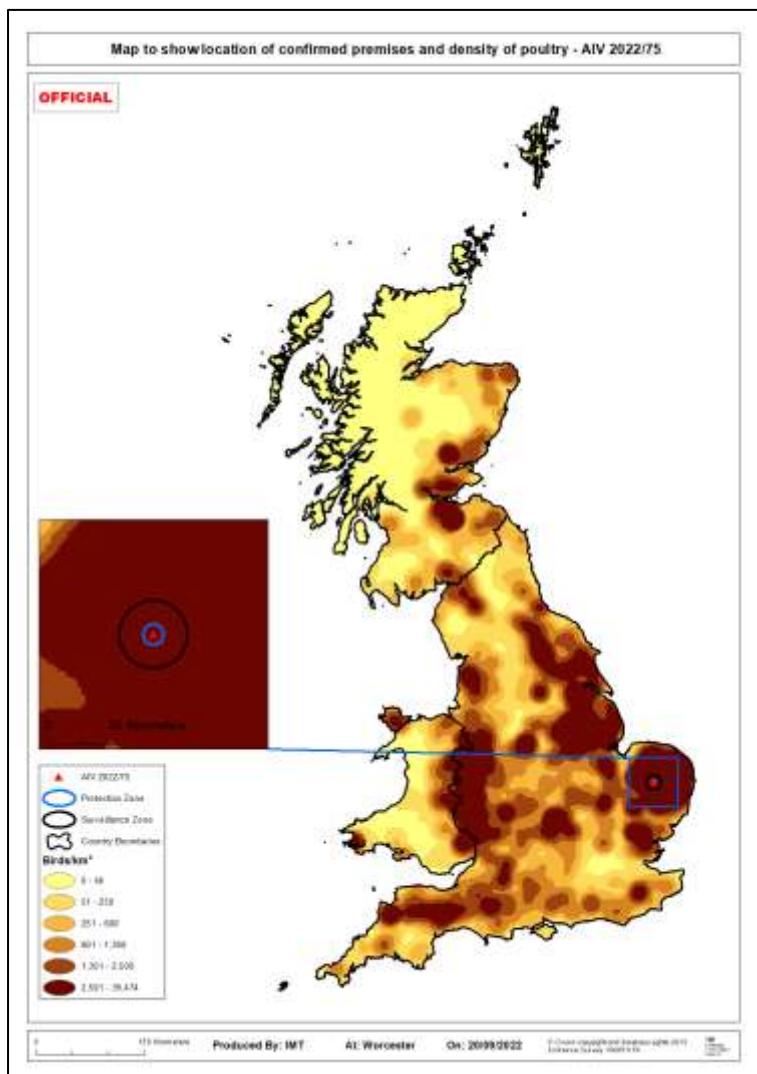


Overview of biosecurity

Each plot had its own biosecurity hut, which enabled personnel to apply over-boots and overalls. These huts were well-maintained with their own water supply. There was also a vehicle gate for each plot but it was unclear if staff changed boots and overalls in the biosecurity hut before entering on a vehicle. There was a separate visitors' book for each plot. Staff were dedicated to each site and did not work anywhere else with poultry. Feed bins were placed at the site complex so that feed lorries could fill them from the roadside.

Map with location in Great Britain and poultry density

Figure 468: Location of IP and poultry density



Overview of the surrounding area

The IP was in a rural area that was mainly arable land. Whilst it was in an area of high poultry density there were no contiguous poultry premises to the IP. The IP was directly opposite a large water body.

Ornithological assessment:

Desktop assessment: The nearby river supported an extensive ribbon of pools and small lakes in its floodplain, which also included additional areas of marsh, fen and wet grazing protected by an SSSI. These were likely to have been attractive to many wild birds including wildfowl, corvids and gulls. There was therefore likely to have been significant traffic of wild birds over the IP which represented a likely source of infection pressure.

Clinical picture

14/09/2022 – food and water intake decreased.

17/09/2022 – 160 birds were found dead in plot D.

18/09/2022 – 320 more birds were found dead in plot D. By this point a large proportion of the birds across plots C and D were showing lethargy, swollen heads, cyanotic combs and pink legs suggestive of vasculitis.

Timeline

[Tracings windows](#)

Source tracings window:

High-risk:	11/09/2022 to 13/09/2022
Likely:	31/08/2022 to 10/09/2022
Precautionary:	28/08/2022 to 30/08/2022

Spread tracings window:

High-risk:	12/09/2022 to 18/09/2022
Likely:	01/09/2022 to 11/09/2022
Precautionary:	29/08/2022 to 31/08/2022

Most likely date of infection: 11/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 469: Source and spread timeline for AIV 2022/75

Source Tracing Window	Spread Tracing Window	Date	
Day 17		28/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		29/08/22	Start of precautionary spread tracing window (source + 24h).
Day 15		30/08/22	
Day 14		31/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	01/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	02/09/22	
Day 11	Day 3	03/09/22	
Day 10	Day 4	04/09/22	
Day 9	Day 5	05/09/22	
Day 8	Day 6	06/09/22	
Day 7	Day 7	07/09/22	
Day 6	Day 8	08/09/22	
Day 5	Day 9	09/09/22	
Day 4	Day 10	10/09/22	
Day 3	Day 11	11/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	12/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	13/09/22	
	Day 14	14/09/22	Precautionary onset of clinical signs based on reduction in feed and water intake
	Day 15	15/09/22	
	Day 16	16/09/22	
	Day 17	17/09/22	
	Day 18	18/09/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/185). Restrictions served.
	Day 19	19/09/22	Avian Influenza H5N1 confirmed based on PCR results with case reference AIV2022-75.
	Day 20	20/09/22	
	Day 21	21/09/22	
	Day 22	22/09/22	
	Day 23	23/09/22	Cull and preliminary C&D completed
	Day 24	24/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

41 premises with poultry, excluding the IP, holding between 1 and 35,000 birds. 35 premises with 1-49 birds, 1 premises with 50-999 birds, 5 premises with >1000 birds.

0 premises with pigs and poultry.

SZ (3-10 km)

352 premises with poultry holding between 1 and 377,593 birds. 296 premises with 1-49 birds, 22 premises with 50-999 birds, 34 premises with >1000 birds.

10 premises with pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for feed deliveries, a private vet, two staff members and an ABP collection within the high-risk tracing windows. All

investigations concluded that the risk of disease transmission was very low, no further actions were required, and all the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The free-range nature of the IP meant that indirect and direct contact with wild birds had a high likelihood.

All other sources of virus were investigated and ruled out.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/76, Near Dartington, South Hams, Devon, England

Description of the premises

Overview of the premises and the wider business

This was a commercial enterprise breeding, rearing and slaughtering ducks, chickens, turkeys, and guinea fowl. Ducklings were hatched on site to rear for the table and some other birds were also bought in to rear for meat.

There had been no movements on of live birds or hatching eggs within the tracing windows.

A hatchery, slaughterhouse and cutting plant were also present on the site, together with holiday accommodation.

The keeper reported that he hadn't operated the onsite slaughterhouse since 19/07/2022.

Only three family members worked on the premises and did not have any contact with other poultry elsewhere. The keeper looked after the various groups of birds across the site, his wife looked after the hatchery operation, and his father looked after the brooder unit.

There were also 29 pigs and two cattle on the site.

Guests staying at the bed and breakfast accommodation only had access via the driveway to the house, and did not have any access to the poultry areas or land surrounding the house.

Species and number of each present

Commercial table Pekin ducks, organic breeder ducks, broiler chickens, turkeys, pure breed Emden Geese and Guinea Fowl.

Approximately 9,000 ducks aged between one to eight weeks and kept in age groups of one week – so eight groups were reared for meat:

734 breeding ducks supplying eggs for the hatchery:

100 32-week-old organic breeding ducks kept in a polytunnel .

302 47-week-old and 332 32-week-old breeding ducks kept as separate groups but within the same airspace in the main building in the centre of the premises.

Broiler chickens were kept in 3 groups:

- 250 12-week-olds.
- 400 14-week-olds.
- 350 16-week-olds.
- 40 pure breed Emden geese aged 3-4 months.
- 200 8-week-old turkeys.
- 50-60 Guinea Fowl more than 20 weeks of age.

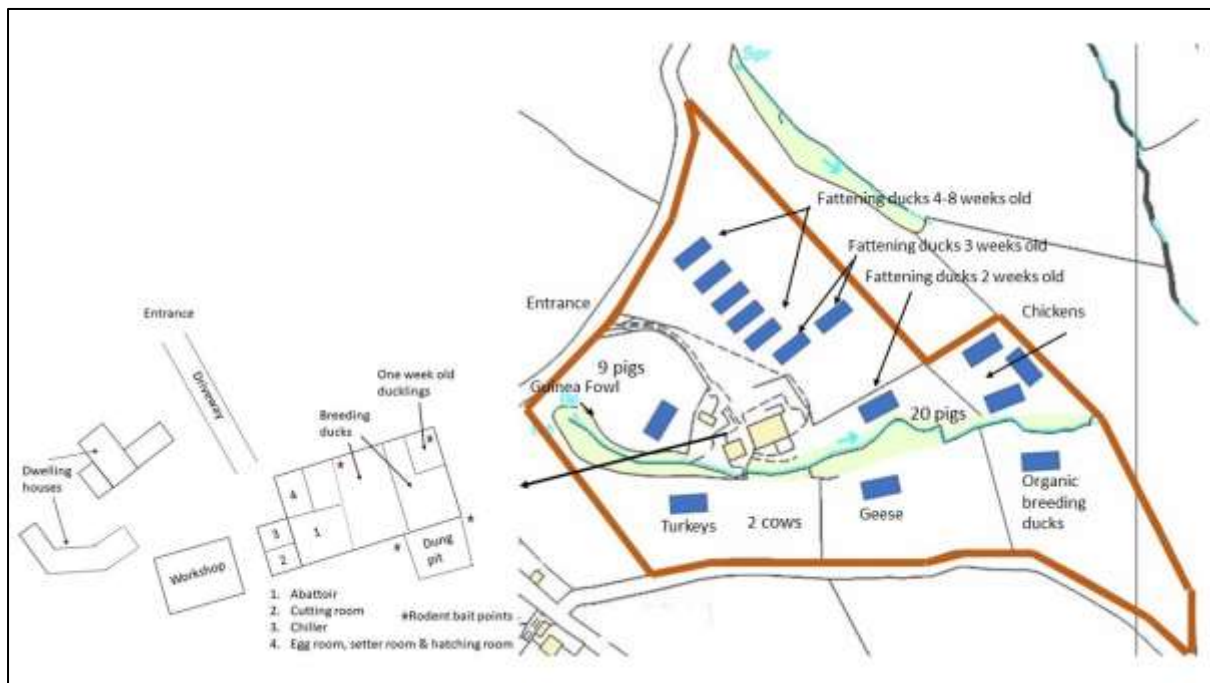
Description of the housing

The birds were all kept in closed polytunnels, approximately 20 metres apart, except for the groups of six, seven and eight-week-old ducks. These had previously had access to a limited outdoor area up until 17/09/2022 when they were housed following the onset of mortalities in the affected groups of younger ducklings. There were also two age groups of breeding ducks and a group of one week old ducklings which were kept in a large shed at the centre of the site.

Natural ventilation was used, windows manually opened and all structures appeared to be in a generally good state of repair and maintained accordingly.

Plan of the infected premises

Figure 470: Plan of AIV 2022/76



Overview of biosecurity

The poultry accommodation was in a generally good state of repair.

The location had two access points – one for farm access, and the other for access to the houses. Both had locked gates with foot dips at the entrances and manual pump sprays for vehicle C&D. The disinfectant used was Virkon S and was used at the correct dilution rate.

Disinfectant foot dips were present outside each area containing birds. However, the disinfectant was only changed every five days.

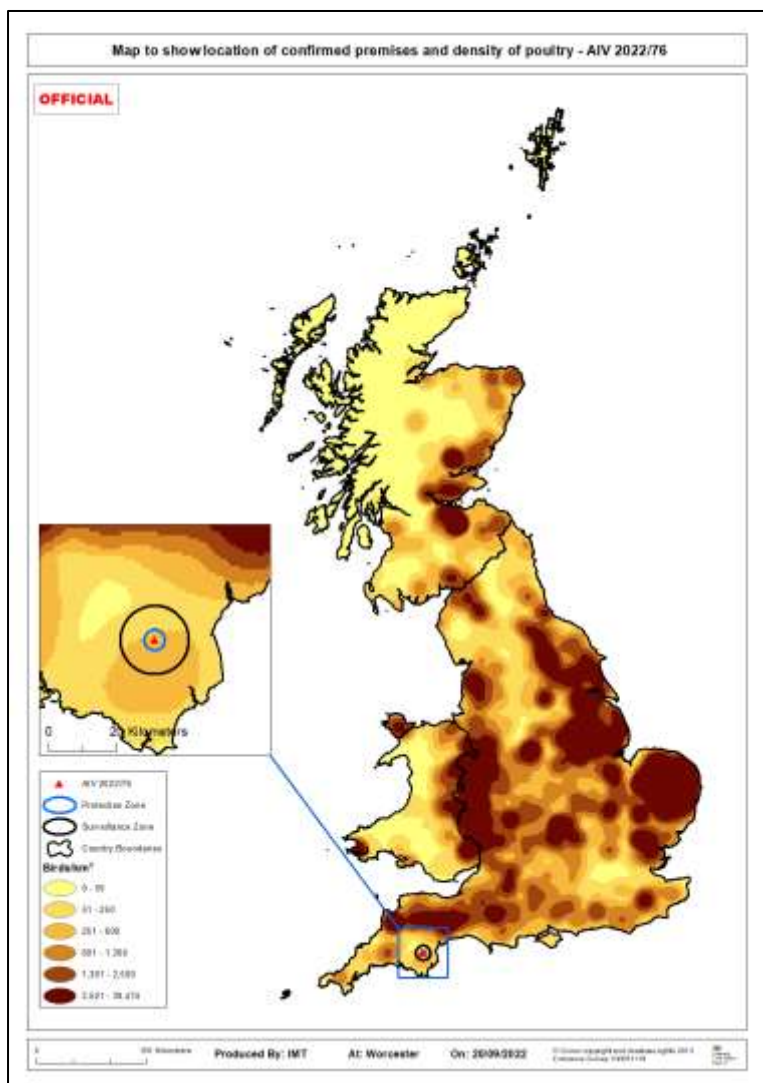
Additionally, there was a visitor book to sign outside the poultry site entrance used for recording deliveries, collections etc.

The effectiveness of biosecurity measures when accessing the bird areas was questionable and could possibly have been compromised, based on the foot dip location. If used accordingly, foot dips would rapidly have become contaminated.

Dedicated site footwear and textile overalls were used in the poultry accommodation, but the frequency of cleaning/washing of PPE and clothing was unclear. There was no formal, documented, biosecurity protocol in place.

Rodent control was undertaken by a pest control contractor. At their last visit on 05/09/2022 there was little evidence of significant rodent activity in the external bait boxes around the manure pit, and none in the internal bait boxes within the main building at the centre of the premises (housing breeding ducks, the brooder, hatchery, slaughterhouse and cutting plant/chiller).

Figure 471: Location of IP and poultry density



Overview of the surrounding area

The premises was in an area of medium poultry density. The site was in an inland, lowland location and set in a richly wooded, largely pastoral landscape likely to have supported abundant populations of passerines, woodpigeon, and corvids. Substantial water features which might have hosted water birds and permitted their aggregation were few, with the largest waterbody in scope being a reservoir (13 ha of open water) but it was distant (>8 km) and at altitude (>290 metres). In this season it was unlikely to host many wildfowl (confirmed by published counts from BTO volunteers). Otherwise, locally only a single lake (2 ha of open water at 2.8 km) was >1 ha and therefore no waterbody was thought likely to have hosted significant aggregations of wildfowl in the neighbourhood of the IP. There was unlikely to be a local source of infection.

The river Dart, closest at 2.5 km was a medium sized river, running either as a narrow single channel overhung with trees or a shallow braided and fast-moving

watercourse, neither of which favoured dense aggregations of wildfowl. However, it became tidal at Totnes (7.8 km) and then hosted estuarine habitats in its lower reaches (>11 km distant). Whilst counts of wildfowl by volunteers from the BTO suggested moderate numbers of resident species around Totnes, they were unlikely to be aggregated and thus unlikely to have produced much infection pressure in this case, especially at >5 km from the IP.

More interestingly, winter counts of gulls on the Dart estuary were significant (>700 Herring gull and >700 Black-headed gull) and whilst most of these will have been found on the lower reaches of the Dart (>15 km) sufficient may have commuted upstream regularly to exploit lowland pasture and the dense collection of outdoor farms local to the IP. This might be considered a plausible infection pathway from a distant coastal source of infection.

The IP was located within the PZ of a previously confirmed IP (AIV 2022/52). The PZ was merged with the SZ on 26/08/2022, and the SZ was lifted on 12/09/2022.

Ornithological assessment:

Desktop assessment: The likely absence of a local source of infection which would be required to support infection pathways involving passerines, wood pigeon, and corvids, as well as the likely scarcity of wildfowl in the neighbourhood of the IP suggested limited infection pressure in this case. The potential for gulls enabling infection from a distant source inform the opinion on infection pressure.

Local intelligence: Several neighbours had reported seeing dead and sick rooks, ravens, pigeons and doves and the keeper had noted sick blackbirds, doves, and pigeons on the premises.

Clinical picture

21/08/2022 – oropharyngeal swabs were collected from ducks and guinea fowl at an APHA visit required given its location within the PZ of AIV 2022/52. These were negative.

11/09/2022 – the owner applied for a licence to move birds to slaughter, so their PVS visited the premises and inspected the ducks on 11/09/2022. There were no abnormal findings.

17/09/2022 – Mortality was observed in three groups:

- 1-week breeder ducklings (housed in the shed)
- 2-week ducklings (in poly tunnels)
- 3-week ducklings (in poly tunnels)

Prior to death the affected birds showed clinical signs, including neurological signs, such as hanging their head, head tremor, circling, ataxia as well as coughing and sneezing.

18/09/2022 – suspicion of notifiable avian disease was reported.

19/09/2022 – at the APHA investigation, all birds were inspected 120 ducks were clinically examined. The only birds that were affected at the time of inspection were

the 1-week-old ducklings in the shed and the 2- and 3-week-old ducklings in the poly tunnels. In these groups, mortality had reached 26%, 38% and 7% respectively and 5-10% of the birds were showing clinical signs, including coughing, neurological signs, and white-yellow-green faecal matter around the cloaca. Samples were submitted.

All other birds appeared clinically unaffected at the time of the inspection.

22/09/2022 – nasal swabs were submitted from pigs present and these were negative.

22/09/2022 – the group of 3-week-old ducklings appeared to be recovering and 20 birds were blood sampled. The results suggested that seroconversion was in the early stages and as such there was no reason to suspect an earlier infection date than that initially estimated (11/09/2022).

Timeline

Tracings windows

Source tracings window:

High-risk:	12/09/2022 to 19/09/2022
Likely:	03/09/2022 to 11/09/2022
Precautionary:	29/08/2022 to 02/09/2022

Spread tracings window:

High-risk:	11/09/2022 to 15/09/2022
Likely:	02/09/2022 to 10/09/2022
Precautionary:	28/08/2022 to 01/09/2022

Most likely date of infection: 11/09/2022 (Start of high-risk source tracing window).

Timeline chart

Figure 472: Source and spread timeline for AIV 2022/76

Source Tracing Window	Spread Tracing Window	Date	
Day 19		28/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA)
Day 18		29/08/22	Start of precautionary spread tracing window (source + 24h).
Day 17		30/08/22	
Day 16		31/08/22	
Day 15		01/09/22	
Day 14		02/09/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	03/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	04/09/22	
Day 11	Day 3	05/09/22	
Day 10	Day 4	06/09/22	
Day 9	Day 5	07/09/22	
Day 8	Day 6	08/09/22	
Day 7	Day 7	09/09/22	
Day 6	Day 8	10/09/22	
Day 5	Day 9	11/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak - precautionary based on serology results from report case samples (assuming 7-8 days to detectable seroconversion). PVS inspection prior to licencing ducks to slaughter.
Day 4	Day 10	12/09/22	Start of high risk spread tracing window (source +24h).
Day 3	Day 11	13/09/22	
Day 2	Day 12	14/09/22	
Day 1	Day 13	15/09/22	
	Day 14	16/09/22	Precautionary onset of clinical signs in ducklings.
	Day 15	17/09/22	First mortalities in 1-3 week old ducklings found in morning.
	Day 16	18/09/22	Initial notification of suspicion of disease to APHA. Verbal restrictions served.
	Day 17	19/09/22	APHA investigation and sampling (DPR 2022/186). Restrictions served.
	Day 18	20/09/22	HPAI H5N1 confirmed on PCR results (AIV 2022/76).
	Day 19	21/09/22	
	Day 20	22/09/22	Additional blood sampling of apparently recovering group of 3 week old ducks.
	Day 21	23/09/22	Cull completed
	Day 22	24/09/22	Preliminary C&D completed
	Day 23	25/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

46 premises with poultry, excluding the IP, holding between 1 and 25,000 birds. 43 premises with 1-49 birds, 2 premises with 50-999 birds, 1 premises with >1000 birds.

1 premises with pigs and poultry

SZ (3-10 km)

279 premises with poultry, holding 1-18,300 birds. 257 premises with 1-49 birds, 19 premises with 50-999 birds, 3 premises with >1000 birds.

26 premises with pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracings investigations were initiated for a private vet and two consignments of ducks direct to slaughter during the high-risk tracing windows. The relevant authority was informed about the movement of birds to slaughter and a notice served requiring disposal of any meat that had not yet been consigned to retail. The owner and staff had provided the catching and transportation for the movement of birds to slaughter,

no other poultry contacts were identified, so no further action was required. All tracings were assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Several neighbours had reported seeing dead and sick rooks, ravens, pigeons and doves and the keeper had noted sick blackbirds, doves, and pigeons on the premises.

Affected groups of ducks were housed (1-week olds in a building, 2- and 3-week-olds in polytunnels) but all were tended by same keeper and biosecurity may not have been especially rigorous.

No significant source tracings were identified.

Ornithological assessment was that indirect infection pathways involving gulls were the most likely source of disease introduction.

Spread investigations: Assessment of potential and likelihood of spread

Likelihood of onward transmission through wildlife not higher than the background risk.

Infected poultry were housed and significant escape of virus to the environment considered unlikely.

All other potential spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/77, Near Honington, West Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a small commercial premises with free range chicken and geese, captive birds in aviaries, cattle and pigs.

The chickens and geese were free range and semi feral. Cockerels were fattened for meat production and, along with the eggs, eaten by the owners or sold to family and friends only. None had been sold in the last 18 months due to the HPAI disease restrictions.

Species and number of each present

179 chickens, 26 geese, nine guinea fowl, two ducks, 20 budgies, five doves, eight finches, one sparrow and one pheasant.

Six pigs and 27 cattle.

Description of the housing

Some of the chickens (cockerels) were housed. Some chickens, guinea fowl and captive birds had been kept in pens made of wood and wire netting for the last three months. Other chickens and geese were semi feral and roosted on trees and top of the barn roof.

There was an aviary on the farm with several small pens that housed pigeons, chickens, guinea fowls, budgies and finches. These birds did not have direct contact with the free ranging group and appeared to be clinically well.

Plan of the infected premises

Figure 473: Plan of AIV 2022/77



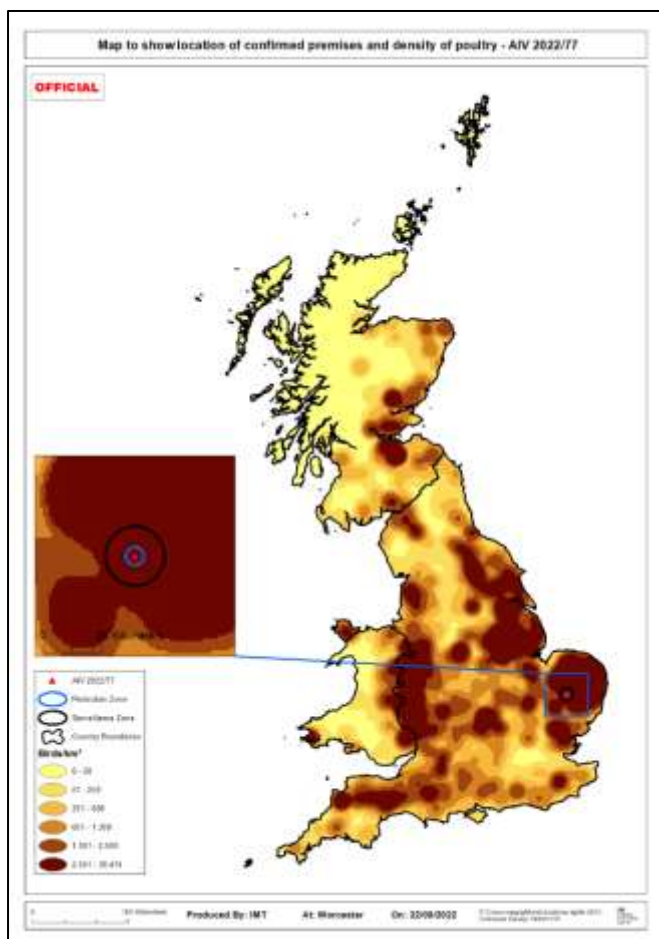
Overview of biosecurity

Biosecurity standards on the IP were very poor. Some of the birds were housed in pens or aviaries but there were no physical barriers to stop the free ranging poultry escaping to the adjacent fields and mixing with wild birds. The boundary fence was damaged and insecure.

There was a pond 400 yards away from the farmhouse that attracted wild birds and some of the feral geese and chickens.

Map with location in Great Britain and poultry density

Figure 474: Location of IP and poultry density



Overview of the surrounding area

This premises was in a landscape dominated by intensive arable agriculture and there were reports of wild pheasant on land adjacent. There were three large forests and many extensive woodlands within 10 km, with the most significant being a small 5 ha block of deciduous planting near to the farm. This was planting was also adjacent to AIV 2022/74, which was infected around the same time.

Ornithological assessment:

Desktop assessment: A full ornithological assessment was not commissioned, but an ornithological expert view was provided for nearby AIV 2022/74. This concluded that wild birds were a likely source of infection pressure:

There was a medium-sized river nearby, which included multiple areas of semi-natural wet pasture habitat, where wildfowl might have gathered.

There were also significant waterbodies (reservoirs and lakes) near, which hosted significant numbers of resident wildfowl, waders and gulls which were possible sources of infection. Other backyard cases (AIV 2022/72 & AIV 2022/85) had

occurred in the area, and a dead buzzard had tested positive for HPAI. All this indicated that wild birds were likely to have acted as a source of infection.

The abundance of gulls, corvids woodpigeons and passerines in this landscape would also have enabled infection pathways.

Local intelligence: The premises was in the PZ of AIV 2022/74 and many pheasants, partridges, seagulls, buzzards and kites were seen in and over the range.

Clinical picture

14/09/2022 – one dead chicken was found .

16/09/2022 – two geese died. These were initially thought to have been due to the eating of rat poison, but subsequently have been attributed to avian influenza.

18/09/2022 – three chickens were found dead.

19/09/2022 – three further chickens and three geese died.

20/09/22 – five chickens and three geese died and suspicion of notifiable avian disease was reported. Clinical signs preceding death included ataxia, loss of appetite and bleeding from the beak. The deaths and clinical signs were reported only in the group of chickens and geese that were free ranging.

Timeline

[Tracings windows](#)

Source tracings window:

High-risk:	10/09/2022 to 12/09/2022
Likely:	30/08/2022 to 09/09/2022
Precautionary:	Precautionary within likely source window due to late reporting of disease suspicion

Spread tracings window:

High-risk:	11/09/2022 to 18/09/2022
Likely:	31/08/2022 to 10/09/2022
Precautionary:	Precautionary within likely source window due to late reporting of disease suspicion.

Most likely date of infection: 10/09/2022 (Start of high-risk source tracing window):

Timeline chart

Figure 475: Source and spread timeline for AIV 2022/77

Source Tracing Window	Spread Tracing Window	Date	
Day 15		29/08/22	
Day 14		30/08/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs). Start of precautionary source tracing window (-21d from notification of suspicion to APHA)
Day 13	Day 1	31/08/22	Start of likely spread tracing window (source tracing window +24h). Start of precautionary spread tracing window (source + 24h).
Day 12	Day 2	01/09/22	
Day 11	Day 3	02/09/22	
Day 10	Day 4	03/09/22	
Day 9	Day 5	04/09/22	
Day 8	Day 6	05/09/22	
Day 7	Day 7	06/09/22	
Day 6	Day 8	07/09/22	
Day 5	Day 9	08/09/22	
Day 4	Day 10	09/09/22	
Day 3	Day 11	10/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	11/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	12/09/22	
	Day 14	13/09/22	Precautionary onset of clinical signs.
		14/09/22	First recorded mortality
	Day 15		
	Day 16	15/09/22	
	Day 17	16/09/22	
	Day 18	17/09/22	
	Day 19	18/09/22	
	Day 20	19/09/22	
	Day 21	20/09/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/188). Restrictions served.
	Day 22	21/09/22	
	Day 23	22/09/22	
	Day 24	23/09/22	
	Day 25	24/09/22	Cull and preliminary C&D completed
	Day 26	25/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

11 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 1-16000 birds (3 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

133 premises with poultry were reported to be within 10 km of the IP with the additional premises holding 1-555500 birds (31 premises with 50 or more birds).

10 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for several visitors, a feed delivery, and a movement of cattle manure off the premises within the high-risk tracing windows. This resulted in a tracing visit being completed to the manure destination premises which also had poultry present. All the tracings were assessed as negligible or very low risk of disease transmission and all tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The affected group of chickens and geese were free range (semi-feral) and free to mingle with wild birds in the range and on the nearby pond, so direct and indirect contact with wild birds was possible.

There were very poor biosecurity standards.

Ornithological advice was that there was a likely high infection pressure in the wild birds supported by the finding of a dead buzzard that tested positive for HPAI plus the fact that AIV 2022/74 was infected around the same time.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/78, Near Easingwold, Hambleton, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

This was a commercial free-range flock of broiler chickens. Birds were aged between four to nine weeks old and. Bird movements off to an abattoir took place at 56-60 days old. There had been no poultry movements on during the tracing risk windows.

The same keeper owned a turkey farm, nine miles away (approximately 12,000 turkeys) but this was managed separately and there were no known epidemiological links identified between them.

Species and number of each present

25,000 broiler chickens.

There was no other livestock on the holding.

Description of the housing

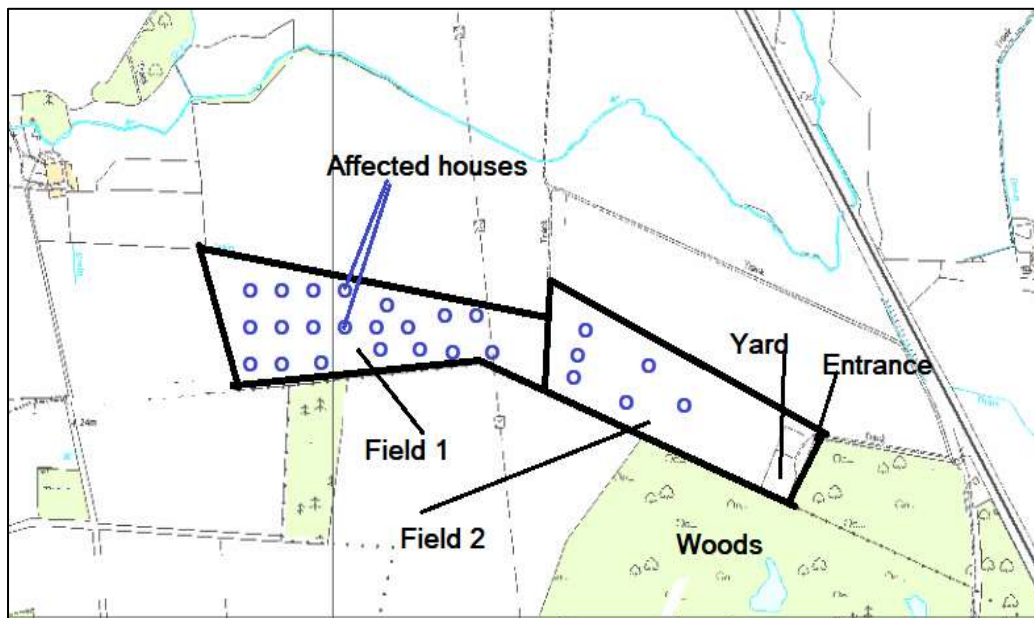
Birds were housed in 29 mobile sheds with variable number of birds per shed, from 750 to 1500. At the time of the report, there were seven empty sheds.

The sheds were covered with tarpaulin, placed directly on the field and were approximately 31 feet apart. They sheds had an automatic water and feed supply. Ventilation and light were natural. Concrete was present only at the entrance to the field.

Plan of the infected premises

Location of the huts is not exact.

Figure 476: Plan of AIV 2022/78



Overview of biosecurity

Biosecurity procedures were basic. Entry to the site was through an old portacabin made into a tunnel and in here there were boot dips (unlidded) at each end. A bench in the middle was designated as the clean/dirty barrier. Overalls, boots, hand sanitiser and a visitors book were kept in this tunnel and workers changed here.

The IP was fenced with wire with trees contributing as boundaries. Parking was outside the premises. The entry for vehicles had a spray with Virkon S (renewed every week) for wheel disinfection (not supervised). There was no disinfectant at the entrance to the poultry huts or at the entrance of the field from the yard.

There were 4 water tanks in the field, connected to the mains, and a pipe system provided water to each hut. Water tanks and the individual hoppers for each hut were lidded.

Feed was delivered weekly into two hoppers in the yard. From here it was collected in a tractor which filled up each hut's individual hopper.

Straw bales for bedding were kept in the yard and used each day to bed up the huts. It was grown and supplied locally and was accessible to wild birds.

Litter and manure were collected once a month by the landlord, who did not have other livestock.

Dead birds collected from huts daily and transported in the vehicles to the specific ABP bins.

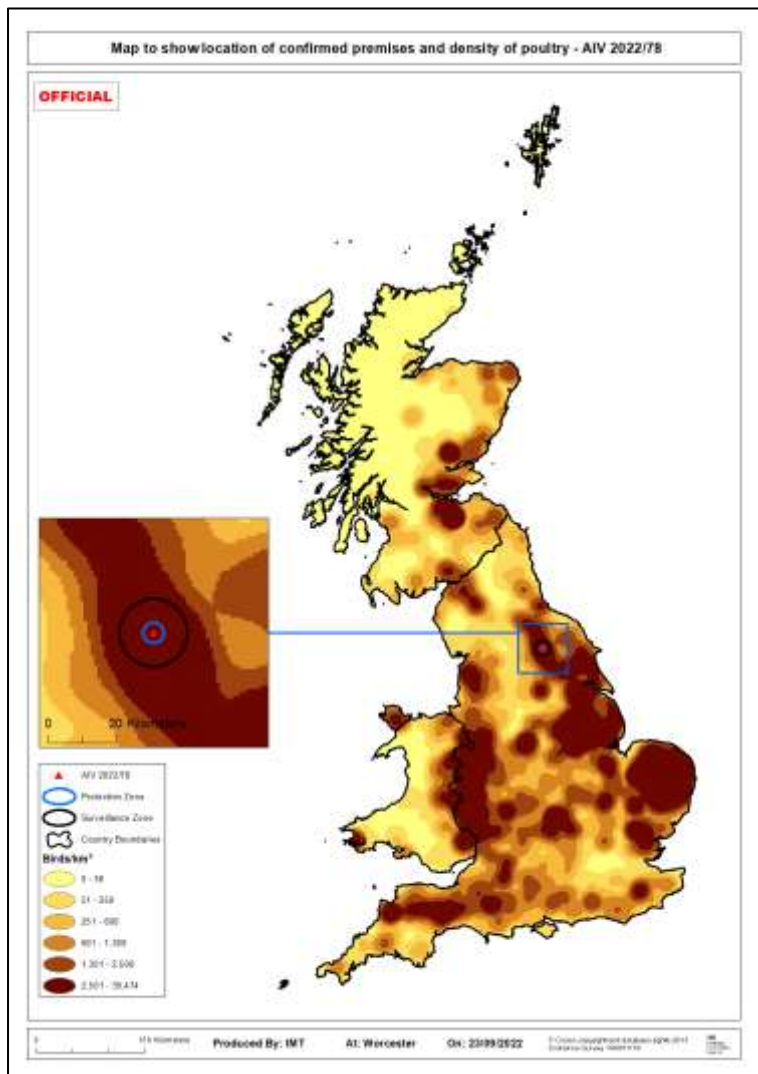
In addition to the keeper, there were two full time members of staff who worked only on this farm. A part time worker attended two 2 days a week and none of the workers had contact with other poultry. There was no movement of staff from or to other poultry premises.

Pest control by external contractor was in place and the site was last visited on the 20/8/2022. No rodent activity was noted in the fields although squirrels were seen near the feed hoppers.

Movements of birds off for slaughter took place twice a week. Birds were caught by farm staff, placed in crates and modules in the yard before being transferred to the abattoir lorries. The lorries only drove into the yard, not the field.

Map with location in Great Britain and poultry density

Figure 477: Location of IP and poultry density



Overview of the surrounding area

The IP was in a high poultry density area. The ranges were surrounded with ponds with relevant wildlife activity.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: There was a river within 1 km of the site and there was some woodland in nearby fields. Gulls, crows, pigeons, buzzards, magpies and pheasants were observed regularly and bird droppings could be seen on top of the huts and water tanks.

Clinical picture

Between 18/09/2022 and 21/09/2022 – increasing mortality was seen in shed 15 (40% of birds had died). Mild lethargy and diarrhoea were seen and dead birds had purple discolouration to the legs. Suspicion of notifiable avian disease was reported.

21/09/2022 – the APHA investigation confirmed the clinical picture. There was also a 4% mortality recorded in shed 8 (next to shed 15). A drop in feed and water intake was observed but there were no neurological or respiratory symptoms. Samples were submitted.

Timeline

[Tracings windows](#)

Source tracings window:

High-risk:	14/09/2022 to 16/09/2022
Likely:	03/09/2022 to 13/09/2022
Precautionary:	31/08/2022 to 02/09/2022

Spread tracings window:

High-risk:	15/09/2022 to 21/09/2022
Likely:	04/09/2022 to 14/09/2022
Precautionary:	01/09/2022 to 03/09/2022

Most likely date of infection: 14/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 478: Source and spread timeline for AIV 2022/78

Source Tracing Window	Spread Tracing Window	Date	
Day 21		27/08/22	
Day 20		28/08/22	
Day 19		29/08/22	
Day 18		30/08/22	
Day 17		31/08/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		01/09/22	Start of precautionary spread tracing window (source + 24h).
Day 15		02/09/22	
Day 14		03/09/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	04/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	05/09/22	
Day 11	Day 3	06/09/22	
Day 10	Day 4	07/09/22	
Day 9	Day 5	08/09/22	
Day 8	Day 6	09/09/22	
Day 7	Day 7	10/09/22	
Day 6	Day 8	11/09/22	
Day 5	Day 9	12/09/22	
Day 4	Day 10	13/09/22	
Day 3	Day 11	14/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	15/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	16/09/22	
	Day 14	17/09/22	Precautionary onset of clinical signs.
	Day 15	18/09/22	Mortality noticed first - 30 chickens dead in hut 15
	Day 16	19/09/22	
	Day 17	20/09/22	
	Day 18	21/09/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/189). Restrictions served.
	Day 19	22/09/22	HPAI positive PCR, confirmed as AIV 2022/78
	Day 20	23/09/22	
	Day 21	24/09/22	
	Day 22	25/09/22	Cull completed
	Day 23	26/09/22	Preliminary C&D completed
	Day 24	27/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

30 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 2-240,000 birds (8 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

152 premises with poultry were reported to be within 10 km of the IP holding between 1-330,000 birds (31 premises with 50 or more birds).

15 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for a movement of birds off to slaughter along with the associated vehicles and catching team, feed deliveries and an ABP collection within the high-risk tracing windows.

The relevant authority was informed about the movement of birds to slaughter. Biosecurity procedures for the vehicles and equipment transporting the birds to slaughter were verified. The tracings were assessed as very low risk and were all closed with no further actions required.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The birds had access to the outdoor area and therefore had a potential direct and indirect contact with wild birds, which were regularly seen.

Bedding bales were stored outdoors and accessible to wild birds. Bird droppings were seen on top of huts and water tanks.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/79, Near Northwold, King's Lynn and West Norfolk, Norfolk, England

Description of the premises

Overview of the premises and the wider business

This was a large commercial free-range geese flock. It was part of a larger company which owned several poultry farms in the area but they were all managed separately with dedicated staff. The birds were brought onto the site from the brooding farm in batches within a six-week period, starting in May-June each year (no recent movements on).

Species and number of each present

26,040 geese, aged between 78 to 113 days old.

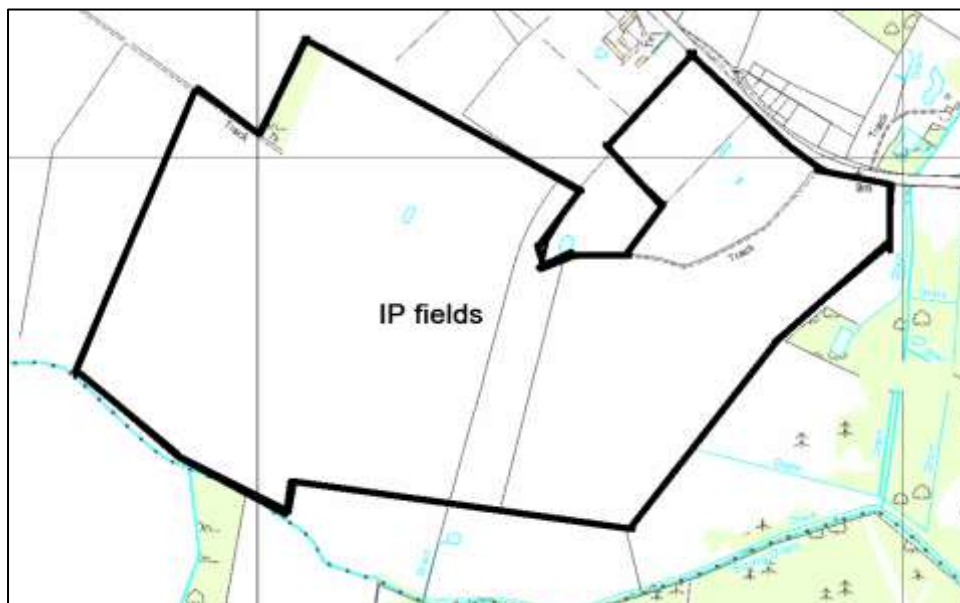
There were no other livestock on the premises.

Description of the housing

The birds were free ranging in pens in three contiguous fields. Each pen had netted sides only, although straying of geese was reportedly rare.

Plan of the infected premises

Figure 479: Plan of AIV 2022/79

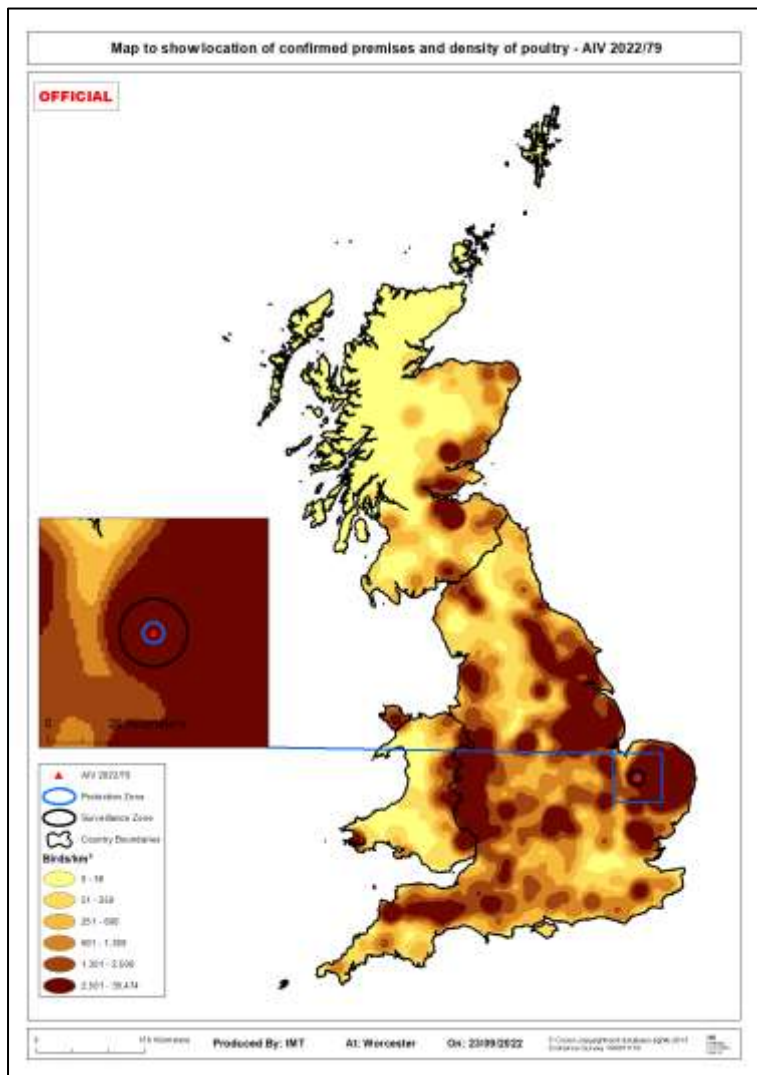


Overview of biosecurity

Biosecurity was poor. A C&D point was located near the office with Virkon S. Vehicle C&D point was located on the farm track (in the middle of the track leading to the geese location). Equipment was dedicated for this site. There was no movement of staff from or to other poultry premises.

Map with location in Great Britain and poultry density

Figure 480: Location of IP and poultry density



Overview of the surrounding area

The IP was in a high poultry density area.

Ornithological assessment:

Desktop assessment: This concluded that wild birds were a likely source of infection.

Local intelligence: There was a pond in a proximity which attracted wild birds. Maize was grown around the pens and the wooded areas increased the likelihood of attracting wild birds and vermin.

Clinical picture

21/09/2022 – one goose was found dead in Pen 19 and two in Pen 18. No mortality had been seen in the previous 17 days.

22/09/2022 – 15 geese were found dead on the morning with another seven deaths in the afternoon (pen 19). Suspicion of notifiable avian disease was reported. Two more geese from Pen 19 were culled on 22/09/2022 due to neurological signs.

At the APHA investigation the same day, pens 18 and 19 were found to be affected. Only one goose in Pen 19 was showing nervous signs.

Timeline

Tracings windows

Source tracings window:

High-risk:	17/09/2022 to 19/09/2022
Likely:	06/09/2022 to 16/09/2022
Precautionary:	01/09/2022 to 05/09/2022

Spread tracings window:

High-risk:	18/09/2022 to 22/09/2022
Likely:	07/09/2022 to 17/09/2022
Precautionary:	02/09/2022 to 06/09/2022

Most likely date of infection 17/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 481: Source and spread timeline for AIV 2022/79

Source Tracing Window	Spread Tracing Window	Date	
Day 19		01/09/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		02/09/22	Start of precautionary spread tracing window (source + 24h).
Day 17		03/09/22	
Day 16		04/09/22	
Day 15		05/09/22	
Day 14		06/09/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	07/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	08/09/22	
Day 11	Day 3	09/09/22	
Day 10	Day 4	10/09/22	
Day 9	Day 5	11/09/22	
Day 8	Day 6	12/09/22	
Day 7	Day 7	13/09/22	
Day 6	Day 8	14/09/22	
Day 5	Day 9	15/09/22	
Day 4	Day 10	16/09/22	
Day 3	Day 11	17/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	18/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	19/09/22	
Day 14	20/09/22		Precautionary onset of clinical signs
Day 15	21/09/22		First 3 mortalities
Day 16	22/09/22		Notification of suspicion of disease to APHA (DPR 2022/190). APHA investigation and sampling. Restrictions served. Further 22 geese found dead, two more culled with neurological signs.
Day 17	23/09/22		HPAI H5N1 confirmed on PCR results (AIV 2022/79)
Day 18	24/09/22		
Day 19	25/09/22		
Day 20	26/09/22		
Day 21	27/09/22		
Day 22	28/09/22		
Day 23	29/09/22		Cull completed
Day 24	30/09/22		Preliminary C&D completed
Day 25	01/10/22		Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these dates.

Surveillance activity

PZ (0-3 km)

54 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 1-190,000 birds (44 premises with 1-49 birds, 4 premises with 50-999 birds, 6 premises with >1000 birds).

0 premises holding both pigs and poultry

SZ (3-10 km)

154 premises with poultry were reported to be within 10 km of the IP holding between 1-190,885 birds (127 premises with 1-49 birds, 17 premises with 50-999 birds, 10 premises with >1000 birds).

13 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

A telephone tracing investigation was initiated for the premises manager – no other poultry contacts were identified. It was assessed as very low risk of disease transmission so no further action was required and the tracing was closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with infected wild birds.

Assessment and evidence base for the likely source

Birds were kept as free range, with potential direct and indirect contact with wild birds.

Water troughs were not sheltered, and the feeders could be accessed by wild birds.

An ornithological desktop assessment concluded that wild birds were a likely source of infection for this IP

All other potential source pathways were assessed as low (or lower) likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as being very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/80, Near Hadleigh, Babergh, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a small, commercial, mixed poultry premises (turkeys, geese and chickens) on an arable farm. The turkeys were reared for the Christmas season, the chicken eggs were sold at the gate, and the geese were kept as pets.

Species and number of each present

40 chickens, 90 turkeys and 11 geese.

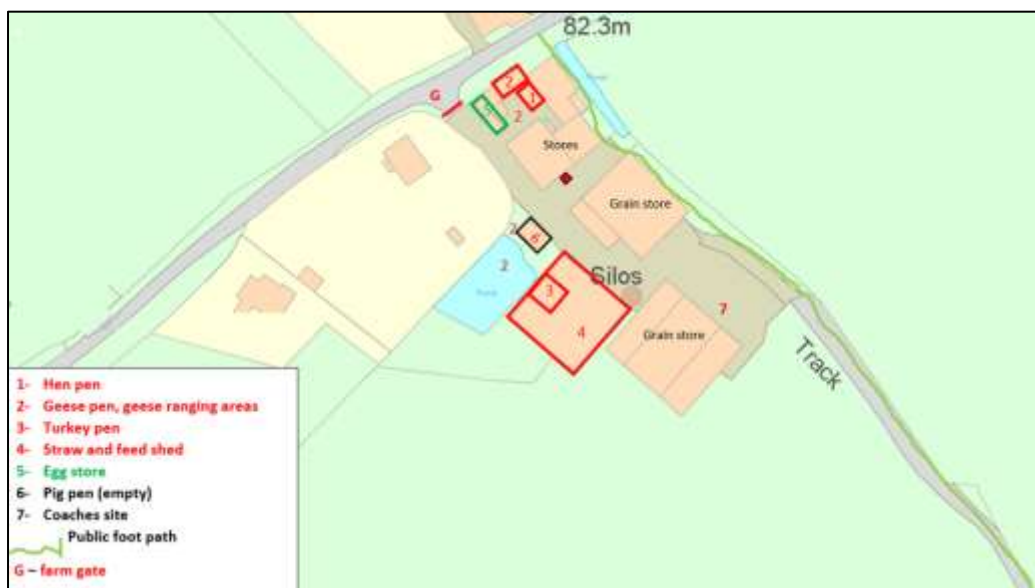
Description of the housing

This IP consisted of several outbuildings. The turkeys were kept in a pen inside a Dutch barn on straw bedding. The walls were made of breeze blocks and the gate of wire netting. The barn was also used to store straw bales, bagged feed and farm equipment. Wild birds could access the building and pigeons were often seen inside. The chickens were brought as point-of-lay hens in March, and were kept inside a pen in another shed, with brick and wooden walls and a door made from wire net.

The geese were free-ranging and had access to a pond that was visited by wild ducks. The geese were housed at night in a pen adjacent to the chicken pen.

Plan of the infected premises

Figure 482: Plan of AIV 2022/80



Overview of biosecurity

Biosecurity was very limited with one foot dip at the farm gate and another at the entrance to the straw/feed/turkey shed.

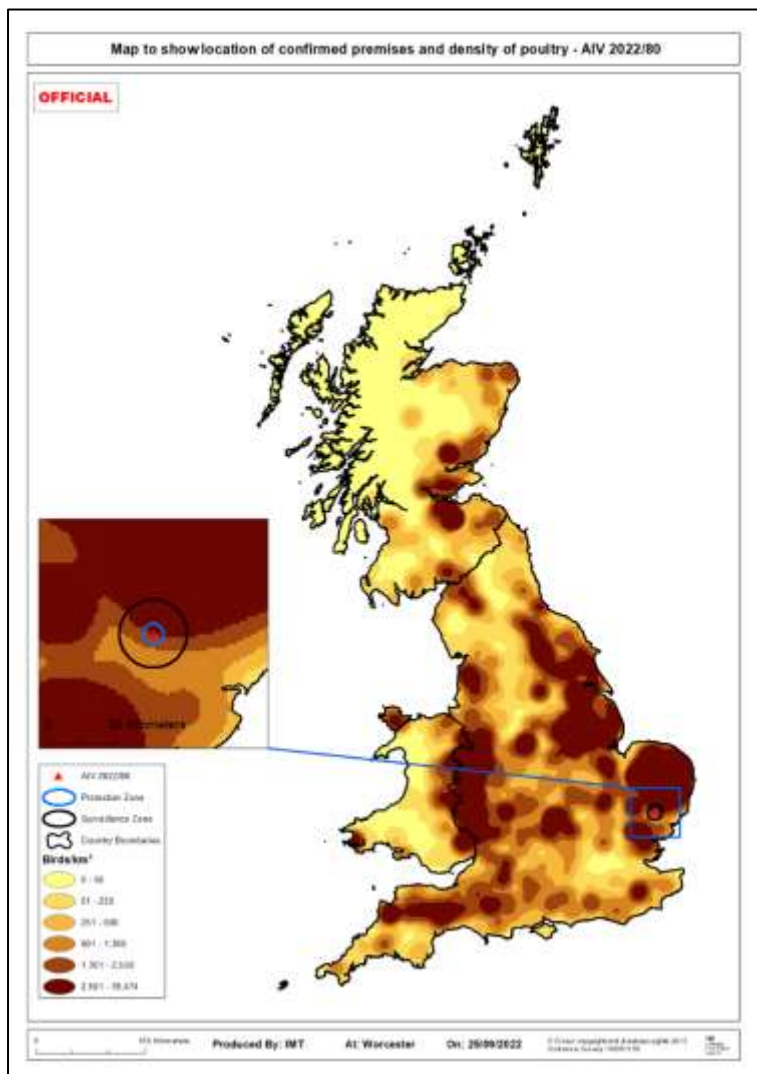
The disinfectant used was Virkon S and the water appeared saturated in disinfectant although the concentration used was not confirmed. A half can was used as foot dips which were uncovered.

There was no dedicated footwear or PPE and no other biosecurity practices in place.

The straw and feed were kept in the same shed as the turkey pen. The door was kept open and vehicles entered the shed without following any C&D protocol. Feed delivery lorries would have had to cross the farmyard to access this barn.

Map with location in Great Britain and poultry density

Figure 483: Location of IP and poultry density



Overview of the surrounding area

The site was bounded by agricultural fields and was within a high-poultry-density area

Ornithological assessment:

Desktop assessment: The IP was in an intensively managed landscape dominated by arable agriculture, with limited pasture scattered in small paddocks around distant small villages and occasional small woodlands. The closest watercourse was a river which was little more than a large stream at its nearest point to the IP (2 km). Neither the stream nor the handful of small ponds it supported along its course were likely to hold more than a few wildfowl. Otherwise, waterbodies large enough to hold more than a moderate aggregation of water birds (>200) were at distances >9 km from the IP and as such no likely source of infection could be identified in this case.

Local intelligence: The geese had access to a pond on the farm and wild ducks were seen on the pond at the time of the investigation

Clinical picture

20/09/2022 – two turkeys and one goose were found dead.

21/09/2022 – one further goose and two more turkeys were found dead.

22/09/2022- two more turkeys died.

23/09/2022 – three more turkeys died and the keeper reported suspicion of notifiable avian disease.

During the veterinary investigation, the geese were alert and responsive; the turkeys presented with white diarrhoea, depression, neurological and respiratory clinical signs. Some also had elevated temperatures. The chickens showed no clinical signs.

Timeline

Tracings windows

Source tracings window:

High-risk:	16/09/2022 to 18/09/2022
Likely:	05/09/2022 to 15/09/2022
Precautionary:	02/09/2022 to 04/09/2022

Spread tracings window:

High-risk:	17/09/2022 to 23/09/2022
Likely:	06/09/2022 to 16/09/2022
Precautionary:	03/09/2022 to 05/09/2022

Most likely date of infection 16/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 484: Source and spread timeline for AIV 2022/80

Source Tracing Window	Spread Tracing Window	Date	
Day 18		01/09/22	
Day 17		02/09/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 16		03/09/22	Start of precautionary spread tracing window (source + 24h).
Day 15		04/09/22	
Day 14		05/09/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13		06/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 1	07/09/22	
Day 11	Day 2	08/09/22	
Day 10	Day 3	09/09/22	
Day 9	Day 4	10/09/22	
Day 8	Day 5	11/09/22	
Day 7	Day 6	12/09/22	
Day 6	Day 7	13/09/22	
Day 5	Day 8	14/09/22	
Day 4	Day 9	15/09/22	
Day 3	Day 10	16/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 11	17/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 12	18/09/22	
	Day 13	19/09/22	Precautionary onset of clinical signs
	Day 14	20/09/22	One goose and two turkeys found dead
	Day 15	21/09/22	Two further turkey deaths
	Day 16	22/09/22	Two further turkey deaths
	Day 17	23/09/22	Notification of suspicion of disease to APHA. Three further turkey deaths. (DPR 2022/191). Restrictions served.
	Day 18	24/09/22	HPAI H5N1 confirmed on PCR results (AIV2022/80)
	Day 19	25/09/22	
	Day 20	26/09/22	Cull and preliminary C&D completed
	Day 21	27/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

43 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 1-25,000 birds (4 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

150 premises with poultry were reported to be within 10 km of the IP with the additional premises holding 1-141,000 birds (12 premises with 50 or more birds).

18 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Due to the co-location of other businesses on the site of this IP, a number of telephone tracings were raised for grain lorries collecting feed and their drivers, a

mechanic, two bus drivers and a farm worker. All were assessed as low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There were many opportunities for exposure to wild birds, including the shared use of a pond by the free-ranging geese and wild ducks.

The feed bags and the straw were stored indoors but the shed doors were kept open, including at the time of the investigation.

Dedicated PPE was not in use and there were no biosecurity protocols for feed deliveries or visitors.

Spread investigations: Assessment of potential and likelihood of spread

As the background infection pressure was considered to be low, there was potential for infection produced by this IP to have been locally significant. However, the rapid pathology in the housed turkeys and the small size of the geese flock would potentially have prevented the free-range geese from excreting substantial amounts of virus into the environment.

There was a low density of neighbouring backyard flocks which would have been most vulnerable to infection by wildlife contaminated from this IP.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/81, Near Poulton-le-Fylde, Wyre, Lancashire, England

Description of the premises

Overview

The IP was a commercial, independent, family run farm comprised of a poultry business with a mixed production of housed layers, housed turkeys, and ducks (most housed but some free-range) as well as a small free-range goose flock.

There was also a dairy herd with 101 cattle and a farm shop.

Species and number of each present

2,400 laying hens aged 8-18 months.

200 laying ducks aged 5-18 months plus five drakes.

95 turkeys aged 12 weeks for seasonal Christmas market

33 geese aged 4 months for seasonal Christmas market

Description of the housing

The chickens were housed in five sheds, with 400-500 per shed.

The ducks were housed in two sheds (Shed 1: 130; Shed 2: 70) plus five drakes. 60 ducks sometimes ranged outside with the geese.

The turkeys were housed but the geese were free ranging with an outside run.

The housing was of wooden construction and relatively old. The state of repair was poor with holes in window netting and gaps in the roofs providing potential access to wild birds.

Footbaths were present at entrances to each shed and at the at the main entrance and farm shop.

There were dedicated staff for each species.

Plan of the infected premises

Figure 485: Plan of AIV 2022/81



Overview of biosecurity

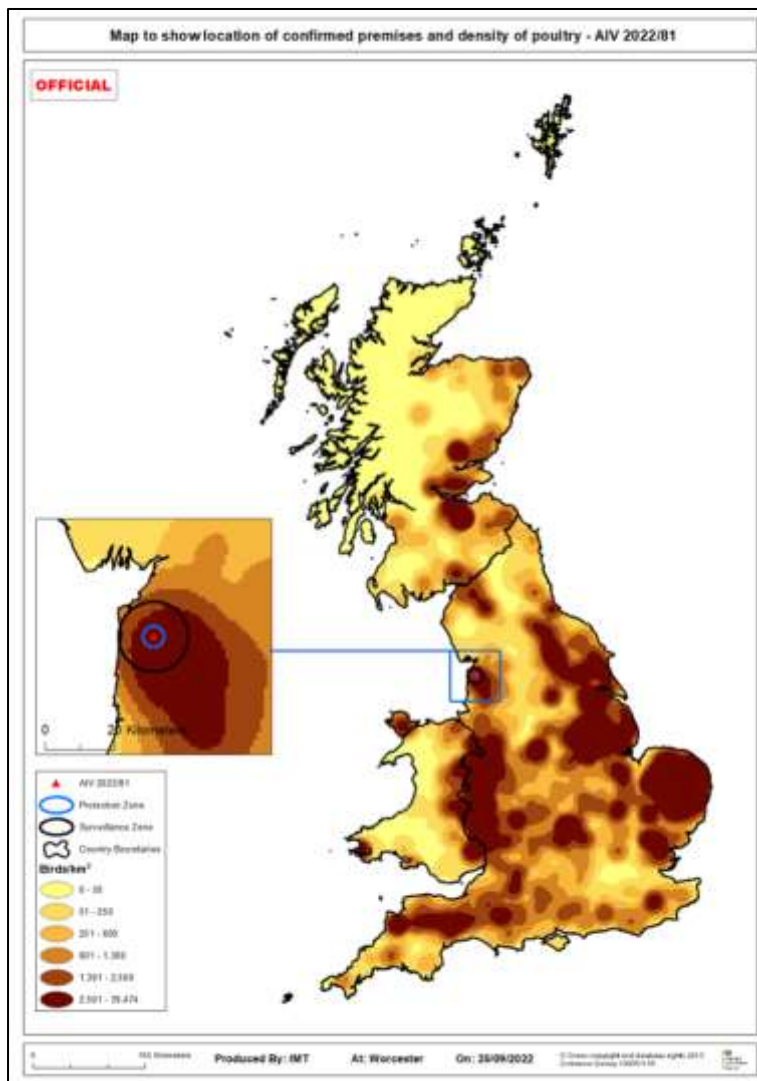
The only biosecurity measures in place were the uncovered foot baths with FAM 30 at the entries to every shed. However, at the time of the visit, the disinfectant was heavily contaminated with dirt. Inside the sheds biosecurity was poor; some of the sheds had opened windows with netting, but some of the netting was broken in places and there were gaps in the roofs, and walls allowing potential access to water, wild birds and rodents.

For the majority of the birds the feed was contained inside; however, the geese were fed outside. The straw was stored in two open sheds providing the opportunity for wild birds to roam and roost/defecate on it.

No records were kept for the poultry unit, apart from a weekly egg diary kept by the owner. No records about feed, bird and other deliveries were available for inspection.

Map with location in Great Britain and poultry density

Figure 486: Location of IP and poultry density



Overview of the surrounding area

All the fields surrounding the geese fields were arable and grass fields. The nearest water course (the tidal River Wyre) was approximately 1 km away, also 1.5 km from semi-natural estuarine saltmarsh habitats, 2 km from the nearest extensive estuarine mudflats and there was a fishery 1.5 km southeast.

Ornithological assessment:

Desktop assessment: There was a likely infection pressure from wild birds for this IP.

The coastal and estuarine areas were known to host substantial aggregations of wildfowl, including migrant wildfowl, waders as well as gulls.

It was considered that the substantial infection pressure produced at the coast could have been carried close to the IP by the Wyre and the populations of wildfowl,

shorebirds and gulls which would have circulated across the true coastal areas and estuarine habitats.

As biosecurity on the IP was reported to be sub-optimal, it was assumed that direct infection pathways by passerines were possible, otherwise all other indirect infection pathways appeared plausible, with contamination of operational surfaces by gulls and corvids as the most likely. These birds (as well as passerines and wood pigeon) could potentially have acquired infection at either the river, or the freshwater pools which undoubtedly received traffic of wild birds which also use the river. Scavenging infected carcasses either on the coast or river by gulls and corvids increased the strength of this pathway.

Local intelligence: The IP was located in an area of high poultry density and the farmer had also reported high levels of wild crows and seagulls on the farm.

Clinical picture

21/09/2022 – one shed of laying hens, aged 14-18 months, were noticed to be quieter than normal.

22/09/2022 – their feed and water consumption reduced and by 17:00 40 birds had been found dead. On the same evening, it was noted that the ducks in another shed had become quieter than normal and the owner noted a drop in their feed and water consumption that night.

23/09/2022 – no mortalities but the ducks were still quiet and not eating or drinking so the owner reported suspicion of notifiable avian disease and a visit was made that day. In the affected laying hens shed, only 120 out of 400-450 hens were still alive. No clinical signs were observed apart from a few hens with diarrhoea and heavy discharge from the beaks and only a few dead birds showed cyanotic combs and wattles. Post-mortem examinations on 2 dead birds were unremarkable, apart from one with congested lungs.

Timeline

[Tracings windows](#)

Source tracings window:

High-risk:	18/09/2022 to 20/09/2022
Likely:	07/09/2022 to 17/09/2022
Precautionary:	02/09/2022 to 16/09/2022

Spread tracings window:

High-risk:	19/09/2022 to 23/09/2022
Likely:	08/09/2022 to 18/09/2022
Precautionary:	03/09/2022 to 07/09/2022

Most likely date of infection: 18/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 487: Source and spread timeline for AIV 2022/81

Source Tracing Window	Spread Tracing Window	Date	
Day 19		02/09/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		03/09/22	Start of precautionary spread tracing window (source + 24h).
Day 17		04/09/22	
Day 16		05/09/22	
Day 15		06/09/22	
Day 14		07/09/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	08/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	09/09/22	
Day 11	Day 3	10/09/22	
Day 10	Day 4	11/09/22	
Day 9	Day 5	12/09/22	
Day 8	Day 6	13/09/22	
Day 7	Day 7	14/09/22	
Day 6	Day 8	15/09/22	
Day 5	Day 9	16/09/22	
Day 4	Day 10	17/09/22	
Day 3	Day 11	18/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	19/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	20/09/22	
	Day 14	21/09/22	Precautionary onset of clinical signs (hens in one house showing lethargy, decrease in feed and water intake, ruffled feathers.)
	Day 15	22/09/22	40 dead hens in affected shed, and adjacent shed of 145 ducks affected later in day
	Day 16	23/09/22	Notification of suspicion of disease to APHA. 400 - 500 deaths since 22/09/2022 (DPR 2022/192). Restrictions served.
	Day 17	24/09/22	HPAI Confirmed. AIV2022-81
	Day 18	25/09/22	
	Day 19	26/09/22	Cull and preliminary C&D completed
	Day 20	27/09/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

64 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 1-67,000 birds (6 premises with 50 or more birds).

3 premises holding both pigs and poultry.

SZ (3-10 km)

353 premises with poultry were reported to be within 10 km of the IP with the additional premises holding 1-300,000 birds (44 premises with 50 or more birds).

12 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for milk tanker collections and a feed delivery during the high-risk tracing windows. No other poultry contacts were identified; the tracings were all assessed as very low risk and the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The coast and nearby estuary were considered likely substantial sources of infection. Very abundant wildfowl and gull populations and abundant corvid populations enable indirect infection pathways close to, or onto the IP.

The shed housing the initially infected chickens was in bad condition with holes in the roof and windows nets missing.

Biosecurity was poor with no dedicated footwear or clothing and poorly maintained foot-dips.

Spread investigations: Assessment of potential and likelihood of spread

Spread of infection off the IP via wild birds: The background infection pressure was assumed to have been substantial and any additional contribution by this IP would be limited as the affected birds were housed.

The lack of records made tracings of eggs and products sold to the public at the farm shop impossible to be traced but risk of spread via that route was assessed as very low as the purchasers would be the final consumers.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/82, Near Attleborough, Breckland, Norfolk, England

Description of the premises

Overview of the premises and the wider business

The IP was a commercial indoors turkey fattening unit owner by a large poultry company with multiple other sites. It operated as all-in-all-out system with birds placed at six-weeks old and reared on site until they reached slaughter weight.

Species and number of each present

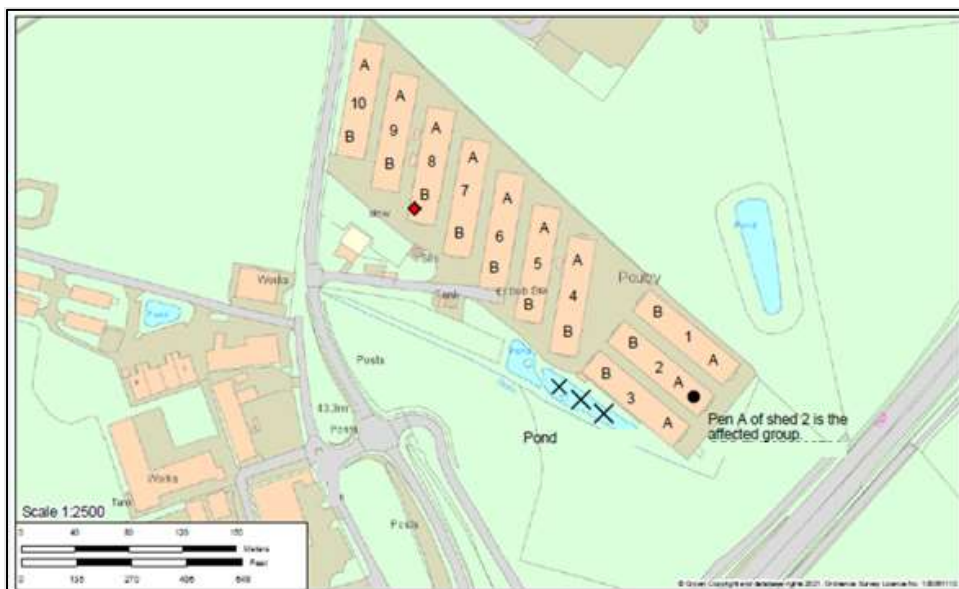
63,600 turkeys aged between 98 -119 days.

Description of the housing

The premises consisted of 10 sheds, each divided into 2 pens. There was a lobby area in the central part of the shed, separating the two pens, each of which held 2,500 – 3,000 birds. The sheds were found in good state of repair and it was unlikely that wild birds could access the flock. The sheds were made of solid walls, provided with mainly artificial lightning and a fan-operated ventilation system. All the turkeys were bedded on deep wood shavings.

Plan of the infected premises

Figure 488: Plan of AIV 2022/82



Overview of biosecurity

Biosecurity was reported to be good. There was a wheel wash and disinfection point for vehicles at the site entry.

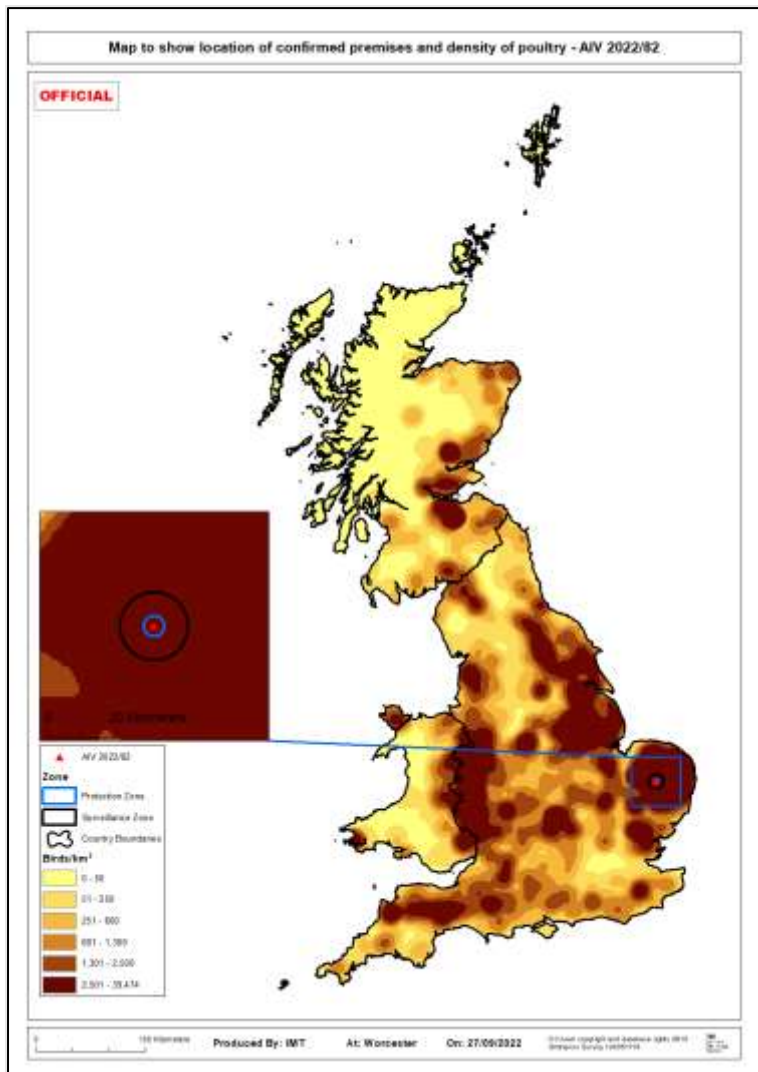
Three full-time workers tended the site and there was a shower on and shower off system in place. There were boot dips on entry to each shed and shed specific footwear was kept within the lobby area. The boots were very clean but the hygiene barrier in the lobbies was not effectively separating the clean from the dirty area as it was not fixed on the floor. Overalls were not changed when entering bird accommodation

Rodent control was carried out by external contractor and there was no evidence of rodent/vermin infestation at the time of APHA visit.

The bedding (bales of wood shavings and straw) was stored in three outdoor sites. The bales were individually wrapped, stored on pallets and covered. They were unwrapped inside the poultry accommodation and so were a possible source of contamination.

Map with location in Great Britain and poultry density

Figure 489: Location of IP and poultry density



Overview of the surrounding area

The IP was in a high poultry density area.

Ornithological assessment

Desktop assessment: This concluded that there was a strong local source of infection nearby with infection pathways involving gulls or corvids being the most likely.

Local intelligence: There were two ponds and woodland nearby with seagulls and rooks making daily visits to the premises.

Clinical picture

24/09/2022 – one dead turkey found in pen A of house 2.

25/09/2022 – three more deaths in the same pen.

26/09/2022 – 40 more deaths and 11 culled on welfare grounds in pen A of house 2. Suspicion of notifiable avian disease (NAD) was reported. The only clinical sign noted was depression and reduced water intake.

At the APHA investigation the same day, 20 birds were examined, and all were lethargic. Two had an increased nasal discharge and one bird presented with neurological signs. Samples were submitted.

Timeline

Tracings windows

Source tracings window:

High-risk:	21/09/2022 to 23/09/2022
Likely:	10/09/2022 to 20/09/2022
Precautionary:	05/09/2022 to 09/09/2022

Spread tracings window:

High-risk:	22/09/2022 to 26/09/2022
Likely:	11/09/2022 to 21/09/2022
Precautionary:	06/09/2022 to 10/09/2022

Most likely date of infection: 21/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 490: Source and spread timeline for AIV 2022/82

Source Tracing Window	Spread Tracing Window	Date	
Day 21		06/12/21	
Day 20		07/12/21	
Day 19		08/12/21	
Day 18		09/12/21	
Day 17		10/12/21	
Day 16		11/12/21	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 15		12/12/21	Start of precautionary spread tracing window (source + 24h).
Day 14		13/12/21	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	14/12/21	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	15/12/21	
Day 11	Day 3	16/12/21	
Day 10	Day 4	17/12/21	
Day 9	Day 5	18/12/21	
Day 8	Day 6	19/12/21	
Day 7	Day 7	20/12/21	
Day 6	Day 8	21/12/21	
Day 5	Day 9	22/12/21	
Day 4	Day 10	23/12/21	
Day 3	Day 11	24/12/21	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	25/12/21	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	26/12/21	
	Day 14	27/12/21	Precautionary onset of clinical signs.
	Day 15	28/12/21	
	Day 16	29/12/21	
	Day 17	30/12/21	
	Day 18	31/12/21	
	Day 19	01/01/22	Notification of suspicion of disease to APHA. APHA investigation and sampling (DPR 2022/XXX). Restrictions served.
	Day 20	02/01/22	
	Day 21	03/01/22	
	Day 22	04/01/22	
	Day 23	05/01/22	
	Day 24	06/01/22	Cull completed
	Day 25	07/01/22	Preliminary C&D completed
	Day 26	08/01/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

28 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 2-32,638 birds (26 premises with 1-49 birds, 0 premises with 50-999 birds, 2 premises with >1000 birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

388 premises with poultry were reported to be within 10 km of the IP holding between 1-377,593 birds (329 premises with 1-49 birds, 22 premises with 50-999 birds, 37 premises with >1000 birds).

11 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for several feed deliveries and ABP collections within the high-risk tracing windows. All staff members were confirmed as having no other poultry contacts. No further actions were required for the tracings, as all were assessed as very low risk and closed.

Source investigations: Hypothesis for the source

The most likely source identified was indirect contact with infected wild birds.

Assessment and evidence base for the likely source

A desktop assessment concluded that there was a strong local source of infection nearby.

Daily visits to site by seagulls and rooks were noted.

Although biosecurity was relatively good there were some issues that could have resulted in indirect introduction of infective material and ingress via the ventilation system could not be ruled out.

All other source pathways were assessed as very low or negligible likelihood.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways were assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/83, Near Selby, Selby, North Yorkshire, England

Description of the premises

Overview of the premises and the wider business

The IP was a commercial, free-range layer unit, housing approximately 32,000 free-range layer hens in a multi-tier system. The premises consisted of one shed divided into two, with 16,000 birds in each side. Both sheds shared the same air space (communicating by door). The hens were delivered at 16 weeks old and normally stayed until they were between 72-78 weeks old, at which point they would have been sent to slaughter.

The site operated an all in/all out system. Once the sheds were emptied, contractors were used to remove the litter, wash and disinfect the sheds. After three weeks empty, new hens would be placed and the laying cycle would start again.

At the time of the visit the hens were 30 weeks old and producing just over 30,000 eggs each day. These came from the sheds via the conveyor belt into the egg grading/packing room where they were graded, placed in trays and moved to the storeroom. Egg collections from the site were generally 3 times a week with the last collection on the same day as the first deaths were seen.

Species and number of each present

32,000 laying hens.

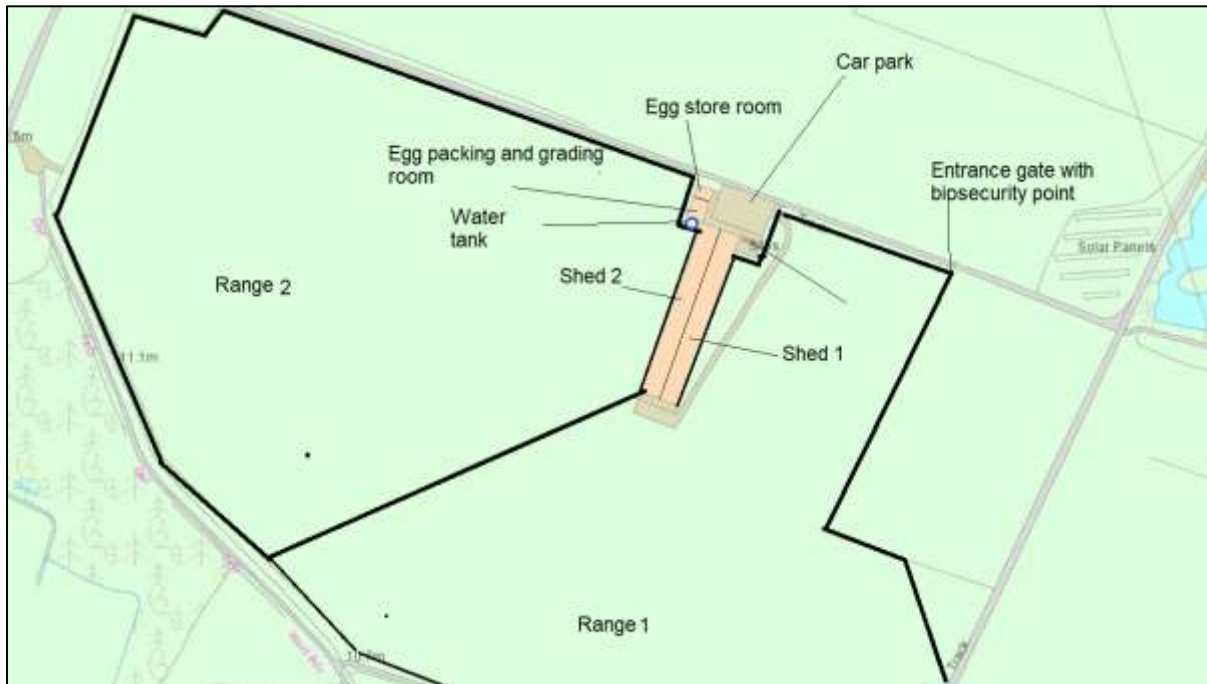
Description of the housing

The bird house was five-years old, with a concrete apron around the building. It had an automatic ventilation system, nine roof exhaust fans, two fans at the end of each shed, two front doors and two back doors. It was a standard building in very good

condition. There were twenty-four outside doors (“pop-holes”) on each wall to allow the hens to get access to the outside.

Plan of the infected premises

Figure 491: Plan of AIV 2022/83



Overview of biosecurity

Biosecurity was reported to be good, but contact with wildlife and wild birds was possible.

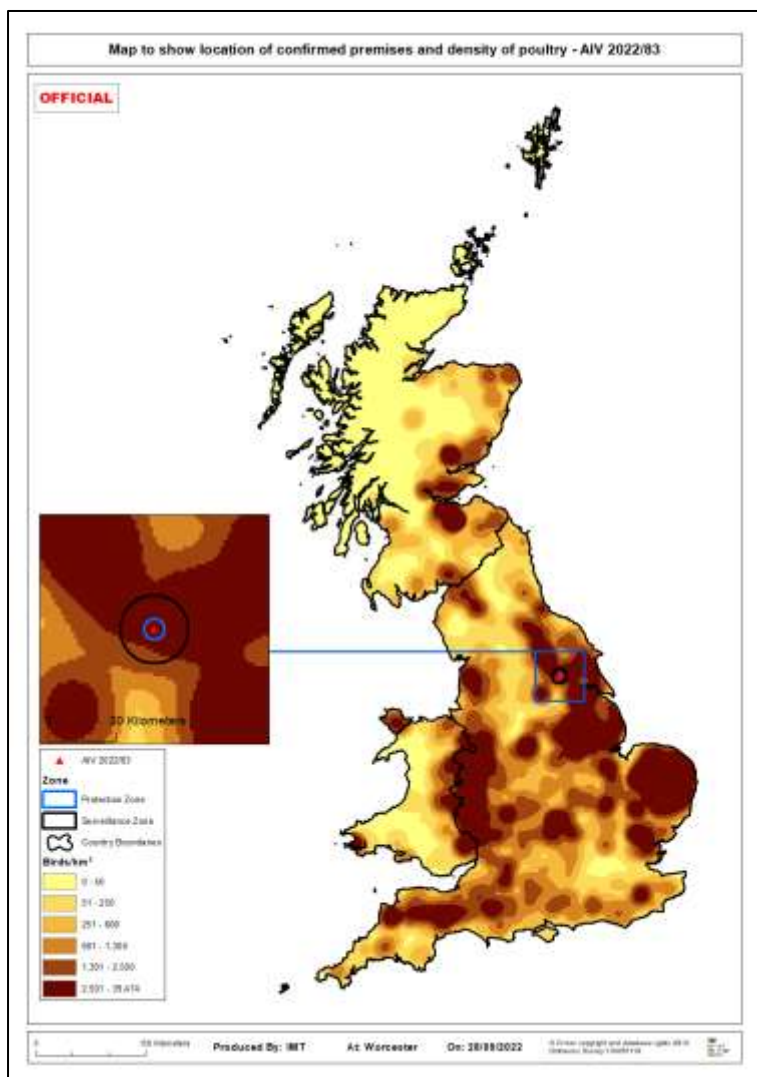
There were vehicle tyre sprays at the entrance, and boots dip on several points at the perimeter of the building. Coveralls and boots were provided on site.

Overall, the buildings were reasonably new and in good condition. The concrete apron was clean and tidy with bait traps deployed on the perimeter. No vermin activity was seen.

The units were wildlife proof, but the chickens were free range and contact with wild birds was likely. There was a lake which had attracted wild geese about 100 m away.

Map with location in Great Britain and poultry density

Figure 492: Location of IP and poultry density



Overview of the surrounding area

The farm was in a wet area and the range fields used to be wetlands in the past but had now been filled and raised using soil and rock. There was a wood near the range fields and a lake about 100 metres away, where there were numerous wild birds and waterfowl. There were also other nature reserves in the locality and a high density of poultry farms in the area.

Ornithological assessment:

Desktop assessment: The IP was in a rural, lowland and inland setting in a landscape dominated by arable land-use. Despite this general description, the immediate setting of the IP is within a large block of pasture (which included the extensive ranges at this site) with substantial blocks of natural deciduous woodland within 400 m across the north, west and south of the site and a small block to the

east. This woodland graded into semi-natural vegetation (scrub and heath) producing a large area suitable for many wild birds.

There was a pond <100 m from the edge of the range (>1 ha of open water and with small islands) which was considered attractive to wildfowl and other water birds; this feature was only 1.8 km from a river.

There was a substantial potential source of infection close to the IP including massive numbers of gulls. The free-range system was also where wildfowl, waders, gulls and corvids might have produced direct infection pathways. All indirect infection pathways were also likely.

Local intelligence: The IP was in a high poultry density area.

Clinical picture

Normally there was about one death per week in both shed but on 26/09/2022 seven birds died in shed 2. Food and water consumption were normal and egg production remained normal.

27/09/2022 – 30 birds died and food and water consumption dropped a little. Birds showed signs of lethargy and diarrhoea. Suspicion of notifiable avian disease was reported.

28/09/2022 – another 80 birds were found dead in the morning and more birds were affected. Another 170 birds were found dead in the afternoon. Water and feed consumption dropped by 5% and egg production decreased to 27,000 instead of the expected 30,000.

A similar picture started to develop in Shed 1 with 3 dead birds and a few looking sick. No change in normal feed and water consumption.

Timeline

[Tracings windows](#)

Source tracings window:

High-risk:	22/09/2022 to 24/09/2022
Likely:	11/09/2022 to 21/09/2022
Precautionary:	06/09/2022 to 10/09/2022

Spread tracings window:

High-risk:	23/09/2022 to 27/09/2022
Likely:	12/09/2022 to 22/09/2022
Precautionary:	07/09/2022 to 11/09/2022

Most likely date of infection: 22/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 493: Source and spread timeline for AIV 2022/83

Source Tracing Window	Spread Tracing Window	Date	
Day 19		06/09/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 18		07/09/22	Start of precautionary spread tracing window (source + 24h).
Day 17		08/09/22	
Day 16		09/09/22	
Day 15		10/09/22	
Day 14		11/09/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	12/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	13/09/22	
Day 11	Day 3	14/09/22	
Day 10	Day 4	15/09/22	
Day 9	Day 5	16/09/22	
Day 8	Day 6	17/09/22	
Day 7	Day 7	18/09/22	
Day 6	Day 8	19/09/22	
Day 5	Day 9	20/09/22	
Day 4	Day 10	21/09/22	
Day 3	Day 11	22/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	23/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	24/09/22	
	Day 14	25/09/22	Precautionary onset of clinical signs (increased mortality over night).
	Day 15	26/09/22	Initial dead birds found
	Day 16	27/09/22	Notification of suspicion of disease to APHA. Increase in mortality APHA investigation and sampling (DPR 2022/198). Restrictions served.
Day 17		28/09/22	HPAI positive PCR, confirmed as AIV 2022/83
Day 18		29/09/22	
Day 19		30/09/22	
Day 20		01/10/22	
Day 21		02/10/22	Cull and preliminary C&D completed
Day 22		03/10/22	Preliminary C&D considered effective
Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.			
Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these			

Surveillance activity

PZ (0-3 km)

13 premises with poultry were reported to be within 3 km of the IP with the additional premises holding 2-43 birds (0 premises with 50 or more birds).

0 premises holding both pigs and poultry.

SZ (3-10 km)

63 premises with poultry were reported to be within 10 km of the IP with the additional premises holding 1-240000 birds (29 premises with 50 or more birds).

9 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

Tracing investigations were initiated for a private vet, egg collections, feed deliveries and a movement of manure off the premises within the high-risk tracing windows. A visit was generated to further investigate the destination of the manure location,

which was subsequently restricted for 42 days at the destination. All tracings were assessed as negligible or very low risk of disease transmission and the tracings were closed.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

The farm was free range and the hens roamed freely in the fields, where they could have had both direct and indirect contact with potentially infected wildlife. There was a large pond with wildfowl about 100 m from range 1.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.

AIV 2022/84, Near Lowestoft, East Suffolk, Suffolk, England

Description of the premises

Overview of the premises and the wider business

This was a small, mixed species commercial premises. The eggs from the chicken flock were consumed by the owners, sold at the farm gate or given to friends. Some eggs had been given to a friend on 23/09/2022, but she had no poultry contacts.

The geese were kept as pets.

Species and number of each present

60 chickens and five free-range geese.

29 sheep, one sow with nine piglets.

Description of the housing

The chickens were housed in small groups in both inside and outside pens.

Area 1 in Figure 1

The affected group (26 hens) were housed in a pen of netted mesh inside an old cow shed, accessible to wild birds.

A pen of 8 adult chickens and 2 chicks were housed in another pen in the same shed.

Areas 3, 4 and 5

There were also three outside pens each consisting of a wooden hut with a netted run, housing groups of 1 adult and 7 chicks, 6 adults, and 12 adults.

Area 6

All the geese were free-range/semi-wild and regularly ranged outside their enclosure. They had access to a pond which was also visited by wild birds. Wild ducks and other aquatic birds had been observed at the time of the investigation (Area 6 with the sheep).

9 piglets were housed in a pen in the old cow shed (Area 2) and 1 sow lived in an outdoor hut in a field with the 29 sheep (Area 9).

The bedding for the birds was sawdust and cut grass. The water was mains supplied.

Plan of the infected premises

Figure 494: Plan of AIV 2022/84

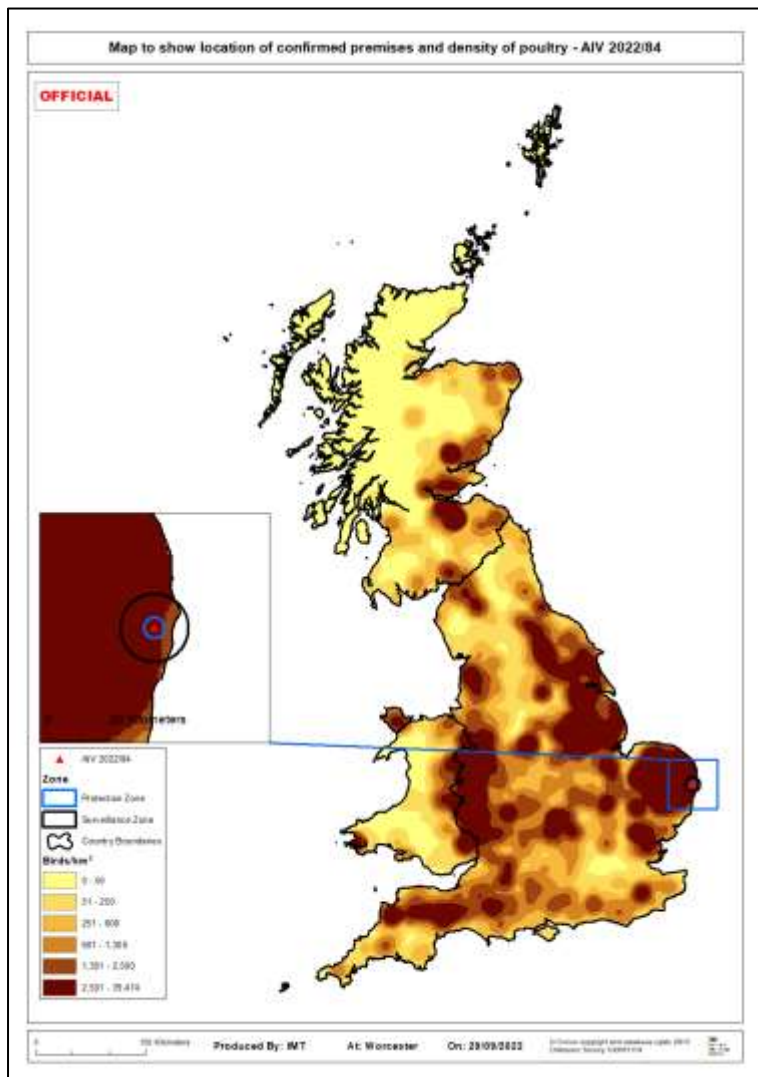


Overview of biosecurity

There were no biosecurity measures on the IP (no dedicated PPE, no foot-dips near the birds and one of the gates to the shed was left open for ventilation purposes which allowed wild bird access).

Map with location in Great Britain and poultry density

Figure 495: Location of IP and poultry density



Overview of the surrounding area

The IP was in an area of high poultry density and close to the coast.

Ornithological assessment:

Desktop assessment: Not conducted.

Local intelligence: Infection pressure in this area was assessed as substantial due to its close proximity to the coast. There was a relatively low density of premises (8) within 3 km of the IP

Clinical picture

27/09/2022 – Two chickens were found dead in the group of 26 (Area 1).

28/09/2022 – Five more chickens in the same group were found dead and suspicion of avian notifiable disease was reported. The remainder of the group were lethargic with ruffled feathers, oedema of the eyelids and conjunctivitis. One bird was showing neurological signs and the cockerel had a congested comb.

Timeline

Tracings windows

Source tracings window:

High-risk: 24/09/2022 to 26/09/2022
 Likely: 13/09/2022 to 23/09/2022
 Precautionary: 07/09/2022 to 12/09/2022

Spread tracings window:

High-risk: 25/09/2022 to 28/09/2022
 Likely: 14/09/2022 to 24/09/2022
 Precautionary: 08/09/2022 to 13/09/2022

Most likely date of infection: 24/09/2022 (Start of high-risk source tracing window)

Timeline chart

Figure 496: Source and spread timeline for AIV 2022/84

Source Tracing Window	Spread Tracing Window	Date	
Day 20		07/09/22	Start of precautionary source tracing window (-21d from notification of suspicion to APHA).
Day 19		08/09/22	Start of precautionary spread tracing window (source + 24h).
Day 18		09/09/22	
Day 17		10/09/22	
Day 16		11/09/22	
Day 15		12/09/22	
Day 14		13/09/22	Start of likely source tracing window (-14d from precautionary onset of clinical signs).
Day 13	Day 1	14/09/22	Start of likely spread tracing window (source tracing window +24h).
Day 12	Day 2	15/09/22	
Day 11	Day 3	16/09/22	
Day 10	Day 4	17/09/22	
Day 9	Day 5	18/09/22	
Day 8	Day 6	19/09/22	
Day 7	Day 7	20/09/22	
Day 6	Day 8	21/09/22	
Day 5	Day 9	22/09/22	
Day 4	Day 10	23/09/22	
Day 3	Day 11	24/09/22	Start of high risk source tracing window (-3d). Most likely infection date for this outbreak.
Day 2	Day 12	25/09/22	Start of high risk spread tracing window (source +24h).
Day 1	Day 13	26/09/22	
	Day 14	27/09/22	Precautionary onset of clinical signs (two birds found dead in the evening).
	Day 15	28/09/22	Notification of suspicion of disease to APHA. Further 5 birds found dead APHA investigation and sampling (DPR 2022/156). Restrictions served.
	Day 16	29/09/22	
	Day 17	30/09/22	Cull and preliminary C&D completed
	Day 18	01/10/22	Preliminary C&D considered effective
			Purple colour reflects source tracing window. Increased intensity of colour reflects increased possibility of introduction on these dates.
			Yellow colour reflects spread tracing window. Increased intensity of colour reflects increased possibility of spread from the IP on these

Surveillance activity

PZ (0-3 km)

8 premises with poultry were reported to be within 3 km of the IP with the additional premises holding between 4 and 174 birds (1 premises with 50 or more birds).

1 premises holding both pigs and poultry.

SZ (3-10 km)

90 premises with poultry were reported to be within 10 km of the IP with the additional premises holding 1-300,000 birds (28 premises with 50 or more birds).

18 premises holding both pigs and poultry.

Investigations on the infected premises

Overview of tracing activities

There were no tracings identified within the high-risk tracing windows.

Source investigations: Hypothesis for the source

The most likely source identified was direct or indirect contact with wild birds.

Assessment and evidence base for the likely source

There were no biosecurity measures in place.

The door to the shed housing the affected birds was left open for ventilation purposes allowing wild birds to access the pen.

Cut grass was used as bedding and this could have introduced infection.

Spread investigations: Assessment of potential and likelihood of spread

Onward transmission through wildlife: Risk not higher than the background risk.

All other spread pathways assessed as very low or negligible likelihood.

Remaining uncertainty

No remaining uncertainty.