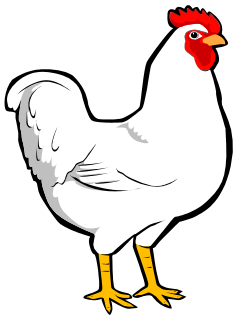
Animal & Plant Health Agency



SRUC

GB avian quarterly report

Disease surveillance and emerging threats

Volume 24: Q3 – July-September 2020

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Introduction and overview

This quarterly report reviews disease trends and disease threats for the third quarter of 2020, July to September. It contains analyses carried out on disease data gathered from 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.

https://www.gov.uk/government/publications/information-on-data-analysis

Issues & Trends

Industry trends – chick and poult placings

Broilers

There was a 1.2% decrease in placings of broiler chicks from UK hatcheries during September 2020 compared with September 2019 (Figure 1), at 82.8 million chicks, representing an average of 20.7 million chicks per week for the quarter. The decline in the number of placings compared with 2018 and 2019 coincides with the COVID-19 pandemic.

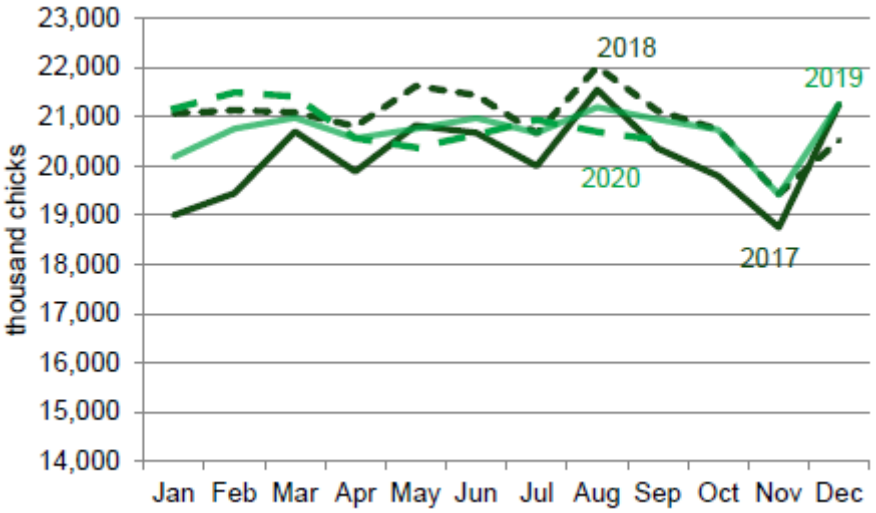

Figure 1 Average number of broiler chicks placed per week in the UK from UK hatcheries

Turkeys

There was a decrease of 1.1% in the number of turkey poults placed during September 2020 compared with September 2019 (Figure 2), at 1.6 million, representing an average of 0.4 million poults placed per week for the quarter, below the average seen in recent years.

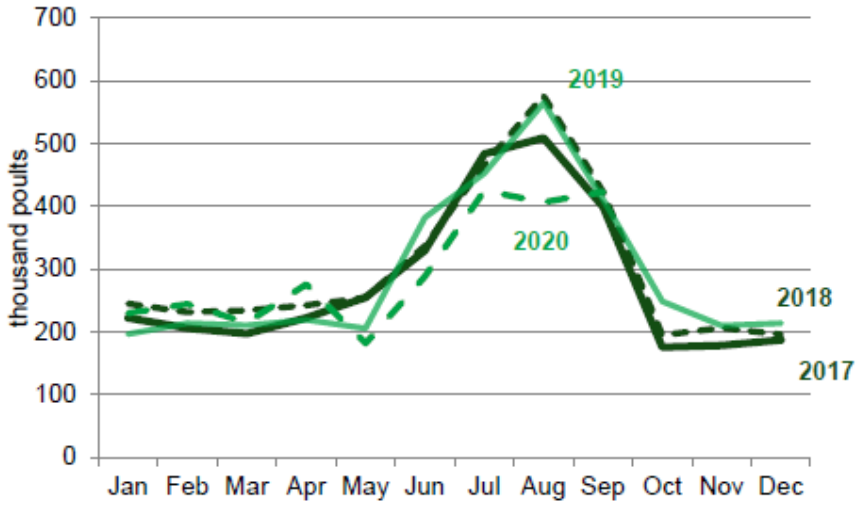

Figure 2 Average number of turkey poults placed per week in the UK by UK hatcheries

Layers

The number of layer chicks placed during September 2020 was 27.0% lower than the corresponding figure for September 2019, at 2.4 million chicks (Figure 3). UK packing station egg throughput in Q3-2020, at 7.7 million cases, was 3.3% lower than in Q3-2019 and 0.5% higher than Q2-2020. Free range eggs accounted for 55.4% of eggs packed in Q3-2020, compared with 52.6% in Q3-2019. Free range egg output during Q2-2020 exceeded enriched colony system output by 43.1%, the latter having declined to its lowest level in recent years. Barn and organic production remained at low levels, although there was a small increase in organic output which reached its highest level in recent years. Average UK farm gate prices for eggs in Q3-2020 were 3.3% higher than the preceding quarter, and 14.7% higher than Q3-2019.

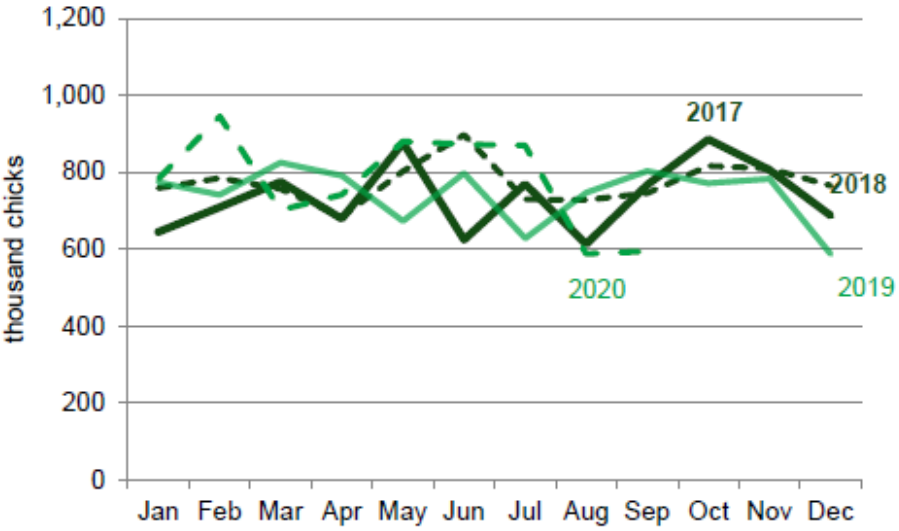

Figure 3 Average number of layer chicks placed per week in the UK by UK hatcheries

The poultry industry statistics are available online at:

Poultry and poultry meat statistics:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/928469/poultry-statsnotice-22oct20.pdf [accessed 3 November 2020]

Egg statistics:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/930487/eggs-statsnotice-29oct20.pdf [accessed 3 November 2020]

New and re-emerging diseases and threats

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

Highly Pathogenic Avian influenza (HPAI) in Europe

There were no outbreaks of Highly Pathogenic Avian Influenza (HPAI) in poultry in the UK during Q3-2020 and no detections in wild birds in the UK.

Situation update to 17 November 2020

Avian influenza **H5N8 HPAI** has been confirmed on two commercial poultry premises in the **UK** up to and including 17 November, both in broiler breeders. The first report was in on 3 November and the second on 12 November.

H5N8 HPAI has also been confirmed in the UK in wild birds, from the first week of November onwards. The initial findings were in four Canada geese (*Branta canadensis*) and a greylag goose (*Anser anser*) which were found dead in Gloucestershire and reported on 2 November. The weekly findings are given at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936805/ai-findings-2020.csv/preview.

There have also been confirmed outbreaks of H5N8 HPAI in **Western Europe**; in the **Netherlands** in poultry, captive birds and wild birds (following the first report on 20 October), in **Germany** in poultry and wild birds (following the first report on 30 October) and in **Denmark** in wild birds (first report 5 November) and **Ireland** in a wild bird (first report 7 November). The wild bird species affected so far in Europe have been waterfowl (ducks, geese, swans), birds of prey (White-tailed eagle, *Haliaeetus albicilla*, peregrine falcon *Falco peregrinus*, Eurasian buzzard *Buteo buteo* and short-eared owl *Asio flammeus),* a cormorant (*Phalacrocorvax carbo*), a curlew (*Numenius arquata*), a crane (*Grus* sp) and gull species. In addition a small number of cases of H5N1 and H5N5 HPAI have been confirmed in wild birds in the Netherlands and Germany respectively, and one case of H5N5 in poultry in Germany. A table of outbreaks and species affected in individual countries up to 17 November is given in the International Disease Monitoring (IDM) team Updated Outbreak Assessment.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936694/hpai-europe-201117.pdf.

The distribution of confirmed cases in Europe in relation to wild bird migration flyways is shown in Figure 4.

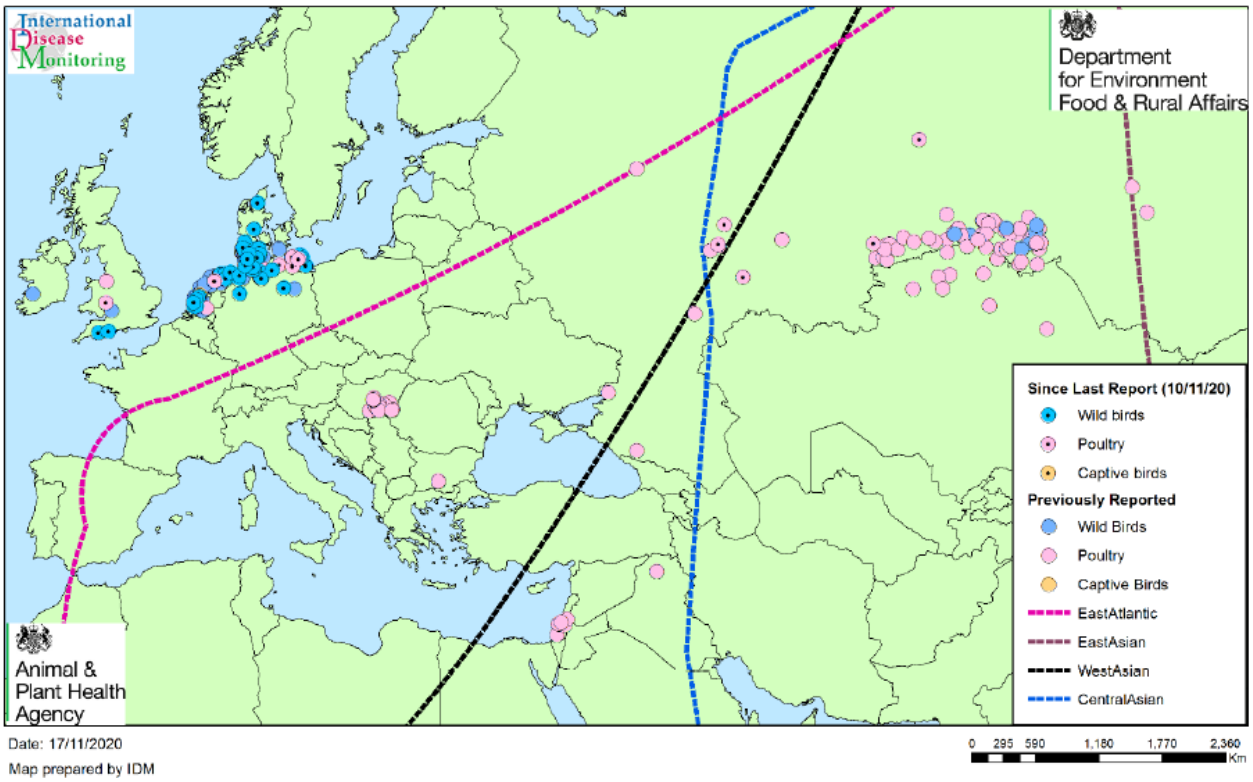

Figure 4 Outbreaks of highly pathogenic influenza in poultry, captive and wild birds in Europe and western Asia between May 2020 and up to 17 November 2020. The migration flyways are shown as dotted lines, with the UK being in the East Atlantic flyway

The outbreaks in western Europe follow a series of detections of H5N8 HPAI in poultry and wild birds in southern Russia (described in the IDM preliminary outbreak assessment dated 4 September, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/915180/poa-avian-influenza-H5N8-russia-Sep20.pdf) and the neighbouring part of Kazakhstan, and the strains are genetically closely related. Public Health England has confirmed that the risk to public health is very low and the Food Standards Agency has said that avian influenza does not pose a food safety risk for UK consumers.

The IDM Updated Outbreak Assessment dated 17 November, referred to above, reports that “In GB, the sensitivity of surveillance has been increased, to ensure collection and analyses of targeted species of wild birds (ducks, geese, swans, gulls and birds of prey) known to carry risk of infection with H5 HPAI viruses. Single dead birds of target species, where possible, will be collected and tested. Several systems are in place, including working through NGOs (non-governmental organisations), and members of the public reporting wild bird mortality.

The migration season for wild waterfowl to overwinter in the UK has begun, although numbers may not peak until December/January, depending on the species and the weather conditions in Continental Europe. Generally the Netherlands has a far higher number of wintering water birds than the UK, but cold weather on the Continent can force birds to move across the North Sea to the British Isles."

It concludes "As a consequence of the H5N8 HPAI poultry outbreaks in the UK, and in Germany and the Netherlands; as well as the increasing HPAI H5N8 cases in wild birds in the UK, Netherlands and Germany this week, and the known migration routes on to the UK from these countries: the risk of HPAI incursion in wild birds in the UK is **HIGH**. The overall risk of infection of poultry in the UK is **MEDIUM**; although it should be noted that the risk of introduction to individual premises depends upon the level of biosecurity implemented on farm to prevent direct or indirect contact with wild birds.

In response to the increased risk, an Avian Influenza Prevention Zone has been declared in England, Scotland and Wales and the Chief Veterinary Officers from England, Scotland, Wales and Northern Ireland are urging bird keepers across the UK to maintain and strengthen their biosecurity measures; in order to prevent further outbreaks of avian influenza in the UK.

If you keep poultry (including game birds or as pets), you should follow our biosecurity best practice advice, which can be found here:

https://www.gov.uk/guidance/avian-influenza-bird-flu#biosecurity-advice.

Remain vigilant for any signs of disease in your flock and report any sign of avian influenza to Defra Rural Services Helpline on 03000 200 301."

The current strain of H5N8 HPAI circulating in Western Europe is distinct from the H5N8 HPAI detected in Bulgaria earlier in 2020, referred to in the previous quarterly report (APHA 2020).

Low Pathogenicity Avian Influenza in Europe

No outbreaks of **notifiable** Low Pathogenicity Avian Influenza (LPAI) were identified in Q3-2020 in the UK.

Situation update

H5N2 LPAI was confirmed on 2 November on a small scale mixed poultry farm in south-east England; this was the first confirmation of this strain in Europe in 2020. Other LPAI strains were confirmed in Europe in the previous quarter (APHA 2020) and H5 LPAI was confirmed in a zoo in Germany in September, as described in the IDM Preliminary Outbreak Assessment date 4 November https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932950/lpai-uk-201104.pdf

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

The scheme started in May 2014 (Gibbens and others 2014) and is ongoing (http://apha.defra.gov.uk/vet-gateway/tte/nad.htm; accessed 13 May 2020). There were no exclusion testing investigations during Q3-2020. The scheme is very valuable in enabling possible LPAI to be investigated where it is considered to be a differential diagnosis for the clinical signs seen in birds on a site. The scheme currently only applies to chickens and turkeys.

Differential diagnosis of negated notifiable disease **report cases in GB**

This scheme was introduced in autumn 2018 to offer differential diagnostic testing through APHA and its partners in cases where suspicion of Notifiable Avian Disease (NAD) has been reported and are subsequently negated on either clinical grounds or by laboratory testing. The scheme is also available for TTE cases referred to above where NAD has been ruled out by laboratory testing. The scheme is described in more detail by Welchman and others (2019).

There were no differential diagnostic investigations carried out on negated NAD report cases in Q3-2020.

Pigeon paramyxovirus investigations

There were five submissions of material tested for Pigeon Paramyxovirus-1 (pAAvV-1, formerly PPMV-1)) at APHA Weybridge during Q3-2020, all of which were from diseased birds submitted as report cases. PAAvV-1 was detected in samples from four of these submissions, in July and August.

Unusual diagnoses

Adenoviral hepatitis and aspergillosis in Fancy Fowl

Adenoviral infections have long been recognised as a problem in poultry throughout the world as the recent reviews highlight (Schachner and others 2018, 2020). The most common presentations in British poultry are adenoviral gizzard erosions and inclusion body hepatitis (IBH) in chickens. IBH is caused by fowl adenoviruses (FAdV) FAdV-2, -8a, -8b and -11 and is usually observed in young broilers and broiler breeder chicks; it is frequently diagnosed in this type of bird in Great Britain (Figure 5). Whilst the disease can be reproduced experimentally, in the field the disease is often triggered by stressful events for example thinning of the flock or due to immunosuppression. The ages of birds in which diagnoses have been made in recent years in GB are shown in Figure 6. IBH has not been recorded by APHA in the layer sector in recent years.

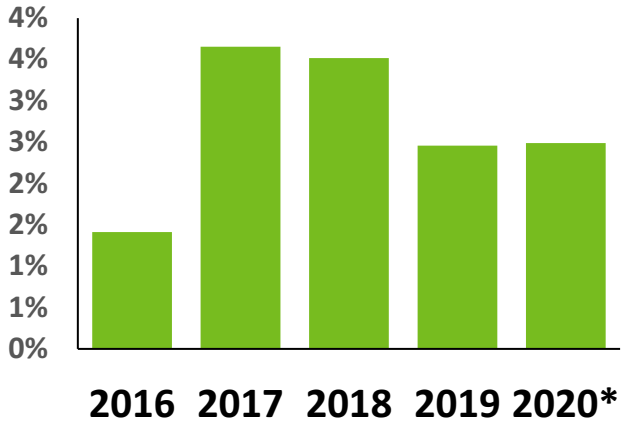

Figure 5 Diagnoses of Inclusion Body Hepatitis (IBH) as a percentage of all diagnoses reached for the broiler sector (broiler breeders and broilers combined) from 2016 to 2020, based on VIDA data. (*data for 2020 only include quarters 1, 2 and 3)

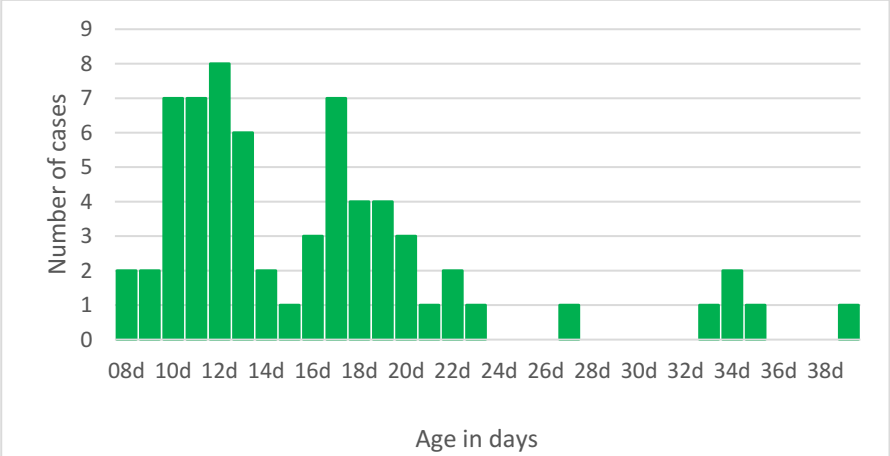

Figure 6 Age of broilers and broiler breeders diagnosed with inclusion body hepatitis by APHA

Unusually, in Q3-2020 IBH was diagnosed in a small group of four nine-week-old fancy fowl, three of which died in the 12 days following purchase. One died suddenly two days after arrival. A week after arrival, a second bird died after collapsing with a wing extended and head flexion. Subsequently a third bird died after being found weak and progressing to comatose over two days and this bird was submitted for investigation. The birds were unvaccinated and the premises of origin reported no disease. Gross examination of this bird revealed poor body condition, a pale liver and an enlarged spleen both with small white spots; pale kidneys; exudate in the air sacs and nasal cavities as well as white nodules in the air sacs and in the intestinal walls. A colisepticaemia, likely to be terminal, was diagnosed. Histopathology revealed a severe acute fibrinonecrotising hepatitis with intranuclear inclusion bodies consistent with IBH. The lesions detected in the air sacs at gross examination were shown to be caused by an *Aspergillus* spp infection. As with IBH, *Aspergillus* sp infections are often triggered by immunosuppression (Hauck and others 2020). The splenic lymphoid depletion detected at histopathology suggest that an immunosuppressive event had taken place. Whilst it is not possible to say with absolute

certainty what caused this, the history suggests that the disease problem was triggered by the stress associated with moving premise. The source of the *Aspergillus* sp. is most likely the direct environment of the chicks. In contrast, as with other adenoviruses, IBH is often transmitted vertically and derived from the parent flock and is thus more difficult to control.

The presence of IBH in a small flock of fancy chickens raises the possibility of a new FAdV strain emerging, although strain identification was not undertaken in this flock. APHA is aware that IBH is already endemic in the British broiler industry. We are monitoring the situation carefully for changes in the pattern of IBH in commercial poultry. Should this occur, molecular analysis may be indicated to investigate the strain(s) of FAdV involved.

Duck viral hepatitis in a backyard flock

A diagnosis of duck viral hepatitis (DVH) was recorded in a seven-week-old duckling submitted to APHA for post-mortem examination from a small backyard flock. The duckling had developed acute malaise 24 hours prior to death, characterised by marked depression and was observed convulsing an hour before death. It was one of three hatched on the farm and had been kept inside until a week earlier when it had been released with the rest of the ducks (two adults and five other ducklings). The group had free access to the entire farm, including a pond although this duckling had not yet been on the pond. The other ducks appeared healthy at the time of submission and no further deaths were reported. Post-mortem examination showed enlargement of the liver with red-black foci within the parenchyma (Figure 7).

Histological examination confirmed severe, widespread hepatic necrosis with severe lymphoid depletion and erythrophagocytosis in the spleen, suggestive of DVH or duck viral enteritis (DVE). Use of a newly developed PCR test on liver tissue produced a strong positive result for duck hepatitis virus type 1 (DHV-1) and a negative result for DVE, thus confirming the diagnosis of DVH.

DVH is an acute, highly contagious disease which typically affects ducklings less than six weeks of age. It is characterized by a short incubation period and although older ducks can become infected, clinical signs are unlikely to be seen over seven weeks old, which may explain why no further deaths were reported in this flock. DHV-1 is a picornavirus and can survive for several weeks in the environment and can be transmitted by recovered ducks either directly or via fomites such as feed, water and contaminated equipment, and possibly carried by wild waterfowl and also by rats. Control in small flocks relies on strict isolation of young ducklings and preventing access to potential reservoir hosts, contaminated fomites and sources of environmental contamination.

DVH was last confirmed by APHA in 2007 and this recent case may have been a sporadic incident. However surveillance for the disease will continue and this will be helped by the availability of the new PCR test at APHA.

Figure 7 Liver of a duckling showing dark coloured foci associated with duck viral hepatitis

This case was described in the APHA disease surveillance report for September 2020 in the Veterinary Record at http://dx.doi.org/10.1136/vr.m3829

Changes in disease patterns and risk factors

Marek's disease in broiler breeders

Marek's disease is a common viral disease of chickens and some other gallinaceous bird species throughout the world. Usually the disease presents either as a neurological disease with typical leg paralysis or as a combination of weight loss, lack of egg production and lymphomatous tumours. It is caused by a Herpesvirus, Marek's Disease virus (MDV) and disease is preventable through the use of vaccines. In Britain, the disease is diagnosed by APHA mainly in small and backyard flock chickens and fancy fowl (Figure 8) in which vaccination is often not undertaken, as exemplified by the cases described in the Q2-2020 report (APHA 2020).

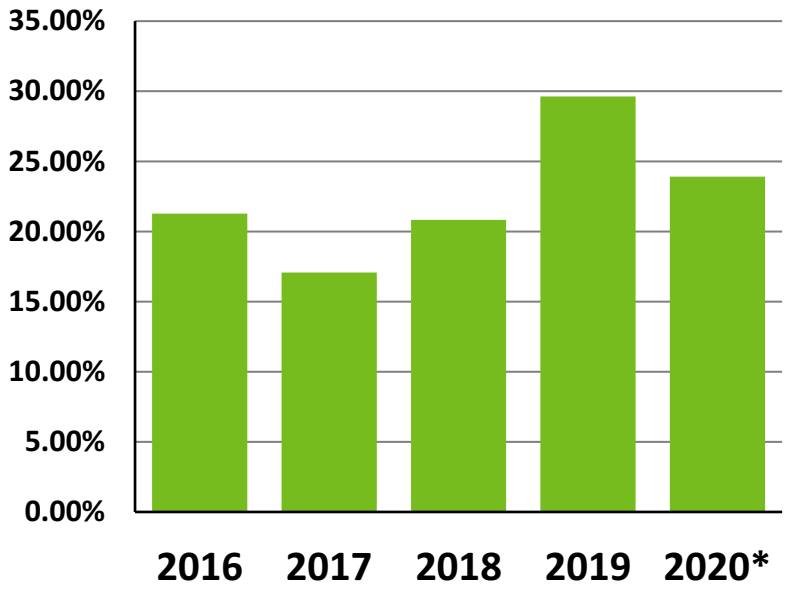

Figure 8 Marek's disease diagnoses in small and backyard flock chicken submissions as a percentage of all diagnoses reached in this type of bird, from 2016 to 2020. (*data for 2020 only include quarters 1, 2 and 3)

In contrast, Marek's disease is controlled much more effectively in the commercial sector as suitable vaccines are available and used. A recent paper from Italy (Stamilla and others 2020) shows the importance of investigating low-grade mortality events carefully as the disease in broiler breeders usually does not present as increased mortality and tumour lesions may only be detected once systematic post-mortem examinations and auxiliary testing have been carried out. In their cases, the weekly mortality rate increased by 0.4-0.6% between weeks 32 and 47. At the end of the production cycle, they attributed approximately 6% of the cumulative mortality to Marek's disease despite the flock being vaccinated. Similar outbreaks can be detected in GB and APHA has been monitoring the situation of Marek's disease in commercial broiler breeders for some time (Figure 9); affected birds have usually been between 28 and 41 weeks of age, representing diagnoses through much of the production cycle. On three occasions since the beginning of 2016, the disease has been also been diagnosed in broiler breeder chicks in rear despite the use of vaccination. Overall, the data suggest that this disease is increasingly identified as a problem by poultry.

This observation is important as new strains of MDV have been emerging on a regular basis. Two such emerging strains were recently reported in two separate Marek's disease outbreaks in broiler chickens in Tunisia (Lachheb and others 2020). The affected birds showed clinical signs suggestive of Marek's disease and typical lymphomatous lesions were seen at post-mortem examination. Interestingly, these Tunisian isolates had mutations in the Meq gene, which is one of the main genes involved in lymphomatous tumour formation and seems to be one of the drivers of virulence in a virus strain. Further molecular analysis showed that the Meq genes of the Tunisian strains were most closely related to the more virulent strains from Italy and China. Other molecular characteristics of the isolates also supported the observation that these were very virulent strains. Another

point of note is that the emerging Tunisian isolates were not very closely related to commonly used vaccine strains, raising the potential for increased vaccine failure.

APHA is aware of the potential welfare and economic implications of new MDV strains emerging and is working closely with the Marek's disease reference laboratory at The Pirbright Institute and poultry veterinarians. The diagnoses of Marek's disease reached by APHA are commonly confirmed by molecular techniques which identify the strains involved, particularly in those cases which derive from commercial poultry. This collaboration is very important as it allows us to detect and monitor any unusual emerging strains.

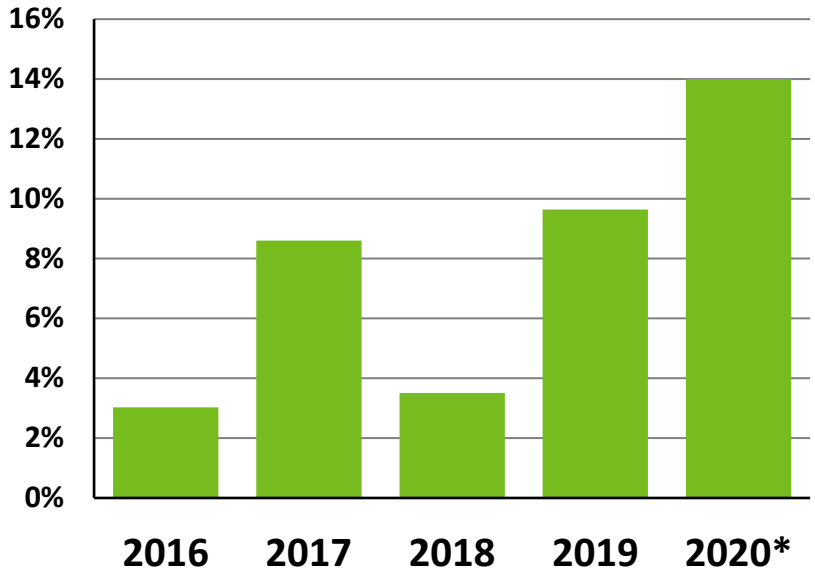

Figure 9 Diagnoses of Marek's disease in broiler breeders as a percentage of all diagnoses reached in broiler breeders, from 2016 to 2020. (*data for 2020 only include quarters 1, 2 and 3)

Horizon scanning

West Nile Virus infections in domestic poultry in Europe: an experimental investigation

West Nile Virus (WNV) is a mosquito-transmitted *Flavivirus* which has been shown to be carried by a variety of mosquito species. The virus circulates in wild birds, but can be transmitted via mosquito bites to domestic birds as well as mammals, particularly horses, and people in whom WNV infection can result in serious neurological disease and death.

WNV used to be considered an exotic disease in Europe. However, WNV is being increasingly recorded in Southern and Eastern Europe and has been detected in Germany since 2018, when it was confirmed in captive birds and horses. An update is available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/911656/wnv-germany-southern-europe-aug2020.pdf. There are different strains of

WNV and, therefore, there is much interest in determining if the European strains of WNV are pathogenic for domestic poultry, and whether poultry could become a reservoir for the disease or could be used as sentinels.

To investigate these questions, a group of scientists in Germany experimentally infected approximately 25-day-old chickens, domestic ducks and geese with the Italian WNV lineage 1 strain via the subcutaneous route to simulate a natural infection (Holicki and others 2020). In addition, geese were exposed to WNV via controlled bites by WNV-infected mosquitoes. All birds injected subcutaneously and four out of eight birds bitten by WNV-positive mosquitoes developed viraemia and seroconverted. In addition, variable oropharyngeal and cloacal shedding of the virus was detected between 2 and 5 days post infection (dpi) in the subcutaneously infected birds and 3 to 8 dpi in the geese infected by mosquitoes, although there were some species differences. The viraemia of longest duration and with the highest viral load was detected in geese between 2 and 6 dpi. The ducks developed antibodies earliest and to a higher titre. Interestingly, apart from one duck which died suddenly 2 dpi, none of the birds showed clinical signs and were culled after three weeks for pathological examination. Non-suppurative encephalitis of variable severity was detected in 2/8 infected chickens, 6/8 infected ducks and in all geese which seroconverted. Heart lesions were recorded in 5/8 chickens, 6/8 ducks and in 3/12 seroconverted geese. Immunohistochemical analysis did not reveal any WNV antigen associated with the microscopic lesions in the brain and spleen. However, this is to be expected as the birds were examined after they had developed an immune response and the viral loads were very low. Another important observation was that the local mosquitoes (*Culex pipiens*) used to infect were able to transmit the Italian strain of WNV to German domestic geese.

The authors concluded that serology of domestic free-range poultry would be a useful way to monitor for the presence of WNV in a particular geographical area in Germany. This conclusion was based on the fact that chickens, ducks and geese rapidly seroconvert. In addition, they do not appear likely to become significant sources of infection themselves as the viral load remains relatively low and they are unlikely to be a source of virus for local mosquito populations.

Currently, the UK is free of WNV but there is awareness that incursions by infected mosquitoes and/or wild birds could bring the virus into the country. Surveillance for WNV is undertaken by APHA in England and Wales by screening brain and kidney tissue of deceased wild birds between April and November for the presence of WNV by RT-PCR. Based on the results of this paper, WNV is unlikely to be first detected in domestic poultry as the study showed that they did not show clinical signs and rapidly developed immunity. On the other hand, as part of endemic disease surveillance, domestic poultry are regularly examined by histopathology and unusual cases of encephalitis and myocarditis would be picked up and investigated further and provide an additional means of surveillance. Serological surveillance as proposed by the authors of this paper may only become relevant should the virus or disease be detected in the UK.

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