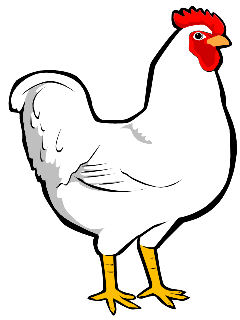
Animal & Plant Health Agency



SRUC

Great Britain avian quarterly report: disease surveillance and emerging threats

Volume 29: Quarter 4 – October to December 2022

Highlights

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Introduction and overview

This quarterly report reviews disease trends and disease threats for the fourth quarter of 2022, October to December. It contains analyses carried out on disease data gathered from the Animal and Plant Health Agency (APHA), Scotland's Rural College (SRUC) Veterinary Services and partner post-mortem providers, and intelligence gathered through the Avian Expert Group.

In addition, links to other sources of information including reports from other parts of the APHA and Defra agencies are included. A full explanation of how data is analysed is provided in the Annex available on GOV.UK.

Issues and trends

Industry trends – chick and poult placings

Broilers

The UK broiler chick placements were 1.6% higher, at 94.5 million chicks, in December 2022 than December 2021. On average, 22.2 million chicks were placed each week in the quarter (Figure 1).

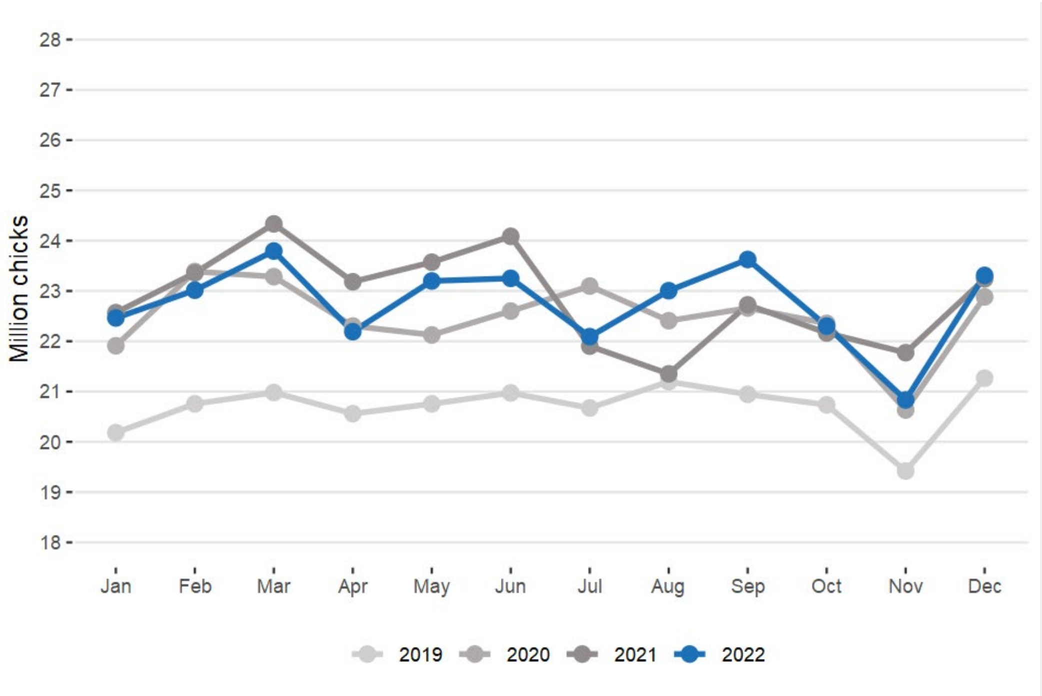

Figure 1: Chart comparing monthly average of broiler chicks placed in the UK each week by UK hatcheries between 2019 and 2022

Turkeys

There was a decrease of 14.2% in turkey chick placements in December 2022 from December 2021, with 0.8 million poults placed in December 2022. On average, 0.2 million poults were placed each week in the quarter (Figure 2).

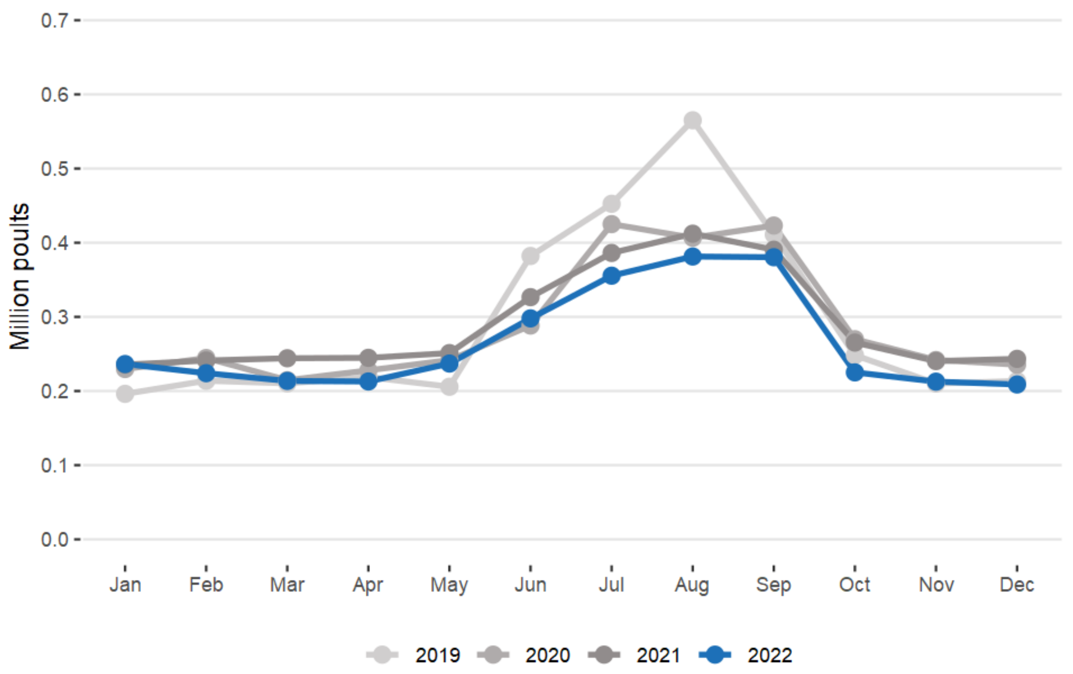

Figure 2: Chart comparing monthly average of turkey poults placed in the UK each week by UK hatcheries between 2019 and 2022

Layers

Commercial layer chick placements were 0.1% lower in December 2022, with 2.6 million chicks placed, compared to December 2021. On average, 0.7 million chicks were placed each week in the quarter (Figure 3).

During this quarter 204 million dozens were packed in UK egg packing stations. This was 12% lower than Quarter 4 of 2021, and 4.2% lower than the previous quarter. In this quarter, 65% of eggs going through UK packing stations were free range, 25% were from hens in enriched colony systems, and 6% were barn eggs. The number of barn eggs was 2.6 times higher in this quarter than the same quarter in 2021. This may be associated with the ongoing highly pathogenic avian influenza outbreak.

The average UK farm-gate egg price this quarter was 108.9 pence per dozen. This is 24% higher than Quarter 4 of 2021 and a 9.9% higher than the previous quarter.

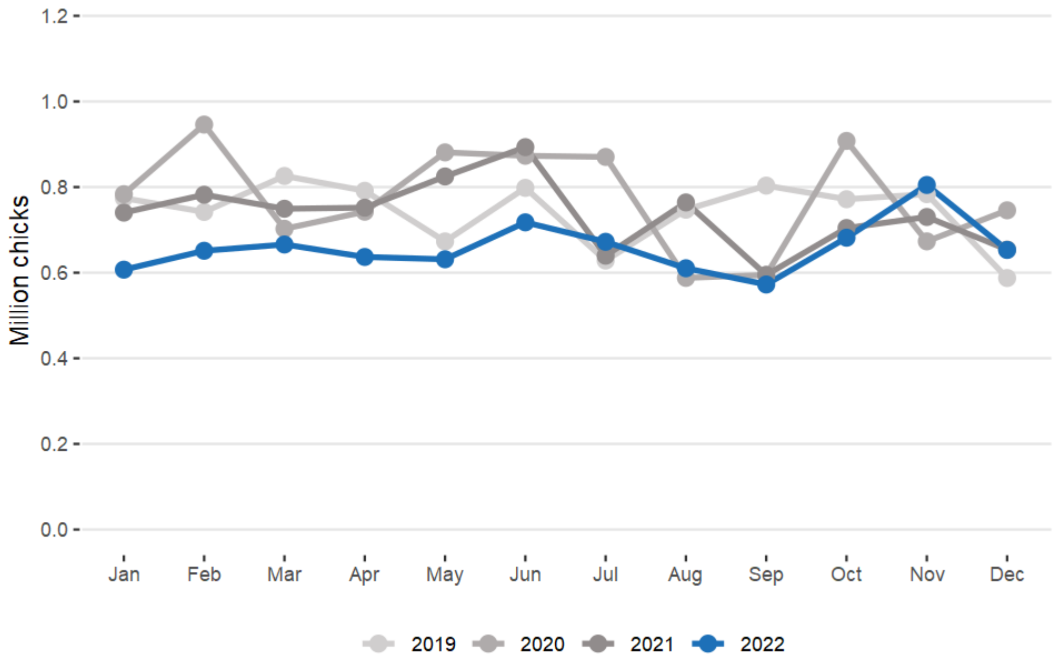

Figure 3: Chart comparing monthly average of layer chicks placed in the UK each week by UK hatcheries between 2019 and 2022

Poultry industry statistics

The poultry industry statistics and the egg statistics are available on GOV.UK.

New and re-emerging diseases and threats

Refer to the annex on GOV.UK for more information on the data and analysis.

Highly Pathogenic Avian influenza (HPAI) in the UK and Europe

Numerous outbreaks of highly pathogenic avian influenza (HPAI) were confirmed in poultry, captive and wild birds in the UK and elsewhere in Europe during Quarter 4 of 2022.

UK situation update to 4 January 2023

For administrative purposes the 2021/2022 HPAI season ended on 30th September 2022, and the 2022/2023 HPAI season started on the 1st October 2022. Between 1st October and 4th January 2023 there were 156 infected premises (IPs) identified with HPAI H5N1. The number of cases per week peaked at the start of the quarter (Figure 4). The infected premises were mainly located in England, but there were also occurrences in Scotland, and Wales.

Avian Influenza Prevention Zones were declared in England, Scotland, Wales and Northern Ireland on 17th October 2022. A housing order was introduced in England on 7th November 2022, and in Wales on 2nd December 2022.

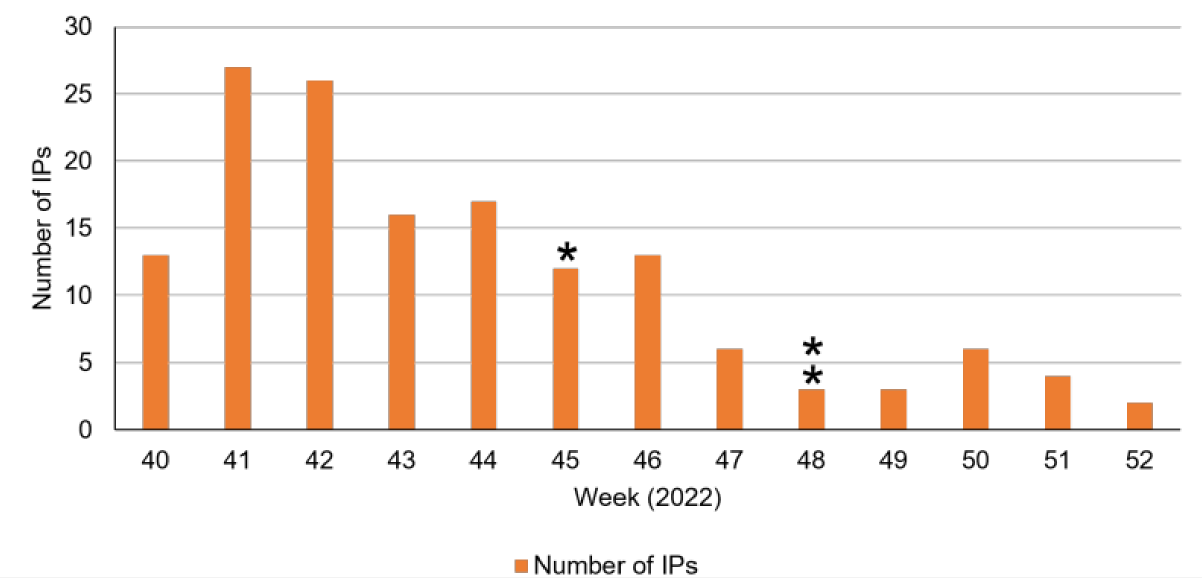

Figure 4: Number of IPs confirmed with HPAI H5N1 in Great Britain between week 40 (start of October) and week 52 (end of December) 2022. Asterisks denote when housing measures were introduced across England (single) and Wales (double) (Freath, 2023)

Between 1st October 2022 and 4th January 2023 there were 642 confirmed cases of HPAI H5 in wild birds in Great Britain (GB). These were across a range of species of waterfowl, seabirds and birds of prey.

Detection of HPAI H5 was confirmed in grey seals in GB at the start of the quarter.

The outbreaks are summarised in the updated outbreak assessments available on gov.uk.

European Food Safety Authority (EFSA) report

The 'European Food Safety Authority avian influenza overview September – December 2022' (EFSA, 2023) reports on the period 10 September to 2 December. The report indicates that in this period there were 398 HPAI outbreaks in poultry, 151 in captive birds and 613 virus detections in wild birds. This spanned across 37 countries, including the UK. The geographic spread of these can be seen in Figure 5, from the EFSA report.

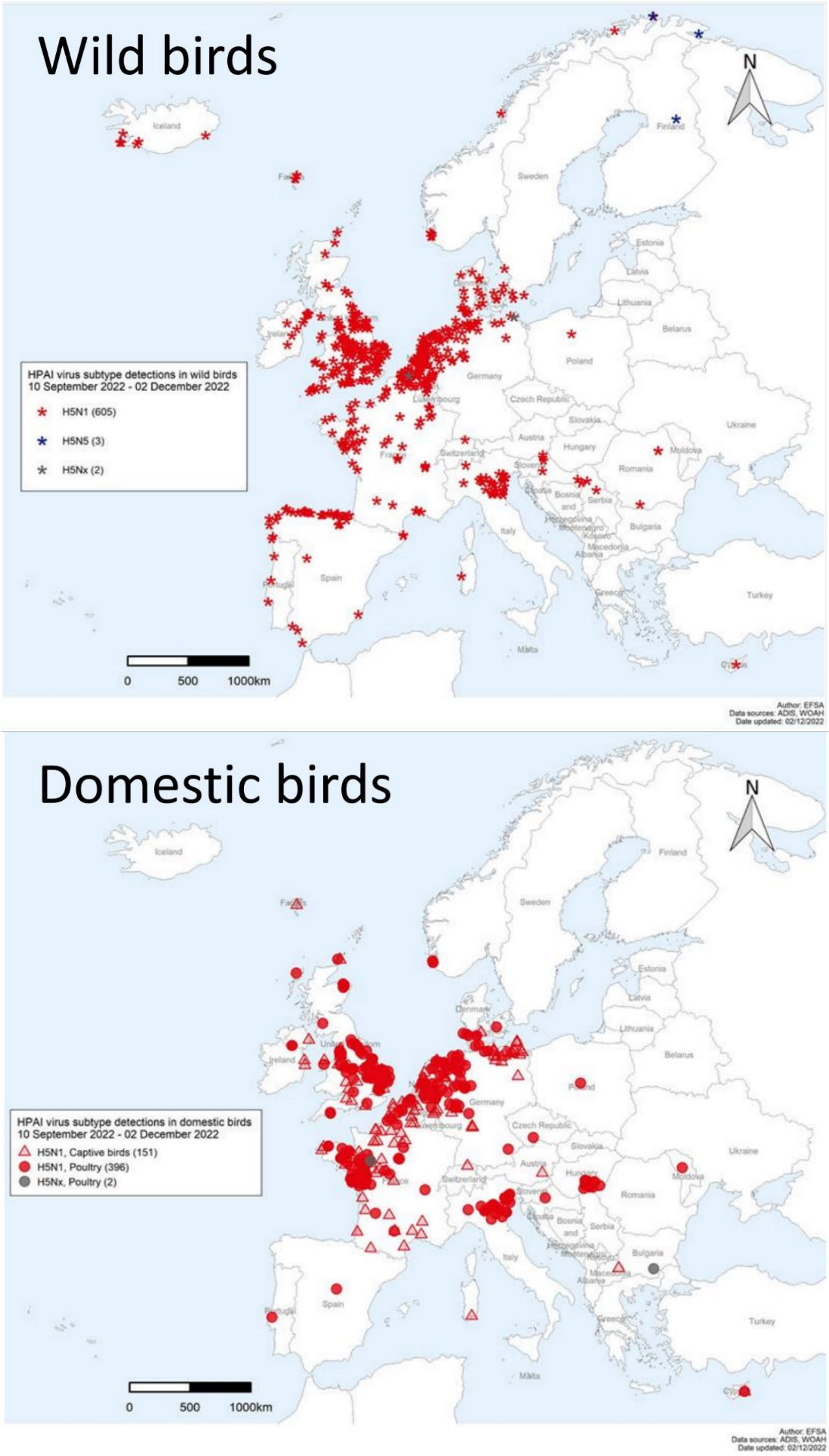

Figure 5: Geographical distribution, based on available geocoordinates, of highly pathogenic avian influenza virus detections in wild birds (613) (upper panel) and outbreaks in poultry and captive birds (549) (lower panel) reported by virus subtype in Europe from 10 September to 2 December2022 (EFSA, 2023)

The weekly numbers of detections of HPAI across all avian species (poultry, captive birds, and wild birds) in successive years, with the number of countries affected each year, are shown in Figure 6, taken from the EFSA report.

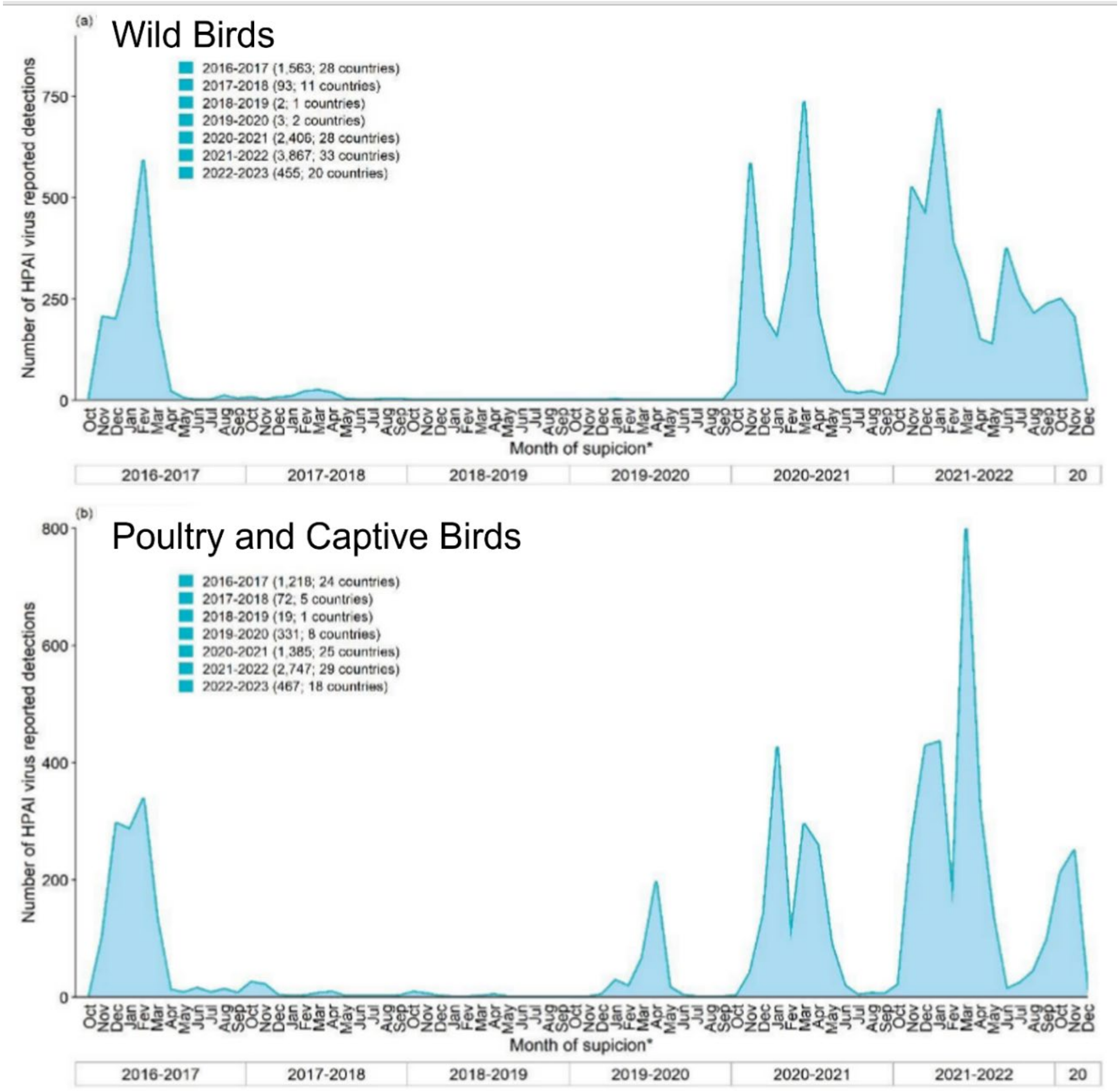

Figure 6: Temporal distribution of the number of HPAI virus detections reported in Europe from 1 October 2016 to 2 December 2022, by month of suspicion in (upper figure) wild birds, and (lower figure) poultry and captive birds (EFSA, 2023).

As seen in the UK, the number of outbreaks in kept birds increased to peak in October. The number of infected premises in this period was 35% higher than the number seen in the same period in 2021. Generally, outbreaks were from direct or in-direct contact with wild birds in several countries such as France, Germany and the Netherlands. Spread between kept poultry was reported more often in Hungry.

Between 10 September and 2 December, the number of waterfowl detections increased. However, the overall number of wild bird detections in EU countries decreased, due to a large decrease in colony-breeding seabird detections.

All the HPAI A(H5Nx) viruses characterised since October 2020 in Europe belong to clade 2.3.4.4b. Based on the available genetic information, the A(H5N1) viruses detected since September 2022 belong to eleven genotypes. Three of these have circulated in Europe during the summer months. The remaining eight are new genotypes that likely evolved through local reassortment events.

The numbers of detections in Africa, Asia and Russia are comparable to the previous reporting period. Reports from the Americas however show four-fold increase in the number of detections. This is due to the spread of HPAI H5N1 to birds in Central and South America. This is the first time that HPAI H5N1 has been reported in South America.

There was one detection of HPAI H5N2 in a smallholder flock in Taiwan.

There have been six new detections of human AI infection in three countries. Two in Spain with H5N1, three in China with H5N1, H5N6 and H9N2 and, one in Vietnam H5 without an NA type. The detections in Spain were deemed by the authorities to be most likely due to environmental contamination, rather than active infection, as there were no clinical signs, and they had been working on culling and cleaning on an infected farm. The detection of H5N1 in China was a lethal infection, they had likely been exposed through culling sick chickens. The detection in Vietnam was in a five-year-old girl who was hospitalised due to clinical signs, she had been in close contact with sick poultry and other domestic birds.

Mammalian detections of HPAI have occurred in this quarter. In October 2022 HPAI H5N1 affected a Spanish mink farm, with increased mortality. HPAI H5N1 was also reported in the United States of America in an American black bear, striped skunks, red foxes, a Virginia opossum and an Amur leopard.

Conclusion

In the UK and across Europe there was no clear separation of the 2022-23 HPAI season in October 2022 from the season in the previous epidemiological year. This was due to the persistence of the virus in wild birds over summer.

The viruses characterised within this quarter retained a preference for avian-type receptors. Mutations associated with mammalian adaptation were only sporadically identified in the analysed viruses from avian species, but they were frequently acquired upon transmission to mammals.

The EFSA report states that 'the risk of infection for the general population in the EU/EEA is assessed as low, and for occupationally exposed people low to medium with high uncertainty due to the high diversity of circulating avian influenza viruses in bird populations.'

The risk assessment published by DEFRA on 4 January 2023 concluded that 'the risk of HPAI H5 infection in wild birds in GB is maintained at VERY HIGH.' The assessment also stated that, 'although the number of IPs has fallen weekly, the infection pressure from both wild birds and residual environmental infectivity remains very high. Therefore, the risk of exposure of poultry across GB where biosecurity is suboptimal is maintained at HIGH (with low uncertainty) while the risk to poultry in GB where biosecurity is stringent is maintained at MEDIUM (with medium uncertainty).'

Low Pathogenicity Avian Influenza

There were no outbreaks of notifiable low pathogenicity avian influenza (LPAI) this quarter.

There are no records of notifiable LPAI in the EFSA report. The non-notifiable subtype H9N2 remains endemic in Asia, the Middle East and Africa. One new human case of H9N2 was reported in China during the period of the EFSA report.

Avian notifiable disease exclusion testing scheme ('Testing To Exclude', TTE, Testing For Exclusion) in Great Britain

The scheme started in May 2014 (Gibbens and others 2014) and is ongoing. For more details see: [APHA Vet Gateway: Testing for exclusion of notifiable avian diseases (defra.gov.uk)].

No exclusion testing investigations were undertaken during Quarter 4 of 2022.

The scheme is very valuable in enabling possible LPAI to be investigated in situations where it is considered to be a differential diagnosis for the clinical signs seen in birds in a flock. The scheme currently only applies to chickens and turkeys.

The first six years of the scheme were reviewed by Reid and others (2021).

Differential diagnosis of negated notifiable disease report (DDNRC) cases in Great Britain

This scheme was introduced in autumn 2018 to offer differential diagnostic investigation through the avian scanning surveillance project at APHA and its partners in cases where suspicion of Notifiable Avian Disease (NAD) has been reported and subsequently negated on either clinical grounds or by laboratory testing.

Differential diagnostic testing is also available for TTE cases if NAD has been ruled out by laboratory testing. The scheme is described in more detail by Welchman and others (2019).

The scheme is important because it gives a better insight into disease outbreaks in both poultry and gamebirds which present with clinical signs suspicious of NAD. When sudden mortality and other clinical signs of NAD affect commercial and small flock birds, there may be significant welfare implications as well as a marked economic impact, warranting further investigation.

Three differential diagnostic investigations were undertaken during Quarter 4 of 2022. There were submissions from a commercial turkey premises, a commercial chicken layer flock, and two smallholder chicken flocks. The cases are summarised in Table 1 below.

Table 1: Table showing details of DDNRC investigations undertaken on cases from Q4 2022

Species	Purpose	Age	NAD negation reason	Clinical signs	Diagnosis
Chicken	Layer	56 weeks old	Official testing	High mortality and dyspnoea	Colisepticaemia
Turkey	Broiler	17 weeks old	Official testing	High mortality and neurological signs. Further detail on page 14	Pasteurellosis
Chicken	Smallholder	10 weeks old	Clinical signs	Dullness and sudden death	Protracted bacterial and fungal infection

Colleagues in private veterinary practice are encouraged to submit samples to this scheme.

Pigeon paramyxovirus investigations

There were two submissions of material tested for Pigeon Paramyxovirus-1 (pAAvV-1, formerly PPMV-1) as NAD report cases at APHA Weybridge during Quarter 4 of 2022. These consisted of cloacal swabs submitted in November and carcasses in December. PAAvV-1 was detected in both by virus isolation and PCR.

Unusual diagnoses

Coccidiosis in a mallard duck

Coccidiosis was identified by histopathology in sections of duodenum and mid-intestine from six-week-old mallard ducks submitted to APHA Lasswade. Approximately 60 birds had died from a flock of 2700. There were no clinical signs noted in the birds. The private veterinary surgeon undertook post-mortem examination (PME) of affected birds and found they were in poor body condition, with friable livers and lesions consistent with necrotising enteritis, and coccidial oocysts were present in the small intestine and caeca. Testing also identified *Brachyspira* species in caecal samples.

Histopathological examination revealed coccidia in different stages of development in the cytoplasm of enterocytes (Figure 7). Fibrinoid necrosis in a small number of villi and the occasional dilated crypt were also identified.

The coccidia species could not be identified as there is limited information available on histological appearance of different coccidia in mallard ducks, and faeces were not submitted for sporulation and speciation of oocysts. Based on the clinical history, necropsy findings and histopathology, coccidiosis was considered as being a major contributor to the clinical signs. The ducklings reportedly responded well to treatment with amoxicillin and toltrazuril.

A comprehensive review of enteric coccidiosis in ducks mentions several pathogenic species of coccidia: *Tyzzeria perniciosa*, affecting commercial ducks, *Tyzzeria pellyerdyi*, affecting mallard ducks, *Eimeria saitamae*, detected in commercial ducks in Japan and affecting predominantly the small intestine, and *Wenyonella philiplevinei*, detected in commercial ducks in North America, affecting the distal portions of the ileum and rectum (Gajadhar and others 1983).

The Veterinary Investigation Diagnostic Analysis (VIDA) database records infrequent diagnoses of coccidiosis in ducks, with 7 diagnoses in the previous 10 years. These diagnoses occurred from June to September, in adult and juvenile birds. This may indicate a seasonality to the disease presentation.

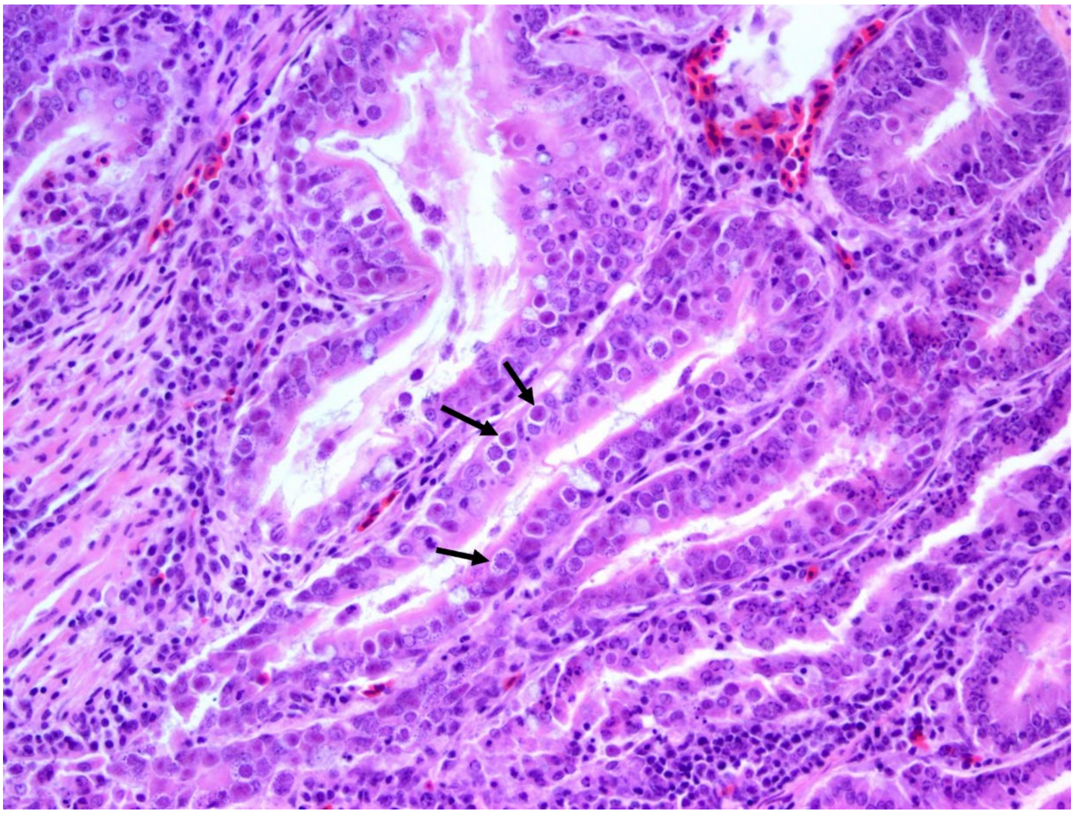

Figure 7: Duodenum of mallard duckling with coccidiosis showing coccidia (arrowed) in different stages of development in the cytoplasm of enterocytes (H&E, original magnification x200).

This case was described in the APHA monthly surveillance report, October 2022, in the Veterinary Record (APHA, 2022b).

Ionophore toxicity in turkeys

Ionophore toxicity due to feed contamination was identified in 11-week-old turkeys. They were housed on a multi-age farm, with 15-week-old turkeys kept in a neighboring barn. The affected birds developed recumbency over a 2- to 3-day period, which led to increased mortality. The main clinical finding was flaccid paralysis of the legs, with most affected birds being in laterally recumbent with raised heads (Figure 8). Affected birds remained bright and alert, but overall the group was generally quieter. The birds had not received any recent treatment. PME by the private practitioner identified changes consistent with dehydration and other body systems were reportedly unremarkable.

Figure 8: Turkeys affected by ionophore toxicity: the white bird is representative of the typical recumbent presentation with the legs laid out to the side.

Histopathological examination at APHA Lasswade revealed an acute to subacute myopathy. Differential diagnoses for this presentation include prolonged recumbency, ionophore toxicity, or a micronutrient imbalance. Additional findings included focal osteonecrosis and medullary depletion of lymphocytic cells in the bursa. The osteonecrosis was likely caused by a small infarct and not considered to be significant at a flock level. The medullary depletion in the bursa is a common finding in birds that are stressed and have other diseases.

Feed analysis identified salinomycin residue at toxic concentrations explaining the clinical signs, mortality, and the myopathy detected by histopathology. Following feed replacement there were no further deaths reported, and the birds body condition improved. As feed contamination was identified the relevant authorities were informed.

Salinomycin is an ionophore coccidiostat, and turkeys are highly susceptible to toxicity. Cinical signs of ionophore toxicity include sudden death and recumbency (Barrow and others 2021). This case demonstrates the importance of considering toxicities, despite no history of exposure at time of submission.

This case was described in the APHA monthly surveillance report, November 2022, in the Veterinary Record (APHA, 2022a).

Pasteurellosis causing high mortality in turkeys

Turkeys were submitted for PME through the DDNRC scheme. The turkeys were from a multi-age site that kept turkeys between the ages of 6 and 19 weeks. Initially, 16- to 18-week-old birds from one house presented with recumbency, head tremors, torticollis, and tachypnoea. There was rising mortality and approximately 3.7% of birds in one house died over four days. Mortality then rose in another group housed in a polytunnel. PME by the private veterinary practitioner found petechiation of the heart, liver and pancreas as well as lung congestion. At this point, due to suspicion of NAD the veterinarian reported suspicion of notifiable avian disease to the APHA. Laboratory testing for NAD carried out at APHA Weybridge was negative for Newcastle disease and avian influenza.

The carcases of a 19-week-old bird from the first affected house, and two 17-week-old birds from the polytunnel were sent to APHA Lasswade for further investigation. The turkeys were in good body condition. The gross pathology was suggestive of a systemic bacterial infection with splenomegaly, lung congestion, air sacculitis and small white lesions in the livers. Other changes included peritonitis in one bird, proventricular haemorrhages in one bird and red mucus in the upper respiratory tract of two birds. *Pasteurella multocida* was isolated from multiple sites of one bird from the polytunnel, and *Escherichia coli* was isolated from the other. No pathogens were identified in the older bird from the house. Histopathological findings in all birds were consistent with pasteurellosis, with splenitis (Figure 9), and hepatitis associated with gram-negative coccobacilli in all birds. There was no microscopic evidence of viral or mycoplasmal disease, and testing for avian metapneumovirus subtypes A and B, and *Mycoplasma* spp. was negative.

It can be difficult to isolate *P. multocida* in more chronic cases, and there was a five-day interval between birds death and PME which may have meant that fewer viable bacteria were present.

The overall findings confirmed a diagnosis of pasteurellosis (also called fowl cholera) as the primary cause of the clinical signs and high mortality. Turkeys are particularly susceptible to this pathogen and, as seen in this case, outbreaks can mimic notifiable disease outbreaks, particularly in the early stages of the infection. Birds, including wild birds, can silently carry *P. multocida*. Transmission can be by direct contact or via fomites. Good biosecurity measures therefore help prevent infection. The bacterium is sensitive to heat and UV light, and correctly used disinfectants will eliminate the bacteria.

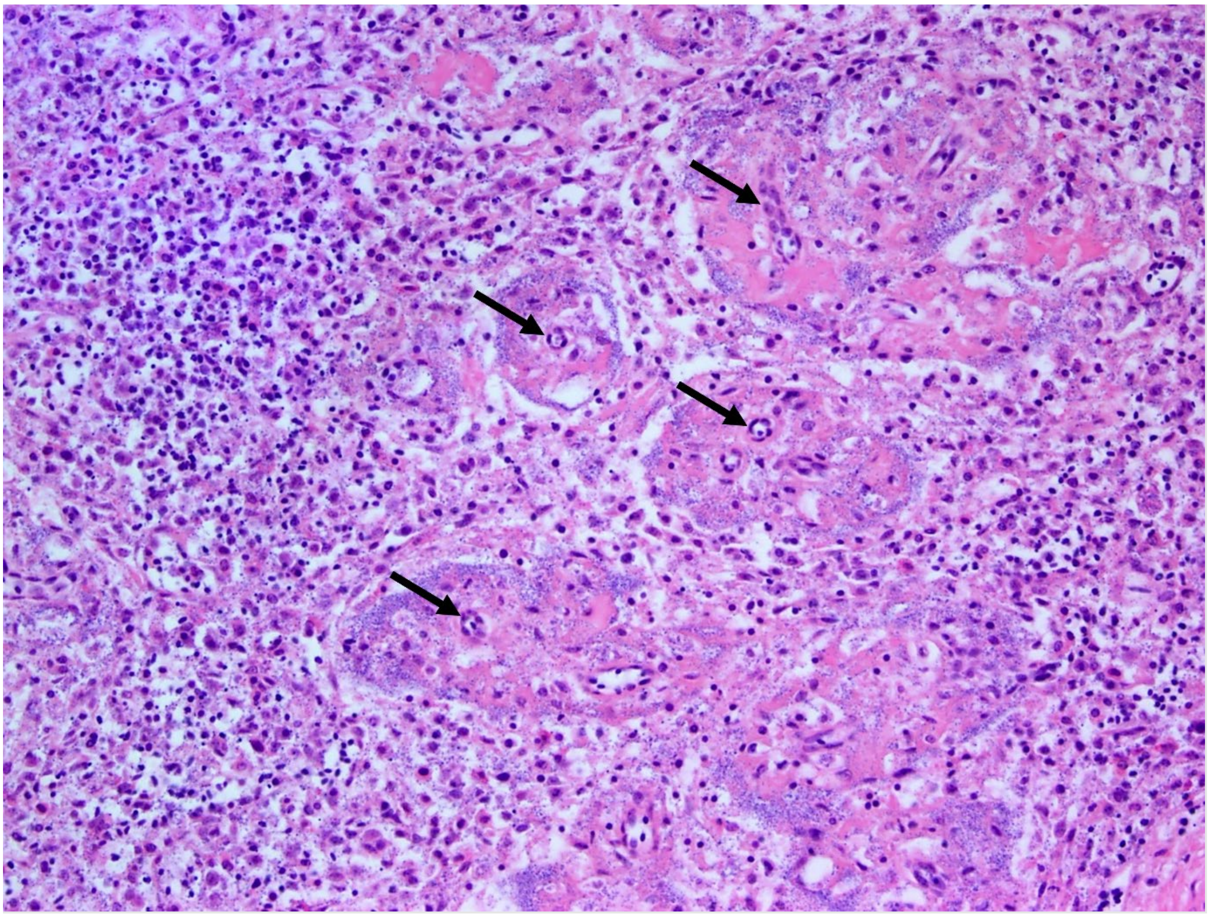

Figure 9: Pasteurellosis: severe fibrinous splenitis associated with numerous Gram-negative coccobacilli. There is marked deposition of eosinophilic fibrinous material around the penicilliform capillaries (arrows) associated with many clusters of bacteria (H&E, original magnification x200)

This case was described in the APHA monthly surveillance report, December 2022, in the Veterinary Record (APHA, 2023).

Horizon scanning

Campylobacter bilis – A new cause of spotty liver disease in chickens

Van and others (2022) have confirmed *Campylobacter bilis* as a cause of spotty liver disease in chickens which was previously thought to be only caused by *Campylobacter hepaticus*. *C. bilis* was first proposed as a cause of spotty liver disease when it was isolated from commercial chickens with spotty liver disease in Australia in 2022 (Phung and others 2022). Van and others (2022) used four groups of 12 disease free chickens to confirm the hypothesis. Three groups were challenged orally with *Campylobacter hepaticus*, or one of two *C. bilis* strains isolated from diseased commercial chickens. The fourth group was kept unchallenged as a control. Gross lesions in the challenged groups were consistent with spotty liver disease, and pure cultures of *C. bilis* were isolated from liver and bile samples.

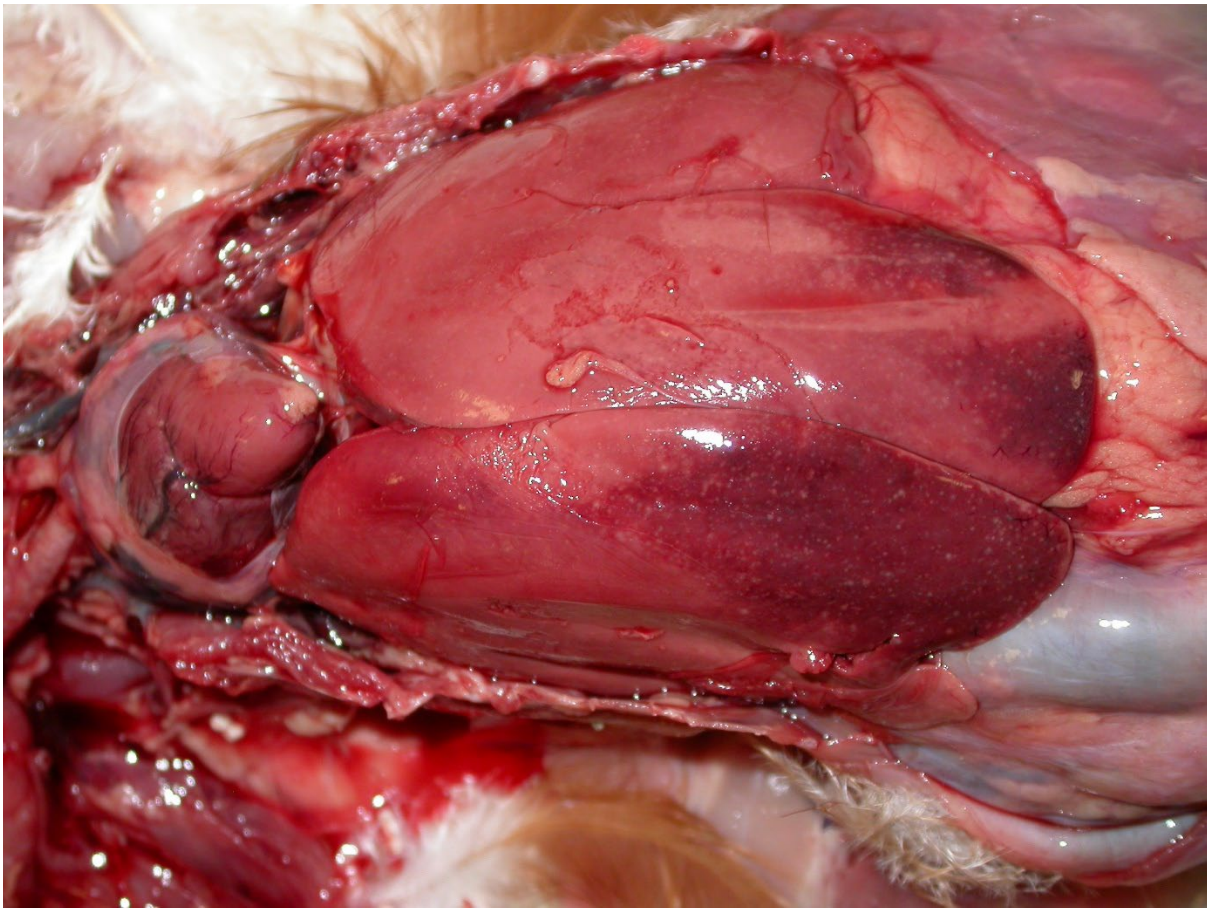

Figure 10: Liver of a chicken diagnosed with spotty liver disease by APHA Lasswade. Note the large numbers of randomly distributed, small pale foci on the liver surface, which the disease was named for

Spotty liver disease is regarded as a sporadic disease most common in free-range layers. It causes characteristic liver lesions consisting of focal to coalescing white spots on and within the liver parenchyma (Figure 10). *C. bilis* has not been detected within the UK by APHA. Culture and differentiation of *C. hepaticus* from *C. bilis* can be done at APHA laboratories. Please contact your local veterinary investigation centre, APHA Lasswade or the avian expert group lead if you would like to investigate cases of spotty liver disease.

Characterisation of infectious bursal disease virus

Legnardi and others (2023) studied 386 infectious bursal disease virus sequences obtained from diagnostic submissions to the Laboratory of Infectious Diseases of the Department of Animal Health, Production and Medicine of the University of Padova during 2021. Samples from Belgium (9), Denmark (6), France (104), Germany (32), Italy (29), The Netherlands (12), Portugal (55), Spain (17), and the United Kingdom (122) were investigated. Of the sequences analysed, 32% were from the UK. with 69 being vaccinal strains and 53 field viruses (considered very virulent) according to the capsid protein VP2 genomic analysis.

The disease is caused by birnavirus, an RNA double-stranded virus, whose genome comprises of two segments. This means that the virus can go through a reassortment process like AIVs. Further analysis performed by Legnardi et al. proved that most field strain detections (both for European and UK strains) were due to recombination between vaccinal and very virulent strains. These viruses seem to be linked to subclinical signs and immunosuppression and according to the study originated from North-Western Europe from which they spread to other areas to become dominant.

IBD is a viral disease, that has direct and indirect effects on a flock's performance. The virus causes varied clinical signs that can span from reduced feed and water intake, depression, intestinal signs and high mortality when very virulent strains are involved. The virus causes immunosuppression as it targets lymphocytes B. Therefore, infected birds may have less of a response to vaccination and are more susceptible to other pathogens, such as *E. coli*. The period where susceptibility to infection is greatest is between 3 and 6 weeks old. (Barrow and others 2021).

This paper demonstrates that IBD is an important disease to understand in GB. Diagnosis is made based on a clinical history with interpretation of gross and histopathological features or results of molecular testing with consideration of the vaccination history. APHA offers agar gel immunodiffusion for antibody detection, however this does not differentiate vaccinated, acutely affected, or historically affected birds.

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http://apha.defra.gov.uk/vet-gateway/surveillance/index.htm

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