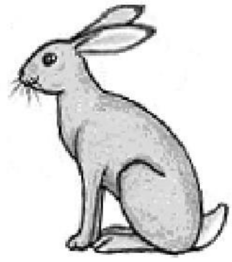
GB Wildlife Disease Surveillance Partnership quarterly report



Disease surveillance and emerging threats

Volume 29: Q2 – April-June 2020

Highlights

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Introduction and overview

The GB Wildlife Disease Surveillance Partnership comprising the Animal and Plant Health Agency (APHA), Scotland's Rural College (SRUC) Veterinary Services, Institute of Zoology (IoZ), the Centre for Environment, Fisheries and Aquaculture (CEFAS), the Wildfowl and Wetlands Trust (WWT), Natural England (NE), the Forestry Commission England (FCE) and the Garden Wildlife Health (GWH) project produces the GB Wildlife Disease Surveillance Partnership Quarterly Reports:
https://www.gov.uk/government/publications/wildlife-gb-disease-surveillance-and-emerging-threats-reports

A full explanation of how data is analysed is provided in the annexe available on GOV.UK
https://www.gov.uk/government/publications/information-on-data-analysis

Issues and trends

The continuing COVID-19 outbreak in Great Britain is reducing submissions for wildlife disease surveillance undertaken by the APHA Diseases of Wildlife Scheme (DoWS) and two of our GB Wildlife Disease Surveillance Partners whom we share surveillance data with, namely the SRUC (Scotland's Rural College) and the Garden Wildlife Health project (GWH). Due to COVID-19, wildlife pathologists at these agencies have in some cases not been able to use their facilities and at the same time the public and wildlife stakeholders have not been as active in the countryside and therefore not finding wild carcases or being in a position to submit them to their nearest appropriate laboratory. APHA Veterinary Investigation Centres have been open throughout COVID-19. We have received a constant supply of wildlife carcases particularly from possible suspect poisoning events however submissions in general have been fewer in number than for comparable periods in recent years. We would encourage members of the public, nature reserve wardens and wildlife stakeholders to contact VI Centres to discuss submission of samples such as carcases, where this is possible and safe to do so within the government safety and social distancing guidance advice.

Notifiable diseases

Avian Influenza (AI) Virus

Great Britain AI Wild Bird Surveillance (AIWBS)

Total wild bird surveillance

Following the flurry of Highly Pathogenic AI (HPAI) activity in Europe in the first quarter, only Hungary and Bulgaria recorded new outbreaks during April – June 2020. Hungary recorded over 150 new outbreaks of HPAI H5N8 in commercial flocks, and small holdings containing poultry at the beginning of the second quarter, though only six of these were in June, which shows that the situation is improving. All but three of these new incursions have been secondary outbreaks. Of the three primary outbreaks, the likely source of virus introduction was linked to feed lorry movement in one case, whilst there have been no epidemiological links yet identified in the other two primary outbreaks. Bulgaria also reported the first new outbreak in three months, with HPAI H5N8 being detected in a large commercial poultry premise.

Three cases of Low Pathogenicity AI (LPAI) were recorded in Italy; In June LPAI H5N3 was detected on an ostrich farm in close proximity of the river Po, on which wild ducks had been observed. In April LPAI H7N1 was recorded on two contiguous commercial turkey farms. The most likely source of the H7N1 virus incursion was identified as indirect contact with wild birds, due to the proximity to large green areas and wetlands where wild ducks and other aquatic wild birds were present.

There have been no reported cases of HPAI in wild birds in Europe since the end of March. In the UK there were two instances where wild birds were found to be Influenza A positive, but H5 negative.

Surveillance activity	Number of birds tested*	Positive AI virus result and species of bird	Comments
Found dead/injured	127 *(187)*	One buzzard (*Buteo buteo*) and one mute swan (*Cygnus olor*) were found to be Influenza A positive (both found in Scotland in May 2020)	Scanning surveillance All-year-round

*Number of birds tested: figures for April-June 2019 are shown in brackets.

Table 1 shows the number of wild birds tested and results in GB – 2nd Quarter

Table 1 shows the number of wild birds tested under the Avian Influenza surveillance scheme. The number of birds tested under the Avian Influenza scheme in the second quarter (April – June) of 2020 was 127 as compared with 187 for the same period in 2019. Scanning surveillance continues year-round and all birds tested were found dead or injured.

Members of the public are asked to remain vigilant and report findings of target species in addition to mass mortality incidents to the **Defra Helpline: 03459 33 55 77**. The criteria for a mass mortality incident are five or more wild birds of any species at any location (irrespective of county) in England, Scotland and Wales.

Warden Patrol Scheme

The main emphasis of the warden patrol scheme is on AIWBS in found dead wild birds, including mass mortality incidents, and patrols of designated reserves by skilled wild bird ecologists and wardens. These Warden Patrols continue all-year-round, but are also seasonally targeted in the winter and spring periods (October to March) each year.

During the period 1st April to 30th June 2020 (Q2-2020), a total of 172 Warden Patrols were performed at sites across GB. This compares with a total of 178 Warden Patrols performed during the same period in 2019 (Q2-2019) in GB. During Q2-2020, all Warden Patrols were performed by the Wildfowl and Wetlands Trust. In total during Q2-2020, 86 wild birds were reported found dead under the Warden Patrol Scheme of which 75 were tested, with no AI detections. This compares with a total of 87 wild birds found dead of which 78 were tested during Q2-2019, with no AI detections.

In Q2-2020, mallard ducks (*Anas platyrhynchos*) (35) were the most common target species found, and birds were most commonly found in the South West region with the lowest numbers in the East (0), Midlands (0) and Scotland (0). Similarly, mallard ducks (35) were the most common target species found in Q2-2019 and birds were most commonly found in the South West region with the lowest numbers in the Midlands (0) and Scotland (0).

Current EU situation

The current EU and UK outbreak situations can be found here:
https://www.gov.uk/government/publications/avian-influenza-bird-flu-in-europe

APHA, in collaboration with Defra, monitors the international situation and distribution of avian influenza detections:
https://www.gov.uk/government/collections/animal-diseases-international-monitoring

Current UK Situation

There have been no detections of HPAI in wild birds so far in 2020. The last detection of HPAI in a wild bird in the UK was a buzzard (*Buteo buteo*) found in the east of England, in April 2018. The UK risk status has been evaluated on a weekly basis. At the present time the official risk status is deemed to be LOW.

There have also been no detections of HPAI or LPAI in GB poultry in Q2 of 2020.

The LPAI cases in GB during Q1 and the presence of HPAI in Europe serve as a reminder that at all times, poultry keepers should maintain robust biosecurity measures, be vigilant for clinical signs of disease and promptly report suspected cases of notifiable avian disease in poultry to APHA:

- In England – call the Defra Rural Services Helpline on **03000 200 301**. The Helpline is open Monday to Friday, 8.30am to 5pm and there is an out of hours facility on the same number for reporting suspicion of disease in animals.
- In Wales, the helpline number is 0300 303 8268.

- In Scotland, contact your local APHA Field Services Office: https://www.gov.uk/government/organisations/animal-and-plant-health-agency/about/access-and-opening

Further information regarding avian influenza in poultry and wild birds is also available:

- Avian influenza guidance: https://www.gov.uk/guidance/avian-influenza-bird-flu.
- When and how to register your poultry flock, and which species must be registered in Great Britain: https://www.gov.uk/guidance/poultry-registration.

Information about the chargeable testing scheme offered in GB by APHA that enables veterinarians to request 'Testing for Exclusion of notifiable avian disease' in chicken and turkey flocks, in circumstances that would not require the implementation of statutory disease control measures (Gibbens and others, 2014) is available at: http://ahvla.defra.gov.uk/vet-gateway/nad/index.htm.

References

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

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/608529/ai-birdflu-factsheet-170413.pdf

https://www.gov.uk/government/publications/avian-influenza-in-wild-birds

Gibbens N, Brown IH, Irvine RM. Testing for exclusion of notifiable avian disease. *Veterinary Record* 2014:**174**:534-535. http://dx.doi.org/10.1136/vr.g3412

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Wildfowl and Wetlands Trust's (WWT) role in GB Avian Influenza Wild Bird Surveillance (AIWBS)

Summary: Threats - HPAIV, targeted active surveillance of wetland birds

Throughout this quarter, WWT continued to carry out passive surveillance of avian influenza across the reserves. Between April and June 2020, 92 dead wild birds were found across six WWT sites located in Gloucestershire, West Sussex, Tyne and Wear, Greater London, Lancashire and Carmarthenshire. Of the birds found, 73 were sampled for avian influenza virus, with 16 carcases being too heavily predated or in advanced decomposition to swab.

A total of 13 priority target species were sampled during this quarter. These included species of swans, geese, ducks, gulls, and rails. In addition, samples were also obtained from three non-priority species: a great cormorant (*Phalacrocorax carbo*), a suspected mallard x domestic duck hybrid and a rook (*Corvus frugilegus*).

No Influenza A viral RNA was detected via PCR in the 73 samples that were sent to the lab. Swabs collected during the last week of March until the last week of April were kept in cold storage to comply with lock-down regulations. Special measures were put in place to resume normal functionality of the surveillance, and from May onwards, a weekly sending of samples was organised throughout the sites.

For further details of HPAI surveillance from across Great Britain, please refer to the APHA report for this quarter.

Rosa Lopez, WWT

Zoonotic Diseases

APHA Diseases of Wildlife Scheme (DoWS); Salmonellosis in wildlife

Threat: Zoonotic, farmed and pet animal risk

There is no routine monitoring of *Salmonella* in wild birds or wild mammals. Therefore, all isolates are usually from clinical cases, although *Salmonella* may often not be the primary cause of disease. Occasionally it is isolated from small-scale surveys.

There were no reports of *Salmonella* in wildlife for this quarter.

Catherine Man, APHA Diseases of Wildlife Scheme

Report from Wildlife Zoonoses and Vector Borne Disease Research Group

Summary - threat: Zoonotic, farmed, pet animal and international trade risk

Passive surveillance for lyssaviruses in UK bats

Sixteen bats were tested for lyssavirus under passive surveillance during this quarter. All were negative.

Four zoo bats were tested in this quarter for lyssavirus. All were negative.

Rabies diagnosis

One dog as a suspect case as well as two dogs that died in quarantine were tested for rabies with negative results. One dead and desiccated bat of unspecified species which arrived in a consignment of goods from China also tested negative for Lyssavirus.

Rabies surveillance in terrestrial wildlife

Vigilance continues for this notifiable disease in UK wildlife but no samples from terrestrial wildlife were submitted for testing this quarter.

West Nile virus and Usutu virus surveillance in wild birds SV3045

No wild birds were tested for WNV or Usutu virus during this quarter.

Testing will recommence on 1st August including the backlog of samples archived during SARS-CoV-2 restrictions.

West Nile virus surveillance in Equids

No tests for WNV in equids have been carried out. Testing will recommence on 1st August.

Paul Phipps, Wildlife Zoonoses and Vector Borne Disease Research Group, APHA Weybridge

Ongoing new and re-emerging diseases, unusual diagnoses and horizon scanning

Wildlife Diseases, horizon scanning; points for interest and potential threats associated with wildlife and wildlife disease. Very brief summaries are given, including possible wildlife disease threats to human, livestock and biodiversity health.

1.) Large, extensive and spreading outbreaks of disease due to Rabbit Haemorrhagic Disease 2 virus (RHDV2) in wild lagomorphs (*Sylvolagus* and *Lepus* spp.) in South West USA. There are at least 10 lagomorph species in North America, most of which are now likely to be challenged by RHD2 virus in coming years, as the virus will probably affect most of the continent and could well extend to all the Americas.

Reference: Various ProMED reports e.g. 14.06.2020; Rabbit hemorrhagic disease - USA (05): (CO) rabbits. http://promedmail.org/post/20200614.7468883

2.) APHA Virology have detected a novel kobuvirus and a novel astrovirus from fatal diarrhoea in two juvenile grey squirrels (*Sciurus vulgaris*). Astro- and kobuviruses infect both humans and animals. The specific risk to human health is unknown but these viruses are probably squirrel specific pathogens. The work provides further insights into the diversity of astro and kobuviruses and broadens the spectrum of viruses infecting grey squirrels.

Reference: Dastjerdi A, Benfield C, Everest D, Stidworthy MF, Zell R. Novel enteric viruses in fatal enteritis of grey squirrels. *Journal of General Virology* 2020:**101**:746-750. https://doi.org/10.1099/jgv.0.001431

3.) Tularaemia is a significant, exotic (to the UK) zoonotic disease. It has been emerging in continental Europe in the past decade with extension of geographical range in France, re-incursion into the Netherlands and record numbers of human cases in Sweden (where zoonotic tularaemia occurs annually). There are no known autochthonous cases recorded in man or animals in the UK. The reason why the UK does not appear to have this pathogen is not known.

Reference: No reference.

4.) Usutu virus (USUV) was detected in Belgium in overwintering pools of *Culex pipiens* mosquitoes and also in bats. Infection in six new avian host species was recorded. The data supports USUV becoming endemic in Belgium rather than constant introduction each season. No other flaviviruses (e.g. WNV) were detected. A new strain (European 1 lineage) was detected in 2016 in a Belgian chaffinch (*Fringilla coelebs*).

Reference: Benzarti E, Sarlet M, Franssen M, Cadar D, Schmidt-Chanasit J, Rivas JF, Linden A, Desmecht D, Garigliany M. Usutu Virus Epizootic in Belgium in 2017 and 2018: Evidence of Virus Endemization and Ongoing Introduction Events. *Vector Borne Zoonotic Diseases* 2020:**20**:43-50. https://doi.org/10.1089/vbz.2019.2469

5.) SARS-CoV-2 shares 96.2% nucleotide identity with the coronavirus, RaTG13, detected in a Chinese horseshoe bat (*Rhinolophus* sp.). US bat workers are recommending that bat rehabilitators do not release captive bats to the wild this season (in case infected with SARS-CoV-2 transmitted from humans).

Reference: Shi J, Wen Z, Zhong G, Yang H, Wang C, Huang B, Liu R, He X, Shuai L, Sun Z, Zhao Y, Liu P, Liang L, Cui P, Wang J, Zhang X, Guan Y, Tan W, Wu G, Chen H, Bu Z. Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2. bioRxiv 2020. https://doi.org/10.1101/2020.03.30.015347

6.) Theoretical risk that a wildlife reservoir for SARS-CoV-2 may eventually be found in populations of wild native species, in particular of (a) mustelids (b) bats and (c) wild cat species. Risks are subsequent zoonotic re-infection of humans from wildlife reservoirs, risk to biodiversity directly and also from public reaction to new threat to public health.

References:

(i) Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, Si HR, Zhu Y, Li B, Huang CL, Chen HD, Chen J, Luo Y, Guo H, Jiang RD, Liu MQ, Chen Y, Shen XR, Wang X, Zheng XS, Zhao K, Chen QJ, Deng F, Liu LL, Yan B, Zhan FX, Wang YY, Xiao GF, Shi ZL. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature* 2020:**579**:270-273. https://doi.org/10.1038/s41586-020-2012-7

(ii) Hu B, Zeng LP, Yang XL, Ge XY, Zhang W, Li B, Xie JZ, Shen XR, Zhang YZ, Wang N, Luo DS, Zheng XS, Wang MN, Daszak P, Wang LF, Cui J, Shi ZL. Discovery of a rich gene pool of bat SARS-related coronaviruses provides new insights into the origin of SARS coronavirus. *PLoS Pathogens* 2017:**13**:e1006698. https://doi.org/10.1371/journal.ppat.1006698

(iii) Yu P, Hu B, Shi ZL, Cui J. Geographical structure of bat SARS-related coronaviruses. *Infection, Genetics, and Evolution*. 2019:**69**:224-229. https://doi.org/10.1016/j.meegid.2019.02.001

7.) H3N8 influenza A virus (IAV) with multiple mammalian-adaptive mutations was recently detected in a rescued English Grey seal (*Halichoerus grypus*) pup. Genetic analysis revealed the virus most likely originated from wild Anseriformes. Multiple mammalian genetic adaptations then occurred within the seal host. Main points of importance: 1. Close contact between pinnipeds and wild waterfowl creates conditions conducive to IAV exchange. 2. Pinnipeds may act as an endemically infected reservoir of IAV and may help to drive mammalian adaptation of the virus. 3. H3 IAV viruses are noted for a particular ability to cross species barriers. 4. Pinnipeds may therefore be potential sources of pandemic influenza viruses. 5. Many pinnipeds are admitted to wildlife rehabilitation centres each year in the UK so there is a risk of potential zoonotic transmission to humans.

Reference: Venkatesh D; Bianco C; Nunez A; Collins R; Thorpe D; Reid SM; Brookes SM; Essen S; Mcginn N; Seekings J; Cooper J; Brown IH; Lewis NS. Detection of H3N8 influenza A virus with multiple mammalian-adaptive mutations in a rescued Grey seal (*Halichoerus grypus*) pup. *Virus Evolution* 2020:6:veaa016. https://doi.org/10.1093/ve/veaa016.

8.) UK chaffinch populations have declined by 25% from 2007-2017, according to the most recent BTO/JNCC/RSPB Breeding Bird Survey (BBS; Harris et al, 2019).

References:

Harris et al. (2019) 702 British Trust for Ornithology ISBN: 978-1-912642-05-2 https://www.bto.org/our-science/publications/breeding-bird-survey-report/breeding-bird-survey-2018

Lawson B, Robinson RA, Toms MP, Risely K, MacDonald S, Cunningham AA. Health hazards to wild birds and risk factors associated with anthropogenic food provisioning. *Philos Trans R Soc Lond B Biol Sci* 2018:**373**:20170091. http://doi.org/10.1098/rstb.2017.0091.

9.) Reports from Germany record deaths in 32,000 birds (predominantly blue tits but other *Paridae* species also). Consistent findings are *Suttonella ornithocola* (a bacterial species) pneumonia. *S ornithocola* was identified as a cause of fatal pneumonia in this species in the UK in the 1990s.

References:

German wild bird charity NABU
https://www.nabu.de/tiere-und-pflanzen/voegel/gefaehrdungen/krankheiten/meisensterben.html

Guardian
https://www.theguardian.com/environment/2020/apr/22/mystery-bird-illness-investigated-after-german-blue-tit-deaths

Garden Wildlife Health have produced a disease factsheet on *S ornithocola* – https://www.gardenwildlifehealth.org/portfolio/suttonella-ornithocola-infection-in-garden-birds/

Garden Wildlife Health summary

During Q2 2020, the Garden Wildlife Health project (GWH) team continued to conduct scanning disease surveillance of garden birds, hedgehogs, reptiles and amphibians, but due to the ongoing situation surrounding the COVID-19 pandemic, submissions of specimens and subsequent post-mortem examinations had to be suspended during lockdown restrictions. However, disease incident reports (DIRs) continued to be received, which are summarised in Tables 2 and 3, as well as in Figure 1.

Taxon	No. of disease incident reports (No. of sites)	Total No. of animals observed (sick/dead)
Amphibians	176 (146)	791 (230/561)
Birds	1813 (1055)	2403 (1371/1032)
Hedgehogs	214 (186)	242 (38/204)
Reptiles	37 (29)	39 (5/34)
Total	**2240 (1376)**	**3475 (1644/1831)**

Table 2 shows the numbers of Garden Wildlife Health disease incident reports submitted during Q2 2020.

Taxon	No. of disease incident reports in Q2 (no. sick/dead)	
	2019	**2020**
Amphibians	96 (140/270)	176 (230/561)
Reptiles	15 (6/19)	37 (5/34)
Hedgehogs	120 (26/103)	214 (38/204)
Birds	828 (715/383)	1813 (1371/1032)
Total	**1059 (887/775)**	**2240 (1644/1831)**

Table 3 compares the numbers of Garden Wildlife Health disease incident reports for Q2 2019 and 2020.

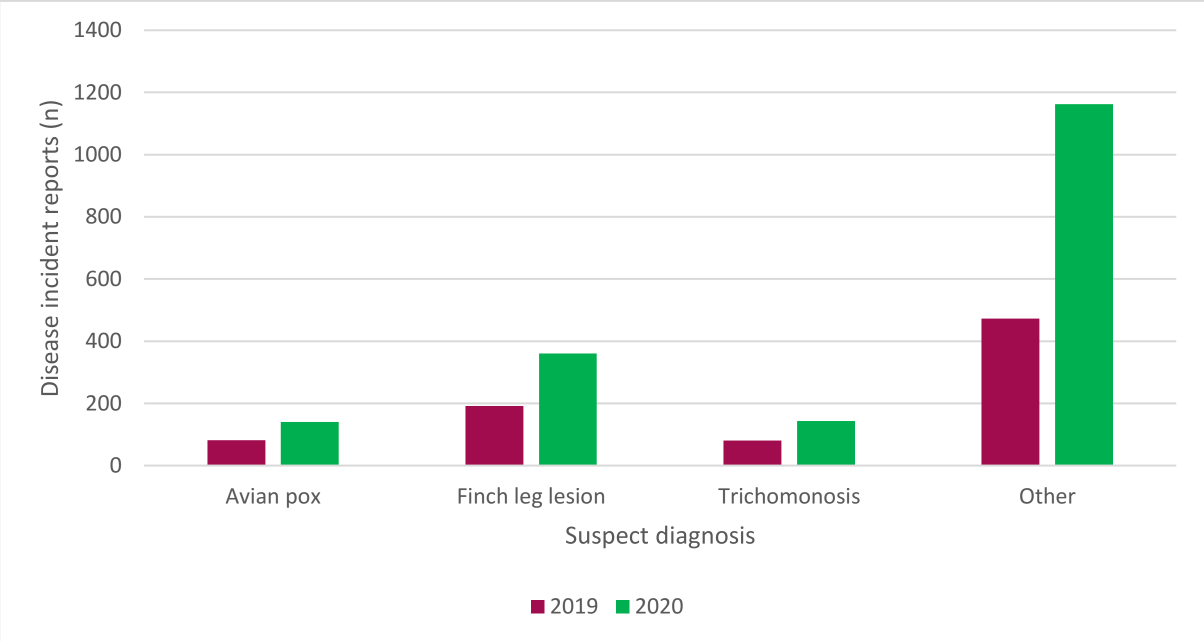

Figure 1 shows the numbers of Garden Wildlife Health avian disease incident reports allocated suspect diagnoses for Q2 2019 and 2020.

Figure 1 compares the numbers of Garden Wildlife Health avian disease incident reports allocated suspect diagnoses for Q2 2019 and 2020, with the category of 'other' mostly comprising reports of nestling mortality, trauma (e.g. window collision), predation or cases of birds exhibiting non-specific signs of ill health (e.g. fluffed-up plumage, lethargy). Further information on avian pox, finch leg lesions and trichomonosis is available by following the respective links.

Whilst there was no evidence of unusual patterns in DIRs observed, with general trends being similar to the same period last year, the increase in overall DIRs from Q2 2019 to Q2 2020 is considered to be due to an increase in the number of British Trust for Ornithology's

Garden BirdWatch participants during lockdown, since the scheme was made free of charge for this period, as well as people spending more time at home and in their gardens.

IoZ

Mammal reports

Wild mammal reports from Scotland

Renal abscessation associated with *Yersinia pseudotuberculosis* was found in a male, adult European brown hare (*Lepus europaeus*) which had been observed to be illegally coursed in East Lothian and submitted for investigation. Hepatic coccidiosis was also noted as an incidental finding. The liver showed diffuse multiple red areas that were also present on cut surfaces. Both kidneys contained focal abscesses which filled with white material, from which *Y. pseudotuberculosis* was isolated. Trauma was the cause of death. Histopathology found severe necrosis of renal parenchyma associated with a mixed, mainly suppurative inflammatory infiltrate and bacterial colonies, and numerous foci of coccidial organisms in the liver. Renal dysfunction caused by the lesions was expected to have contributed to the hare’s inability to escape the dogs.

The submission of brown hares in suspected hare coursing Police cases is fairly common in Scotland, and on occasion can contribute to surveillance where other lesions are observed.

Caroline Robinson, SRUC Veterinary Services

Wild mammal reports from APHA DoWS

Rabbit Haemorrhagic Disease: a re-emerging threat to lagomorphs

RHD History

Rabbit haemorrhagic disease (RHD) was first diagnosed in the UK by a predecessor organisation of APHA in 1992 (Fuller and others 1993). The RHD virus (RHDV), commonly referred to now as ‘classic RHD’ affected only domestic and wild European rabbits (*Oryctolagus cuniculus*). RHDV2 was reported for the first time in France in 2010 and in the same year it was diagnosed by the APHA Diseases of Wildlife Scheme (DoWS) in wild rabbits from the north of England (Westcott and others 2014). From our records, since 2010, classic RHD has not been diagnosed in Britain in any species. RHDV2 has apparently replaced the original classic RHDV however it is not clear how this has occurred.

Recent outbreaks in Wales, Spring 2020

What is RHD?

RHD is a highly contagious, often fatal disease in rabbits caused by a calicivirus. It was also known as viral haemorrhagic disease (VHD). The virus is stable in the environment and very contagious with transmission by direct contact with rabbits, via fomites, mechanically through flies and other insects and it can be transmitted in infected meat as it survives freezing. It is present in all excretions. Rabbits are often just found dead but can show a number of clinical signs including dullness, inappetance, respiratory signs and neurological signs including ataxia and vocalisation.

During May and June 2020, RHD has been diagnosed in wild rabbits from two incidents in Wales by electron microscopy and PCR testing. Accurate mortality data for outbreaks of RHDV2 are problematic as most animals die underground in the warrens and those on the surface are removed by predators or scavengers. However at the Ynyslas Dunes National Nature Reserve (NNR), Ceredigion, where rabbits are important in maintaining the marram coastal grassland ecology (Figure 2), the estimated mortality was 30-40% of a population of approximately 1400 (Figure 3), with a smell of decomposition generally detectable around the reserve. This outbreak was investigated by the Wales Veterinary Science Centre (WVSC) who also diagnosed the disease in pet rabbits in the same area in November 2019.

Figure 2: Ynyslas Dunes National Nature Reserve showing dune habitat, 2020. Wild rabbits are key herbivores, sometimes referred to as ‘keystone ecological engineers’ required to maintain natural grassland habitats like this. (Image courtesy M. Hopkins, WVSC)

Figure 3: Juvenile wild rabbit found dead as part of the outbreak, Ynyslas Dunes NNR, spring 2020. (Image courtesy M.Hopkins, WVSC)

At the other outbreak site in Carmarthenshire, the deaths of four young rabbits were reported over a four- to six week period during May and June, but losses were impossible to fully assess. Two rabbits from this site were submitted to APHA Carmarthen VIC for post-mortem examination (PME) and RHD was confirmed by polymerase chain reaction (PCR) in one of these - final sequencing is in progress to confirm the strain.

Diagnosis is based on PCR plus sequence analysis performed at the Virus Surveillance Unit, Moredun Research Unit and histopathology and electron microscopy have supported the diagnosis in some cases.

Rabbit owners and their veterinarians should take measures, including vaccination, to prevent the disease in domesticated rabbits. Wild rabbits can be a source of virus for domestic animals and *vice-versa*.

Differences between 'classic RHD' and RHDV2

Pathology associated with RHDV2 is more subtle than that seen with classic RHD and frequently with RHDV2 the only gross finding at PME (although not present in all cases) is splenic congestion and enlargement, as seen in a young rabbit from the Carmarthenshire outbreak (Figure 4).

Figure 4: Splenic enlargement in a wild rabbit with RHDV, Carmarthenshire.

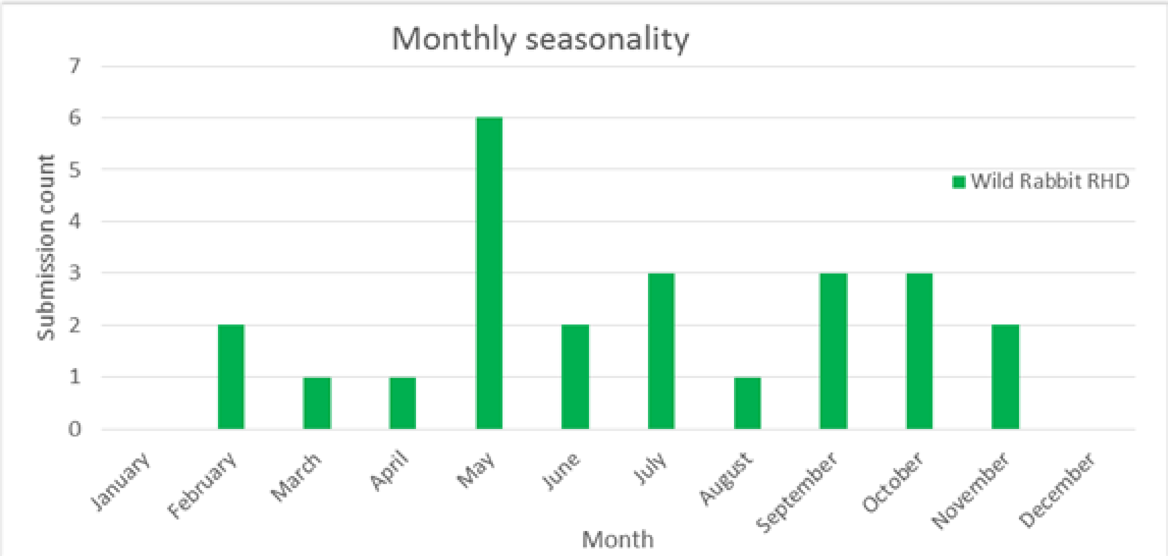

Figure 5: Monthly Seasonality 2010-2020 – diagnoses of RHDV2 in wild rabbits by APHA.

Classic RHD caused mass mortalities in wild rabbits across the UK although these were often transient in nature. However at some localities, often coastal and off-shore islands, mortalities were seen annually, and it was suspected that gulls scavenging on carcases disseminated virus along coastal flyways (Chasey 1994). Seasonality also differs, in that classic RHD in wild rabbits was prevalent during the autumn months while APHA DoWS are seeing RHDV2 more frequently in wild rabbits during late spring (Figure 5), suggesting that environmental factors influence disease occurrence.

Does RHDV2 have an effect on the overall population of wild rabbits in Britain?

A recent publication (Harris and others 2020) indicates that between the years 1995 and 2018 the rabbit population in Great Britain has declined by 53% and this decline is seen across most regions. No other factors likely to have a country-wide effect on national populations have been identified and it therefore must be considered that the population decline might be due partly to RHDV, initially to classic RHD and latterly, since 2010, to RHDV2 infections. Similar declines have been reported in some but not all areas of continental Europe.

RHDV2 across the world

RHDV2, unlike classic RHD, is capable of infecting several lagomorph species, including brown hares (*Lepus europaeus*), and this was reported in the UK in 2019 (Bell and others 2019). During 2020, there have been reports (Anon, 2020) of RHDV2 causing significant outbreaks, for the first time, in *Lepus* and *Sylvolagus* species in 5 states in the Southwestern United States. These outbreaks seem to be spreading rapidly and we hypothesise, in the absence of obvious barriers, that the virus may eventually range over the continent. This year has also seen an outbreak of RHDV2 in captive rabbits in Senegal. There is a concern that it could eventually challenge threatened lagomorphs species such as the volcano rabbit (*Romerolagus diazi*) in Mexico or the Amami rabbit (*Pentalagus furnessi*) from Amami Island, Japan.

RHDV are RNA viruses that are constantly mutating; genetic analysis shows that RHDV2 did not evolve from the classic RHD virus but from another similar rabbit calicivirus. All lagomorph populations could be considered at risk of infection from RHDV2. There is a need to be aware of global changes in RHDV evolution and to continue RHD surveillance in both wild and domesticated rabbits. Veterinarians should, where possible, encourage appropriate vaccination and biosecurity and be aware of local outbreaks.

References

Anon (2020) Rabbit hemorrhagic disease - USA (07): (Western and Eastern States) domestic and wild rabbits. ProMED. 02 July 2020.

Bell DJ, Davis JP, Gardner M, Barlow AM, Rocchi M, Gentil M, Wilson RJ. Rabbit haemorrhagic disease virus type 2 in hares in England. *Veterinary Record* 2019;**184**:127–128. https://doi.org/10.1136/vr.l337

Chasey D. Possible origin of rabbit haemorrhagic disease in the United Kingdom. *Veterinary Record* 1994;**135**:496-499. https://doi.org/10.1136/vr.135.21.496

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This article has been prepared by Paul Duff, Caroline Fenemore and Paul Holmes APHA Wildlife Expert Group, with Beverley Hopkins, Wales Veterinary Science Centre, Jeff Jones, APHA Carmarthen VI Centre, Maggie He and David Everest, APHA and Mara Rocchi, Moredun Research Institute.

Lymphoma in a young red squirrel (*Sciurus vulgaris*)

Neoplasia is infrequently seen in wild rodents which have a short life-span however they can be important as they may be potentially linked to environmental toxicity in some species (Pesavento et al, 2018). A lymphoma was detected in the spleen with tentative metastases in other tissues in a young red squirrel (*Sciurus vulgaris*) from Cumbria. The finding of lymphoma here is likely a sporadic occurrence but APHA did suggest that any further deaths in the parkland should be investigated.

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Figure 6: Lymphoma in the grossly enlarged spleen of a young red squirrel.

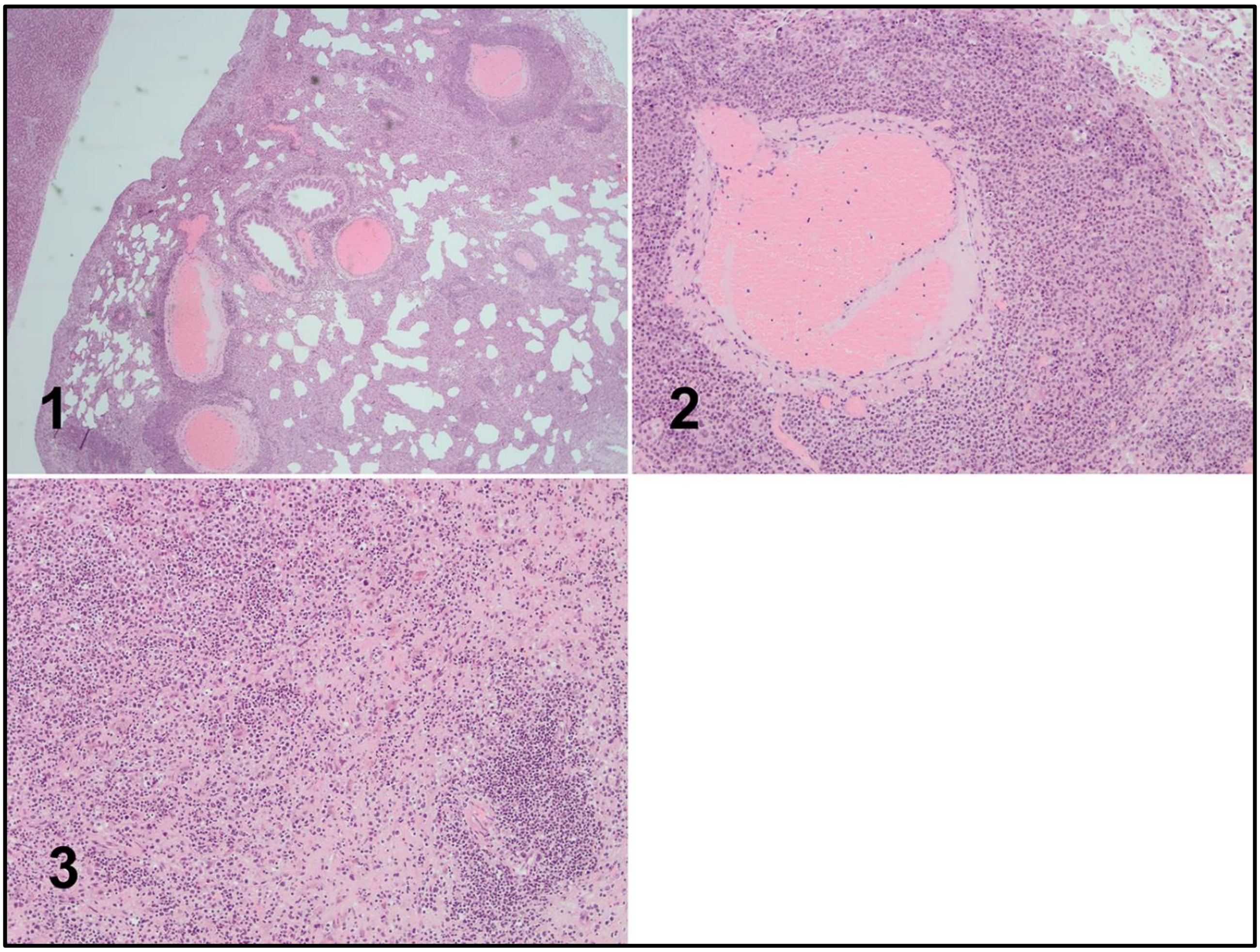

Figure 7: **1) Lung 2x – increased cellularity around blood vessels.**
2) Lung 10x – close-up of perivascular cellular infiltrates.
3) Spleen 10x – Normal lymphoid aggregates (bottom right) and red pulp effaced by cellular infiltrates (top left)

APHA Diseases of Wildlife Scheme

Yersiniosos in a brown hare (*Lepus europaeus*)

A farmer reported finding one out of a group of four hares regularly seen around the farm had died unexpectedly. No diagnostic lesions were seen by the PVS and examination of the liver by APHA confirmed a heavy pure growth of *Yersinia pseudotuberculosis*. The liver was also tested for Rabbit Haemorrhagic Disease (RHD) by PCR which was negative. RHDV2, unlike classic RHD, is capable of infecting several lagomorph species, including brown hares (*Lepus europaeus*), and this was reported in the UK in 2019 (Bell et al 2019).

In this case death was due to yersiniosis. There was severe pyogranulomatous hepatitis with intralesional bacteria, necrotising splenitis with intralesional bacteria and suppurative enteritis. The infection is likely to have been due to an ascending infection from the intestine following ingestion from a contaminated environmental source.

References

Bell DJ, Davis JP, Gardner M, Barlow AM, Rocchi M, Gentil M, Wilson RJ. Rabbit haemorrhagic disease virus type 2 in hares in England. *Veterinary Record* 2019;**184**:127–128. https://doi.org/10.1136/vr.l337

Avian Reports

Wildfowl and Wetlands Trust (WWT) report

Passive surveillance of waterbirds

Post-mortem examinations were performed on 74 wild birds originating from six WWT sites (Slimbridge, Gloucestershire; Arundel, West Sussex; Welney, Norfolk; Martin Mere, Lancashire; London Wetland centre, Greater London and Washington, Tyne and Wear). A total of 11 target species were examined, which included thirty-one mallards (*Anas platyrhynchos*), eighteen black-headed gull (*Chroicocephalus ridibundus*), six common shelducks (*Tadorna tadorna*), four mute swans *(Cygnus olor),* three greylag geese (*Anser anser*), two whooper swans (*Cygnus cygnus)*, two eurasian wigeons (*Mareca penelope),* two tufted ducks *(Aythya fuligula),* one eurasian coot (*Fulica atra*), one herring gull *(Larus argentatus)* and one pintail (*Anas acuta*). Additionally, two other swabbed species were also examined: a cackling Canada goose (*Branta hutchinsii)* and a rook (*Corvus frugilegus*). The primary causes of death are summarised below (Table 4).

The most notable post-mortem finding was gross pathologic lesions related with trauma (39%), with a high indication of it being the result of intraspecific and interspecific aggression, especially within the mallard species. In this category, 11 of the 15 mallards with traumatic lesions were female. All these presented with subcutaneous oedema of the dorsal aspect of the head with extensive bruising and similar lesions in the lumbar region, which was also de-feathered and with variable degree of cutaneous damage. Four female mallards had large yolk follicles at different stages of development, expected at this time of year (breeding season). One female mallard drowned due to this violent behaviour, two mallards presented granuloma-like hepatic lesions compatible with avian mycobacteriosis, and two females within this group also had egg yolk peritonitis. Eight black headed gulls presented with trauma lesions also compatible with inter or intra-species aggression. These all had various puncture wounds throughout their body and extensive muscle bruising. Another species with fatal trauma as a primary cause is a whooper swan that was struck by a power line. Post-mortem examination revealed a dislocated elbow joint of the left wing, cutaneous lesions to the left aspect of the head, severe internal haemorrhage and a ruptured liver. A mute swan also presented with internal haemorrhage and extensive bruising of the pectoral muscles, possibly from a collision.

Predation was another predominant primary cause (21%), elevating the number of finds during the patrols at each centre. Possibly related with the lack of visitors during lockdown.

Avian mycobacteriosis was the main cause of mortality in 5% of the carcases found; however, it was also a concomitant disease in other cases, as in one pintail with a severe complete right tibiotarsus fracture and poor body condition, and a mallard with *Sarcocystis*.

Visceral gout was detected during post-mortem examinations (4%), most likely due to long-term starvation or dehydration since these birds presented extremely poor body condition, with evident muscle loss and mild to moderate macroscopic renal lesions.

Nine wild birds (12%) did not receive diagnostic due to advanced decomposition or lack of obvious gross abnormalities. Seven cases (9%) include other less common causes during this quarter, including mortality related to sepsis, as in a herring gull with tarsometatarsal swelling with potential systemic infection; asphyxia in a cackling Canada goose with a necrotic plug near the syrinx, causing complete tracheal obstruction and gizzard impaction in a greylag (no lead pellets were found in this particular case).

Primary cause of death/PM findings	Total	Species (and notes)
Trauma	29	1 x whooper swan, 1 x mute swan, 8 x black headed gull, 1 x hybrid mallard, 14 x mallards[*1], 1 x pintail, 1 x tufted duck, 1 x shelduck, 1 x greylag
Predation	16	3 x black headed gull, 1 x shelduck, 1 x wigeon, 9 x mallards, 1 x tufted duck, 1 x mute swan[†1]
Avian mycobacteriosis	4	3 x mallard[*1], 1 x wigeon
Drowned	3	1 x shelduck, 1 x mallard, 1 x greylag
Visceral gout	3	1x mute swan, 2 x black headed gull
Egg yolk peritonitis	2	1 x mute swan, 1 x mallard
Aspergillosis	1	1 x whooper swan[†1]
Other	7	1 x cackling canada goose - asphyxiation 3 x black headed gull – starvation 1 x mallard – parasite infestation 1 x Herring gull – septic left foot and tarsometatarsal joint 1 x greylag – gizzard impaction
No diagnosis (due to decomposition or lack of or inconclusive gross abnormalities)	9	2 x black headed gull, 3 x shelduck, 1 x coot, 2 x mallards, 1 x rook,

Table 4 shows confirmed & suspected causes of wild bird mortality (including morbidity meriting euthanasia on welfare grounds) at WWT reserves between during the quarter; †n denotes juvenile birds, and number of juvenile birds; *n denotes euthanased birds, and number of euthanased birds.

Rosa Lopez, Veterinary Officer (Conservation), Wildfowl & Wetlands Trust (WWT)

Wild Bird reports from Scotland

Infection of the nasal passages contributing to a failure to thrive was observed in a juvenile female buzzard (*Buteo buteo*) which was found dead alongside a degraded herring gull (*Larus argentatus*) carcase on the edge of a beach in Angus. The buzzard was in very poor bodily condition and there was dried blood at the left nostril. There was a focus of subcutaneous haemorrhage over the sinuses at the front of the skull. There was a large deposit of inflammatory exudate in the left nasal passage and severe necrosis of the turbinates. The stomach content indicated that the buzzard was likely to have been feeding on the herring gull carcase. Culture of intestinal content from the buzzard yielded *Salmonella* Typhimurium ST19 (10,7,12,9,5,9,2). A degree of intestinal parasitism was also present.

SRUC VS commented that, although this case was of interest due to the species involved and the Salmonella isolated, there are numerous studies that indicate approximately 8% of gulls carry *Salmonella* spp., of which most are carriers with no associated disease. There are also occasional reports of *Salmonella* spp. being isolated from healthy wild buzzards making the significance of the isolate in this case difficult to determine. The buzzard may or may not have picked up the Salmonella from eating the gull over the course of a few days and it may or may not have been involved in the death of the buzzard.

Pneumonia of undetermined cause was seen in a male yearling mute swan (*Cygnus olor*) found dead in a pond in Lanarkshire which was under investigation for possible contamination. The swan was in fair condition but there was nylon fishing line wrapped tightly around the neck, and under the beak, where it had caused skin irritation and feather loss, and the line penetrated through the soft tissue at the back of the beak and through the tissue of the back of the tongue. There was no hook attached at the time of examination. The left lung was discoloured as was the associated thickened air sac. The lung was centrally necrotic with a large yellow-lined cavity. The gastrointestinal tract was empty, indicating that the bird had not fed recently. The liver lead concentration was slightly above background but did not indicate lead poisoning.

This case was of interest due to the concurrent investigation of the pond by the Scottish Environment Protection Agency (SEPA) and the finding of a carcase. In addition, the effects of discarded fishing line on wildlife are of concern.

Louping ill and helminthiasis were diagnosed separately in two red grouse hens (*Lagopus lagopus scotica*) found dead on a moor in Angus. The first was ringed and was 4-5 years old, the other was unringed. Suboptimal body condition was noted in both, and both showed developing ova. A high total worm count was observed in the caeca of the second bird (*Trichostrongylus tenuis*, 10400 worms).

Louping ill virus RNA was detected in brain tissue by real time RT-PCR in the first bird. The gross findings suggested trauma was the direct cause of death, however, it was noted that the presence of louping ill was likely to have predisposed the bird to be predated.

A third, male, bird was submitted a couple of weeks later, after being found dead on the moor in poor body condition. Balls of threadlike white worms were found in the duodenum, while the small intestine contained a large number of tapeworms. The caecal worm count was 3860 *T. tenuis*. Histopathology also revealed intestinal coccidiosis, which is unexpected in an adult bird. It was suggested that the presence of an intestinal worm burden and perhaps the stress of breeding/defending the breeding territory had weakened the bird, with secondary coccidiosis a potential consequence.

Caroline Robinson, SRUC Veterinary Services

Wild bird reports from APHA DoWS

Trichomonosis in Birds of Prey

While trichomonosis is a relatively recently emerged infectious parasitic disease in British passerines, first recognised in 2005 (Holmes and Duff, 2005) by the then Veterinary Laboratory Agency's Diseases of Wildlife Surveillance Scheme, alongside other wildlife disease surveillance bodies, it has been a well-known disease of pigeons and doves for many years, as well as of the raptors that predate these species. References can be found as far back as the 16th Century (Tubervile, 1575) of trichomonosis in birds used for falconry, commonly referred to as frounce.

Two recent diagnoses at APHA Thirsk VIC demonstrates that the condition can still be found today in wild raptors; the birds submitted were unrelated cases and each had unusual variant lesions. Two common buzzards (*Buteo buteo*), were received in March and May 2020; both were found to be in markedly poor condition, each with a swelling in the region of the lower oesophagus and crop, and scant feed material present in the digestive tract. Incision of the lesion in one buzzard (Buzzard 1) found the swelling to be a cavity with cream coloured, thickened walls (Figure 8) and containing dark fibrous material and an autolysed insect larva, probably a caterpillar. Histological examination confirmed the tissue to originate from the crop, and it was suggested that this could be an invagination of the crop likely linked with trichomonad infection. The swelling in the other buzzard (Buzzard 2) was at the level of the thoracic inlet. It consisted of a large, cream coloured mass in the dorsal wall of the crop. The mass had an irregular surface, and was fused with surrounding mucosa. The mass extended into the tissues dorsally (Figure 9), including part of the adjacent cervical vertebral bodies.

In both cases, the birds had been frozen prior to submission which limited further investigation, however histological examination confirmed the diagnosis of trichomonosis, with necrotising ingluvitis and intralesional trichomonads (Figure 10) identified in both birds. The lesions were unusual in these submissions, as they were confined to the crop; the most common site for infection in raptors is the oral cavity and oropharynx (Samour et al, 1995). The trichomonads are considered to be passed on to the raptors when they feed on infected prey species, such as pigeons or passerines, and the continuation of these feeding habits has ensured the persistence of this condition in raptors through the ages.

Figure 8 shows a cross-section through the mass found in the lower neck of Buzzard 1, with dark fibrous material present in the cavity of the lesion.

Figure 9 shows a cross section through the mass in Buzzard 2, with the lesion extending into the surrounding tissues.

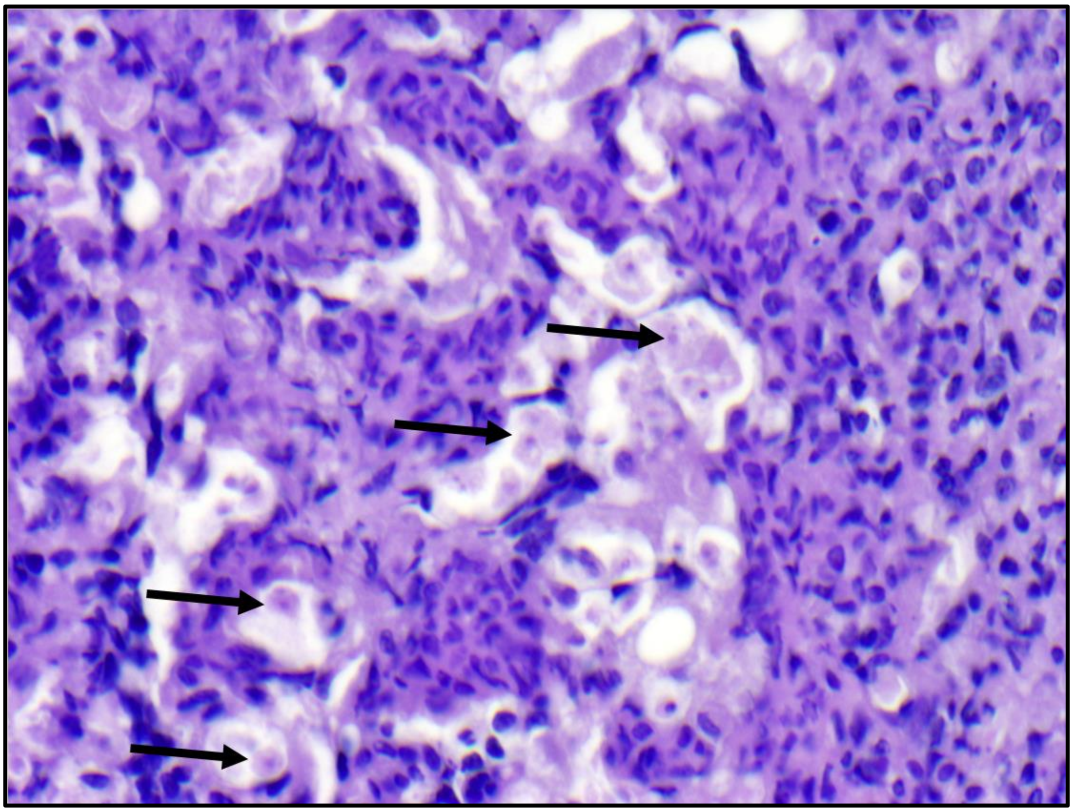

Figure 10: A photo from a PAS stained slide prepared from fixed tissue from Buzzard 1 showing trichomonads (arrowed) within the necrotic crop lesions. (Photo Credit: Christopher Poulos, APHA Lasswade)

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Avian botulism

Avian botulism is seen or suspected in waterbirds each summer in England particularly when ambient temperatures rise. The APHA Diseases of Wildlife Scheme has dealt with three possible outbreaks this June, two in the north west of England. Canada geese (*Branta canadensis*) were predominantly submitted, unfortunately in most cases the carcases were too autolysed for meaningful examinations. Avian botulism was among the differential diagnoses considered however it was unclear why this species was particularly affected; multiple deaths such as these on open waterways cause public concern.

An advice sheet on avian botulism in waterbirds is available at - http://apha.defra.gov.uk/documents/surveillance/diseases/avian-botulism.pdf

Figure 11: Three Canada geese submitted from a total of seven found dead along a canal in northwest England.

Serratospiculum spp in the airsacs of a peregrine falcon (*Falco peregrinus*)

An unusual diagnosis, in fact only seen once previously in 22 years of Diseases of Wildlife Scheme submissions, were impressive nematodes (*Serratospiculum* spp) up to 8cm in length identified in the air-sacs (Figure 12) of a peregrine falcon (*Falco peregrinus*). Tissue toxicology is in progress however infections with *Serratospiculum* spp. have been associated with pneumonia and airsacculitis in free ranging peregrine falcons in Europe, and the infestation is likely to have contributed to the demise of this bird which was found dead in Wales.

Figure 12 shows long, slender, white coloured *Serratospiculum* spp nematodes in the air sacs of a peregrine falcon.

APHA Diseases of Wildlife Scheme

Mute Swan – fishing hook in the oesophagus and abdominal foreign body

A dead Mute swan was received from a town park where deaths due to avian botulism had been suspected in recent years. It was one of a new pair on the lake which was noticed unwell and it had feathers missing from its chest and appeared uncomfortable in the water. It deteriorated, was not seen eating and was eventually caught. There was a large area of necrotic tissue on the lower neck and it was unable to swallow. It died shortly after capture and treatment. A fishing hook, approximately 2.5cm long, was embedded in the mucosa of the distal oesophagus.

It also had 4cm long piece of metal wire in the abdominal cavity, an accumulation of food material in the oropharynx and proximal oesophagus, a large skin lesion on its lower neck. The metal wire is likely to have been ingested and migrated through the intestinal tract, the severe cutaneous skin ulceration may have been due to trauma or related to the embedded fishing hook. A combination of these factors will have resulted in the inability to feed and death of the swan.

Figure 13: Severe cutaneous ulcer with secondary bacterial colonisation.

Figure 14: Fishing hook embedded in the distal oral mucosa.

Any enquiries regarding this report should be sent to APHA's Surveillance Intelligence Unit by emailing SIU@apha.gov.uk.

More information about scanning surveillance reports is available on APHA's Vet Gateway at http://apha.defra.gov.uk/vet-gateway/surveillance/index.htm.

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.