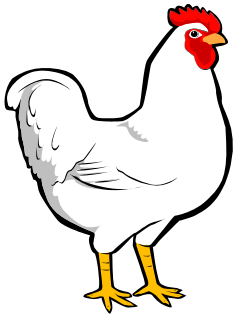
Animal & Plant Health Agency



SRUC

Great Britain avian quarterly report: disease surveillance and emerging threats

Volume 26: Quarter 1 of 2022 (January to March)

Highlights

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Editor: David Welchman
Email: SIU@apha.gov.uk

Introduction and overview

This quarterly report reviews disease trends and disease threats for the first quarter of 2022, January to March. 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

There was an increase of 6.1% in placings of broiler chicks from UK hatcheries during March 2022 compared with March 2021 (see Figure 1), at 103.3 million chicks, representing an average of 24.9 million chicks per week for the quarter.

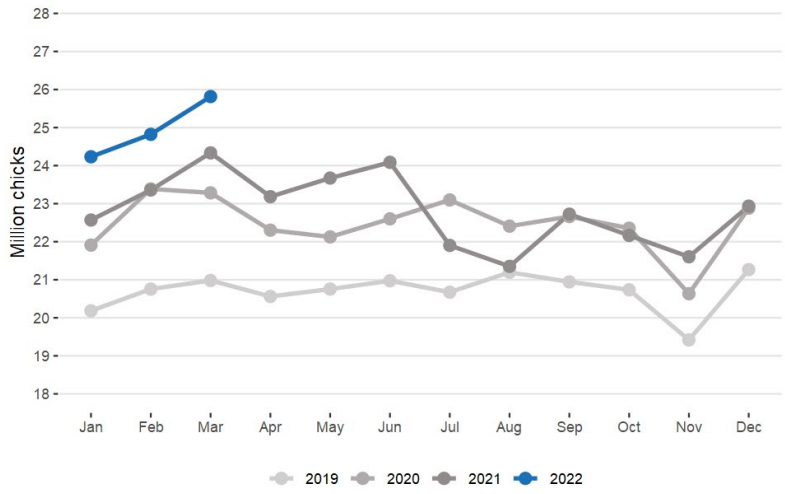

Figure 1: Average number of broiler chicks placed per week in the UK by UK hatcheries

Turkeys

There was 13% increase in the number of turkey poults placed during March 2022 compared with March 2021 (see Figure 2), at 0.9 million, representing an average of 0.2 million poults placed per week for the quarter.

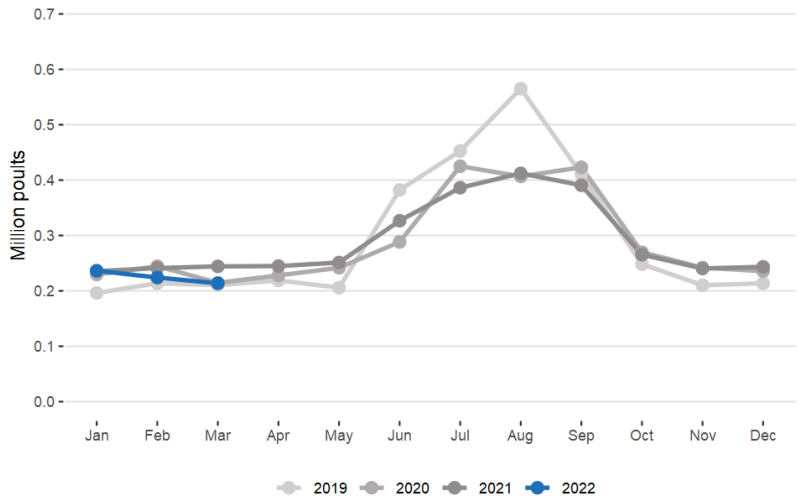

Figure 1: Average number of turkey poults placed per week in the UK by UK hatcheries

Layers

There was a decrease of 11% in the number of layer chicks placed during March 2022 compared with March 2021, at 2.7 million chicks (see Figure 3). UK packing station egg throughput in Quarter 1 of 2022, at 7.6 million cases, was 3.2% lower than in Quarter 1 of 2021 and 1.3% lower than Quarter 4 of 2021. Free range eggs accounted for 56.7% of eggs packed in Quarter 1 of 2022, compared with 57.0% in Quarter 1 of 2021, and enriched colony systems accounted for 32% of eggs packed.

Organic production remained at a low level, with a slight decline compared to the previous quarter. Barn production was 2.4 times higher in Quarter 1 of 2022 compared with the previous quarter, likely to be a result of the housing measures associated with avian influenza. All eggs from free range and organic flocks have been re-labelled as barn eggs since 21 March due to avian influenza restrictions.

Average UK farm gate prices for eggs in Quarter 1 of 2022 were 4.3% lower than the preceding quarter and 3.6% lower than Quarter 1 of 2021.

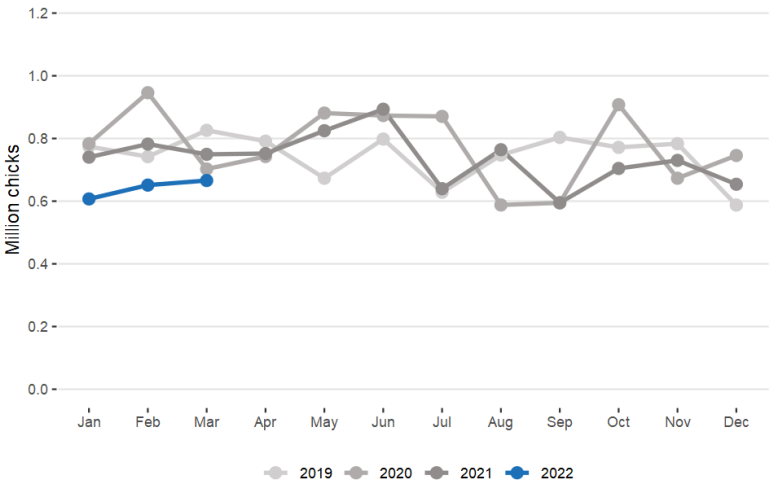

Figure 2: Average number of layer chicks placed per week in the UK by UK hatcheries

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 1 of 2022.

UK situation update to 25 April 2022

Up to 25 April there have been 110 outbreaks of HPAI in poultry and/or captive birds in Great Britain since the start of October 2021, all of which involved H5N1. There have also been 6 outbreaks in Northern Ireland. The outbreaks in poultry have included commercial laying hens, turkeys and ducks, breeder flocks, smallholding and backyard poultry and also gamebirds.

The outbreaks are summarised in the updated outbreak assessment dated 25 April 2022.

Up to 25 April, there have also been 985 wild bird findings in 45 species in which HPAI has been detected, from 270 locations in 74 counties in England, Wales and Scotland. The majority of these have been identified as HPAI H5N1 or, in some cases, the neuraminidase (N) genotype has yet to be identified (H5Nx) due to low viral load. Amongst the largest number of cases, there have been 267 in mute swans (*Cygnus olor*), followed by 129 in Canada geese (*Branta canadensis*), 109 in pink-footed geese (*Anser brachyrhynchus*) and 47 in barnacle geese (*Branta leucopsis*).

Cases have increasingly been identified in different species of raptor, most notably common buzzard (*Buteo buteo*; 112 cases), with an increasing proportion of cases recorded in raptors and other indigenous non-waterfowl species in 2022 compared to 2021. Relatively, very few cases have been identified in ducks, mostly in mallard (*Anas platyrhynchos;* 10 cases).

The outbreaks of HPAI in poultry, captive birds and wild birds in Europe up to 25 April and the relation to wild bird migration flyways are shown in Figure 4.

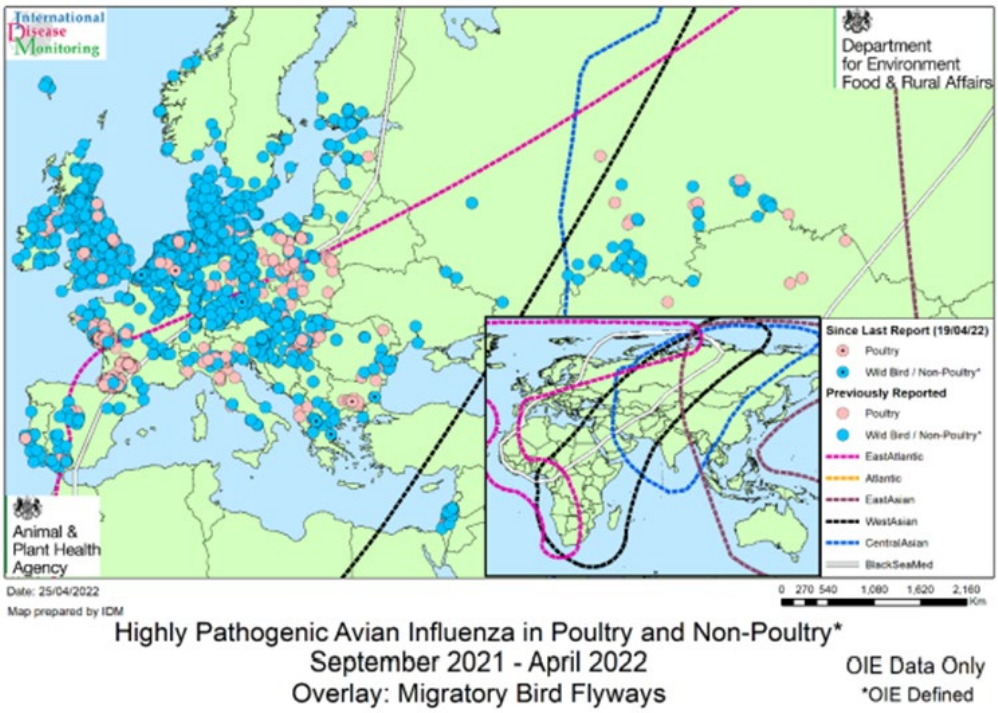

Figure 4: Outbreaks of highly pathogenic avian influenza (from OIE data) in poultry, captive and wild birds across Europe, September to 25 April 2022. Symbols with a central dot are those reported since 19 April 2022 and show the recent emergence of a small number of new outbreaks. The migration flyways are shown as dotted lines, with the UK being in the East Atlantic flyway

European poultry and wildlife update and UK wildlife update 25 April 2022

The latest updated outbreak assessment dated 25 April, referred to above, reports that outbreaks of HPAI have been reported in poultry and/or captive and/or wild birds in 34 European countries (including the UK), according to World Organisation for Animal Health (WOAH) data. Although the situation continues to change daily, the overall number of cases is declining, as shown in Figure 5 below. The strains have been identified principally as H5N1, with only 19 cases of H5N8 in poultry and wild birds, 3 of H5N2 (poultry and wild birds), 2 of H5N5 (wild birds) and one of H5N3 (wild birds).

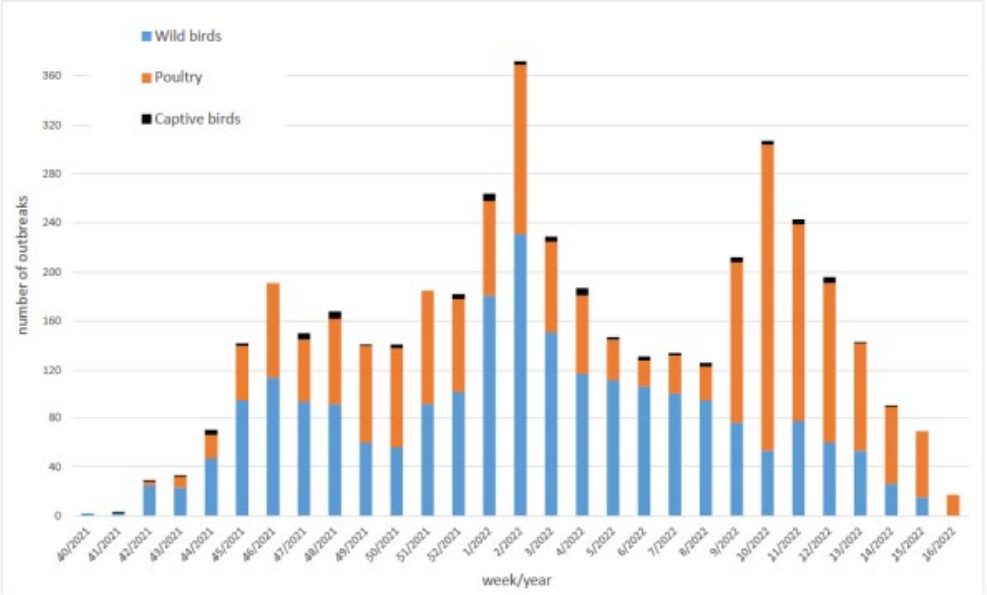

Figure 5: Number of HPAI positive events reported in poultry, captive and wild birds each week in Europe from October 2021 to 21 April 2022 (Istituto Zooprofilattico Sperimentale delie Venezie (IZSVe) 2022)

European Food Safety Authority (EFSA) report

Information in the most recent European Food Safety Authority (EFSA) report dated 30 March 2022 indicates that between 9 December 2021 and 15 March 2022 in Europe (including the UK) there were 1030 HPAI detections in poultry (the majority of poultry detections being in France, Italy, Hungary and Poland), 1489 in wild birds (the majority being in Germany, Netherlands, UK and Denmark) and 133 in captive birds.

In France, there were 389 outbreaks of H5N1 and 17 of N5Nx notified from 5 December to 4 March, the majority in ducks kept for foie gras production in south-western and western regions of France.

HPAI H5N1 was also detected in 5 wild mammal species during the quarter: red fox (*Vulpes vulpes*) in Ireland and the Netherlands, Eurasian otter (*Lutra lutra*) and polecat (*Mustela putorius*) in the Netherlands, ferret (*Mustela furo*) in Slovenia and lynx (*Lynx*

lynx) in Finland. Some of the A(H5N1) viruses from red foxes possessed a mammalian adaptive marker associated with an increased virulence and replication in mammals.

All the HPAI H5N1 viruses characterised during this reporting period (December 2021 to March 2022) belong to clade 2.3.4.4b. The EFSA report states that the results of whole genome sequencing indicate a persistent circulation in Northern Europe of the A(H5N1) and A(H5N8) strains detected during the October 2020 to October 2021 epidemic wave, with the great majority of the viruses belonging to the A(H5N1) subtype. However, the vast majority of the sequenced viruses (approximately 96%) seem likely to be the result of novel virus incursions during the autumn 2021 migration of wild birds.

Between 9 December and 30 March, the principal wild bird species in which HPAI was detected across Europe (more than 30 detections) were barnacle geese (145), common buzzard (122), mute swan (106) and greylag goose (*Anser anser*) (53). The overall geographical pattern shows a concentration of reported cases in a band from the Baltic Sea coasts of southern Sweden, Germany and Denmark in the east, across to the Netherlands in the west.

The numbers of wild birds reported may underestimate the numbers of wild birds that actually died from HPAI, for example HPAI was considered the cause of death of over 4,000 barnacle geese in the Solway Firth, on the west coast of Scotland.

The outbreaks in poultry, captive and wild birds have almost entirely been of HPAI H5N1, with a very small number of outbreaks of HPAI H5N8 which was the predominant subtype in the 2020 to 2021 avian influenza season.

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 below, taken from the EFSA report.

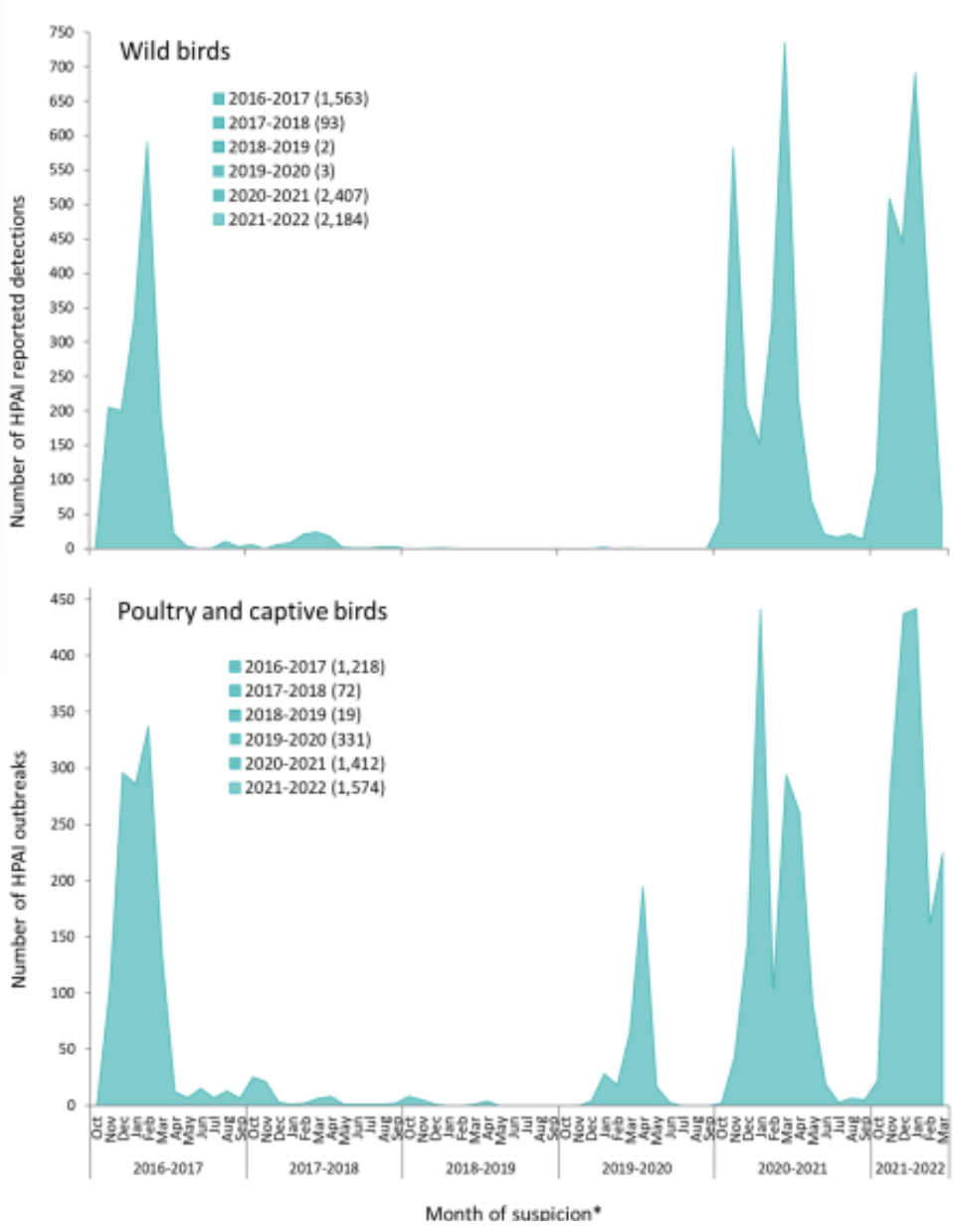

Figure 6: Distribution of total number of HPAI virus detections reported in Europe in the seasons 2016 to 2017, 2017 to 2018, 2018 to 2019, 2019 to 2020, 2020 to 2021 and beginning of 2021 to 2022 by month of suspicion in (upper figure) wild birds (total 6,252) and (lower figure) domestic birds (poultry and captive birds) (total 4,626), from 9 December 2021 to 15 March 2022

The EFSA report also indicates that the 'risk to the general public of human transmission due to avian influenza viruses of the currently circulating clade 2.3.4.4b in Europe is assessed as low and, to people occupationally or otherwise HPAI virus exposed, low to moderate'.

'Avian influenza virus transmission to humans is a rare event and the risk is considered very low for viruses adapted to avian species, which viruses currently circulating in bird populations in Europe are considered to be. However, the detection of viruses carrying

markers for mammal adaptation, and correlated with increased replication and virulence in mammals, is of concern.'

One case of human infection in England was reported in January 2022, arising from very close, regular contact with a large number of infected birds, which were kept in and around the home over a prolonged period of time.

Conclusion

The updated outbreak assessment dated 25 April, referred to above, records that "Even though many birds have been infected already and the remaining migratory waterbirds are departing the UK, there are still immunologically naïve susceptible resident bird species in the UK. However, as these birds disperse to their breeding grounds within the UK, bird-to-bird contacts will reduce, and with decreasing environmental levels of virus the wild bird transmission rate is also decreasing, and with it the wild bird risk. With the departure of the migratory waterbirds from the UK, resident wild bird species will now play a more important role in any residual spread of virus. Bridging species will play a less important role in onward spread of virus given the decrease in environmental contamination. Higher environmental temperatures, together with increasing sunlight intensities will reduce environmental levels of H5N1 and the associated risks in the spring months. The risk of HPAI H5 infection in wild birds in GB is therefore reduced to HIGH".

The report concludes that "Given the decreasing infection pressure from wild birds, the downward trend in confirmed Infected Premises, and changing environmental conditions, we consider the risk of exposure of poultry across the whole GB to be reduced. The risk of exposure of poultry across the whole of Great Britain is assessed as low (with high uncertainty) where good biosecurity is applied, and at medium (with high uncertainty) where biosecurity is suboptimal. This assessment takes into consideration the Avian Influenza Protection Zone (AIPZ) and assumes that bird keepers are taking the additional biosecurity measures required".

The mandatory housing measures announced by the Chief Veterinary Officers for England, Scotland, Wales, and Northern Ireland on 24 November, which came into force on the 29 November 2021, were lifted on 3 May 2022.

Low Pathogenicity Avian Influenza

No outbreaks of notifiable Low Pathogenicity Avian Influenza (LPAI) were identified in the UK in Quarter 1 of 2022.

The EFSA report indicates that no notifiable LPAI was detected in Europe from December to March. The non-notifiable subtype H9N2 remains endemic in Asia, the Middle East and Africa. Fifteen human cases of H9N2 have been reported during the period of the EFSA report in China and one in Cambodia.

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

The Avian notifiable disease exclusion testing scheme started in May 2014 (Gibbens and others 2014) and is ongoing.

No exclusion testing investigations were undertaken during Quarter 1 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 6 years of the scheme were reviewed by Reid and others (2021a, b).

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

This scheme was introduced in autumn 2018 to offer differential diagnostic testing 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 may present with clinical signs suspicious of NAD. When sudden mortality and other clinical signs of NAD affect commercial and small and backyard flock birds, there may be significant welfare implications as well as a marked economic impact, warranting further investigation.

Differential diagnostic investigations were undertaken on 3 cases negated during Quarter 1 of 2022, one in gamebirds (negated following statutory laboratory testing), one in a small backyard flock (negated following clinical examination by the official APHA veterinarian) and one in commercial layers (negated following statutory laboratory testing). No overall diagnosis was reached in the gamebird case, *Mycoplasma synoviae* was identified in the small flock case and erysipelas in the layer case as indicated in the section on erysipelas later in this quarterly report.

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

Pigeon paramyxovirus investigations

There were 4 submissions of material tested for Pigeon Paramyxovirus-1 (pAAvV-1, formerly PPMV-1) as report cases at APHA Weybridge during Quarter 1 of 2022, from pigeon samples submitted in January (one) and March (3, linked to each other). PAAvV-1

was detected by culture from brain tissue and by PCR in cloacal swabs in the January case, but PAAvV-1 was not detected in the March cases.

Unusual diagnoses

Peripheral neuropathy in a bantam

Sudden lameness was reported in a 6-week-old bantam cross chick, one of a clutch of 10 chicks. The bird was bright and eating but was unable to use its legs. The other chicks were not affected, nor were the 11 or 12 hens on the premises. There was no history of vaccination in the birds.

The chick was euthanased and the carcase submitted to APHA for further investigation. Post-mortem examination revealed some slight thickening of the sciatic nerves. Histopathology revealed multifocal perivascular mononuclear infiltration in the white matter of the spinal cord, nerve roots and ganglia and similar mononuclear infiltration in the peripheral nerves and heart. There was also expansion of white pulp in the spleen.

In a small flock such as this, the most common cause for these lesions would be Marek's disease, but PCR testing on the spleen was negative for virulent Marek's disease virus.

However, this presentation is also consistent with the peripheral neuropathy of uncertain aetiology reported in a small percentage of White Leghorns (Bacon and others 2010) and occasionally in some other layer flocks, which sometimes includes inflammatory responses in the spinal nerves and their roots, and which also occurs from 6 weeks of age, as in this case. This peripheral neuropathy is reported to resemble the immunological features of some human polyneuropathies (Bader and others 2010), but the 2 are not otherwise linked.

PCR testing for Marek's disease is required to differentiate between these two conditions in chickens.

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

Toxoplasmosis in a pet chicken

A 9-month-old chicken was submitted to the Veterinary Pathology Centre, University of Surrey after it had shown signs of splayed legs and paresis. Another bird had previously been put to sleep 2 months earlier after showing reduced mobility in one leg. Two birds remained out of the original flock of 4.

Post-mortem examination showed the bird was in good condition with good fat stores. No significant gross lesions were found but the possibility of Marek's disease was suspected based on the clinical signs.

Histopathology was undertaken on a range of tissues including brain, eye, sciatic nerve, heart, lung and spleen. This revealed a severe systemic protozoal infection with major involvement of the central nervous system, heart, and eye. In the brain, there was a

multifocal lymphoplasmacytic and histiocytic meningoencephalitis with numerous protozoal cysts and zoites, and protozoal cysts and zoites were also found in the eye and heart. The severity of the changes associated with the protozoal infection would have accounted for the neurological signs reported clinically. Possible causative protozoa were considered to be *Sarcocystis* and *Toxoplasma* species.

Immunohistochemistry for *Toxoplasma gondii*, undertaken at APHA Weybridge, revealed specific positive labelling of numerous protozoal tachyzoites within foci of necrosis and inflammation in the brain (Figure 7) and specific labelling of bradyzoite cysts with extraocular muscle fibres and associated nerves in the eye, confirming a diagnosis of toxoplasmosis in the bird.

Although chickens are known to be susceptible to *T. gondii* infection, which can be acquired following ingestion of oocysts from cats as the definitive host for the parasite (Beckstead 2020), clinical signs resulting from infection appear to be unusual.

The findings from this bird indicate that toxoplasmosis should be considered in the differential diagnosis of neurological signs in chickens, particularly backyard and smallholding birds that may have access to cats. The consumption of raw or undercooked meat from contaminated birds represents a potential risk of zoonotic infection.

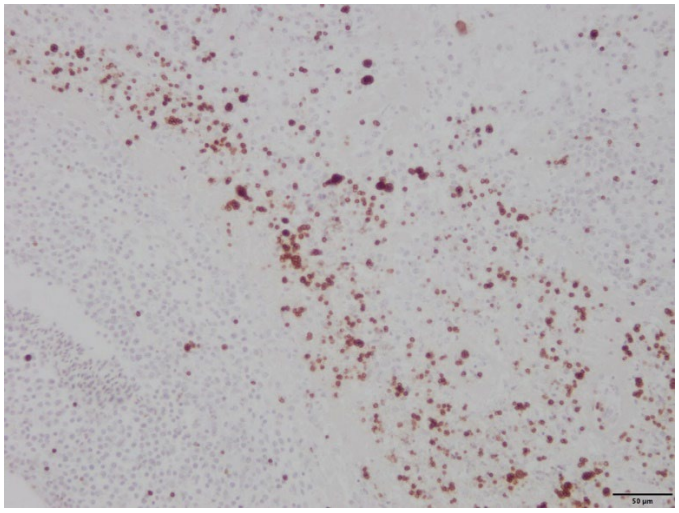

Figure 7: Immunohistochemical labelling of a *Toxoplasma gondii* tachyzoites in the brain of a chicken (bar represents 50 µm)

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

Changes in disease patterns and risk factors

Erysipelas in layer chickens

APHA has regularly diagnosed erysipelas in chickens over the last five years (see Figure 8), based on the isolation *Erysipelothrix rhusiopathiae* directly from post-mortem samples, often from the spleen, or from swabs submitted by practitioners.

The disease is typically diagnosed following an increase in mortality, especially in layer chickens. Two recently diagnosed cases featured mortality; one of 20 birds a day in a flock of 32,000 free range layers aged 74 weeks, housed under the current avian influenza housing measures, and in the other 30 birds were reported to have died out of 24,000 housed free-range layers aged 60 weeks.

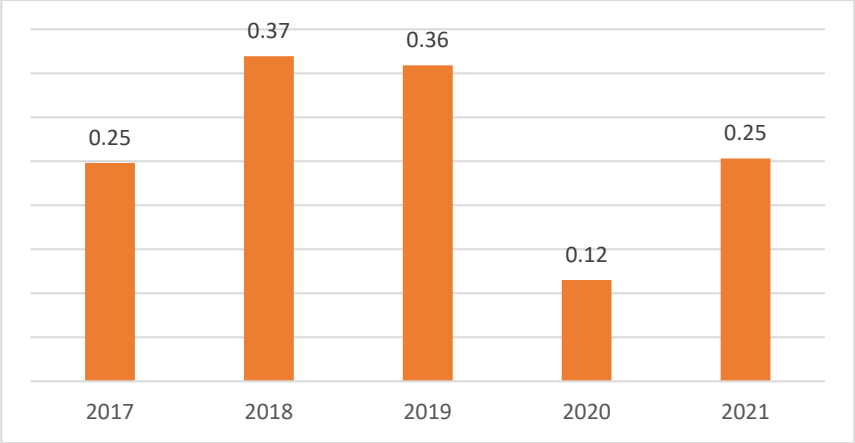

Figure 8: VIDA records of erysipelas diagnoses in chickens, as a percentage of total diagnoses in chickens from 2017 to 2021

In a further recent case, increased mortality in one of 6 houses of housed free-range layers led to suspicion of notifiable disease being reported. Over 70 birds had died in the flock of 2,000 birds in the affected house and others were lethargic.

Post-mortem examinations by the practitioner had revealed splenomegaly and proventricular haemorrhages. Following an official veterinary visit by APHA, statutory samples were collected and notifiable disease was subsequently negated following testing.

Differential diagnostic testing resulted in the isolation of *E. rhusiopathiae* and histopathology on tissues from a bird submitted as part of the statutory sampling revealed numerous intravascular clusters of rod-shaped bacteria in all tissues examined, including, for example, the proventriculus, brain and heart. In the latter, there was a severe acute multifocal necrotising and haemorrhagic myocarditis. These changes were consistent with severe acute septicaemia associated with erysipelas. The flock responded well to amoxycillin treatment after the diagnosis had been made.

There has been an increase in erysipelas cases diagnosed in layer chickens in recent months, as recorded in VIDA (see Figure 9). *E. rhusiopathiae* can be isolated from a wide range of mammalian and avian species, which may act as reservoirs of infection, and it can also be transmitted by flies and other insects. It can also survive for several weeks in soil.

In the case described above, the birds had access to bare soil in the scratching area, which may have been the source of infection. This and some other recent outbreaks may have resulted from increased exposure or contamination in poultry houses owing to birds being housed for a prolonged period due to the current housing measures. The organism

has been shown to be widespread in the poultry house environment during outbreaks including in manure, dust and nipple drinkers (Eriksson and others 2014).

Prompt removal of dead and diseased birds from the environment is important in limiting the spread of infection and this should be done wearing protective gloves to avoid human infection (Eriksson 2020).

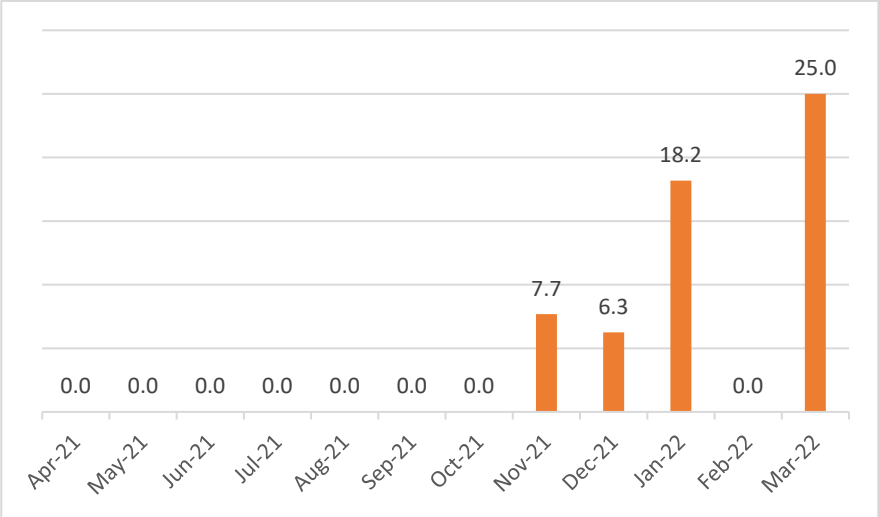

Figure 9: VIDA diagnoses of erysipelas in layer chickens, April 2021 to March 2022, as a percentage of total layer chicken submissions each month

The increase in layer chicken erysipelas cases described above has not coincided with an increase in erysipelas diagnoses in sheep (in which there were no VIDA diagnoses recorded on VIDA between April 2021 and March 2022) or in pigs (in which there have been no consistent trends in VIDA diagnoses since April 2021). This suggests that the increase in chickens is associated with factors not directly related to mammalian livestock.

These cases were described in the APHA monthly surveillance report, April 2022, in the Veterinary Record (APHA 2022c).

Horizon scanning

A novel parvovirus (Chaphamaparvovirus) in French pheasants

In game birds, liver lesions are frequently detected during post-mortem investigation. Many of these changes are part of a systemic disease such as septicaemia. However, hepatitis associated with inclusion bodies has been previously recognised in pheasants (*Phasianus colchicus*) in rear both in the UK and abroad (Rosen and others 1965; Swarbrick 1973). Gelmetti and others (1996) reported 3 outbreaks of mortality in pheasant poults aged 15 to 25 days in which particles resembling parvovirus were detected by electron microscopy in the liver associated with acidophilic inclusion bodies seen on histopathological examination.

In a recent paper, Matos and others (2022) investigated a series of outbreaks on 15 farms between 2017 and 2021 in the east of France, mainly the Pays de la Loire. The main

presenting sign was increased mortality which varied between 4% and 41%, usually of 3-to-4-week-old pheasant poults, but in one case of 6-week-old birds. On gross post-mortem examination, the main finding was enlargement and a mottled appearance of the liver.

In about 20% to 30% of birds, multifocal haemorrhages were detected. Haemorrhagic enteritis, nephritis and splenomegaly were also observed. Histopathology revealed an acute to subacute necrotising hepatitis with a relatively sparse mononuclear reaction and amphophilic to acidophilic intranuclear inclusion bodies. In more chronic cases, a biliary reaction was detected.

Electron microscopy and next generation sequencing (NGS) demonstrated the presence of a parvovirus. Further detailed molecular analysis and *in situ* hybridisation showed the virus to be a novel species of parvovirus designated *Phasianus Chaphamaparvovirus* 1, which was located within the lesions.

The virus was most closely related to a previously described *Chaphamaparvovirus* that was identified in partridges with hepatitis, but also similar to other viruses from the same genus recorded in a variety of galliformes and waterfowl, for most of which the clinical significance is not known.

The virus was distinct from the *Aveparvovirus*, chicken parvovirus, which is commonly associated with runting and stunting syndrome throughout the world. The virus is also distinct from the Dependoparvoviruses, Muscovy duck parvovirus and goose parvovirus (the cause of Derzsy's disease).

The possibility that an adenoviral infection was the cause of the disease was considered. However, whilst adenovirus was detected in some birds, live vaccination with the adenovirus of marble spleen disease had been undertaken and there was no evidence that it was associated with the lesions.

A search of the APHA VIDA data revealed a single case of hepatitis in a group of 28-day old pheasants with inclusion bodies in the liver from 2011. At the time, no further analysis was carried out. Given this recent publication and the links between the gamebird industries in France and Great Britain, APHA will raise awareness of the condition with practitioners so that further surveillance can be carried out.

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The Animal and Plant Health Agency (APHA) is an executive agency of the Department for Environment, Food & Rural Affairs, and also works on behalf of the Scottish Government and Welsh Government.