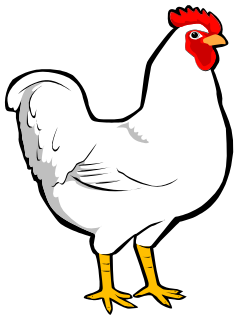
Animal & Plant Health Agency



SRUC

Great Britain avian report: disease surveillance and emerging threats

2023

Highlights

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Contents

Introduction and overview

This annual report reviews disease trends and disease threats for 2023. 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

This review examines diagnoses made in major poultry and gamebird species through Great Britain (GB) scanning surveillance, using data from the Veterinary Investigation Diagnosis Analysis (VIDA) database. The VIDA database contains records of animal diagnoses from APHA laboratories, surveillance pathology partners, and SRUC. VIDA codes, which follow defined diagnostic criteria, are used to record diagnoses, allowing for structured analysis.

This dataset represents cases seen by APHA and SRUC for diagnostic purposes. Since APHA's diagnostic service is voluntary and subject to various biases, the data cannot be extrapolated to determine disease significance for the entire population. Instead, it serves as an indicator of unusual disease presentations and should be interpreted with caution.

Diagnostic throughput

Figure 1 shows the number of submissions to the scanning surveillance network in GB for non-wild poultry and gamebirds from 2019 to 2023, including cases where a diagnosis was not reached. Chickens account for most submissions, followed by non-wild gamebirds and turkeys, with the remainder consisting of non-wild ducks and geese. The actual number of diagnoses in gamebirds and game ducks is likely higher, as excluding wild birds omits some diagnostic submissions. Wild birds were excluded to prevent skewing the figures due to higher numbers of wild birds being seen for avian influenza surveillance. The wildlife report details diagnoses in wild avian species, including wild gamebirds.

Although the total number of submissions has decreased over the years, the proportion of bird types diagnosed has remained stable. The highly pathogenic avian influenza (HPAI) outbreak, briefly discussed under 'New and re-emerging diseases and threats' below, likely impacted submission rates, with fewer diagnoses recorded during outbreak periods such as 2021 to 2023.

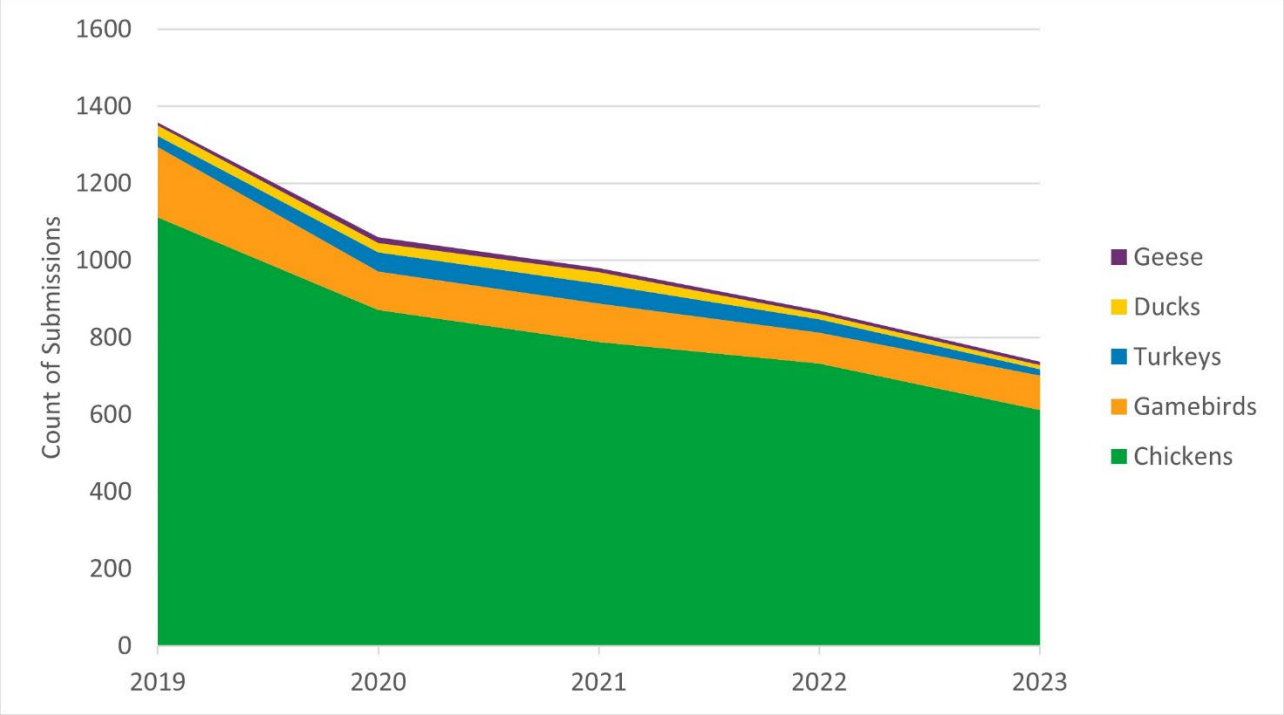

Figure 1: Stacked counts of submissions of non-wild chickens, gamebirds, turkeys, ducks and geese reached in surveillance submission in GB 2019-2023.

The percentage distribution of types of submission, carcass or non-carcass, and whether a diagnosis was reached or not, in 2023 is shown in Figure 2. Most submissions are non-carcass submissions (75%), which is inclusive of fixed tissues for histopathology. Diagnostic rate for carcass submissions is better than non-carcass submissions; in 2023 91% of carcass submissions and 83% of non-carcass submissions were successfully diagnosed. The high diagnostic rate reflects a combination of adequate case histories and optimal sample selection.

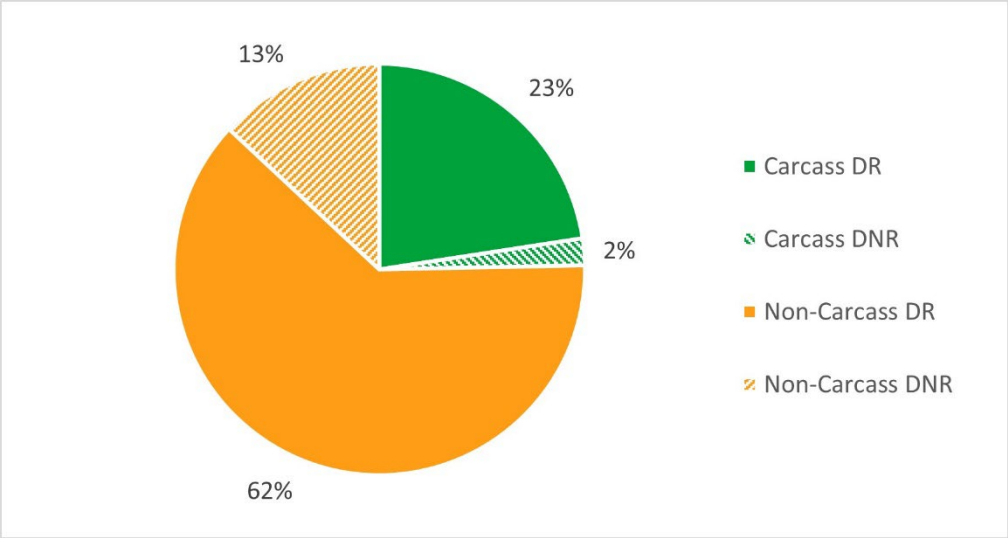

Figure 2: Percentage distribution of submission types and diagnostic outcomes, either Diagnosis reached (DR) or Diagnosis Not Reached (DNR) for all submissions of non-wild chickens, gamebirds, turkeys, geese, and ducks in 2023.

Diagnostic trends

Common diagnoses reached in diagnostic surveillance submissions in GB are discussed below by species, and in chickens by production type. Under each heading there are details of what meta data are used to define these groups. Where meta data are not available these submissions are excluded from analysis. Accurate and complete submission forms help to distinguish groups better.

Chickens

The top 10 diagnoses reached in chickens are discussed by production types of broilers, layers and small flocks. Production type can be difficult to determine due to overlap between commercial and small flocks. For instance, small flocks kept for hobby, pet, or household consumption purposes could be classed as layers if farm gate sales occur. Therefore, differentiation of commercial from small flocks is done by production type and flock size. There may be commercial birds represented in small flock analysis and vice versa, however this is not thought to significantly affect the analysis.

Broiler

Chicken broilers were selected by species, purpose (broiler OR broiler breeder), and flock size of over 2000 for broiler birds. All broiler breeders were included in the analysis regardless of flock size. The top 10 diagnoses reached each year from 2019 are shown in Figure 3.

The number of submissions per diagnosis range from 146 to 11 overall, and from 56 to 17 in 2023 specifically. Low submission numbers can disproportionately affect the rankings; therefore, charts should be interpreted with caution with supporting evidence.

The top 4 diagnoses have been on the list consistently for 5 years. These include gizzard erosion due to adenovirus, and not otherwise specified (NOS); rickets or osteomalacia and poor intestinal health. For the last 3-4 years, transmissible viral proventriculitis (TVP), colisepticaemia, and inclusion body hepatitis (IBH) have been in the list consistently. Histomonosis is new to list; this is discussed later.

Diagnoses that appear to have changed in recent years but are unlikely to be reflective of a change in disease status are coccidiosis and *Enterococcus* cecorum. *Enterococcus* cecorum (coded 266) ranked first in 2022 but is otherwise not a top 10 diagnosis; an initiative to better understand *E. cecorum* lead to increased submissions in 2022.

With coccidiosis, changes in VIDA coding for coccidiosis were made within this time frame. This is discussed later in the context of all chickens. The code 179 is septicaemia NOS, this was regularly within the top 10 but does not feature in 2023. This is unlikely due to a change in diagnostic rate and is more likely reflective of higher numbers of other conditions.

Chicken - Broilers

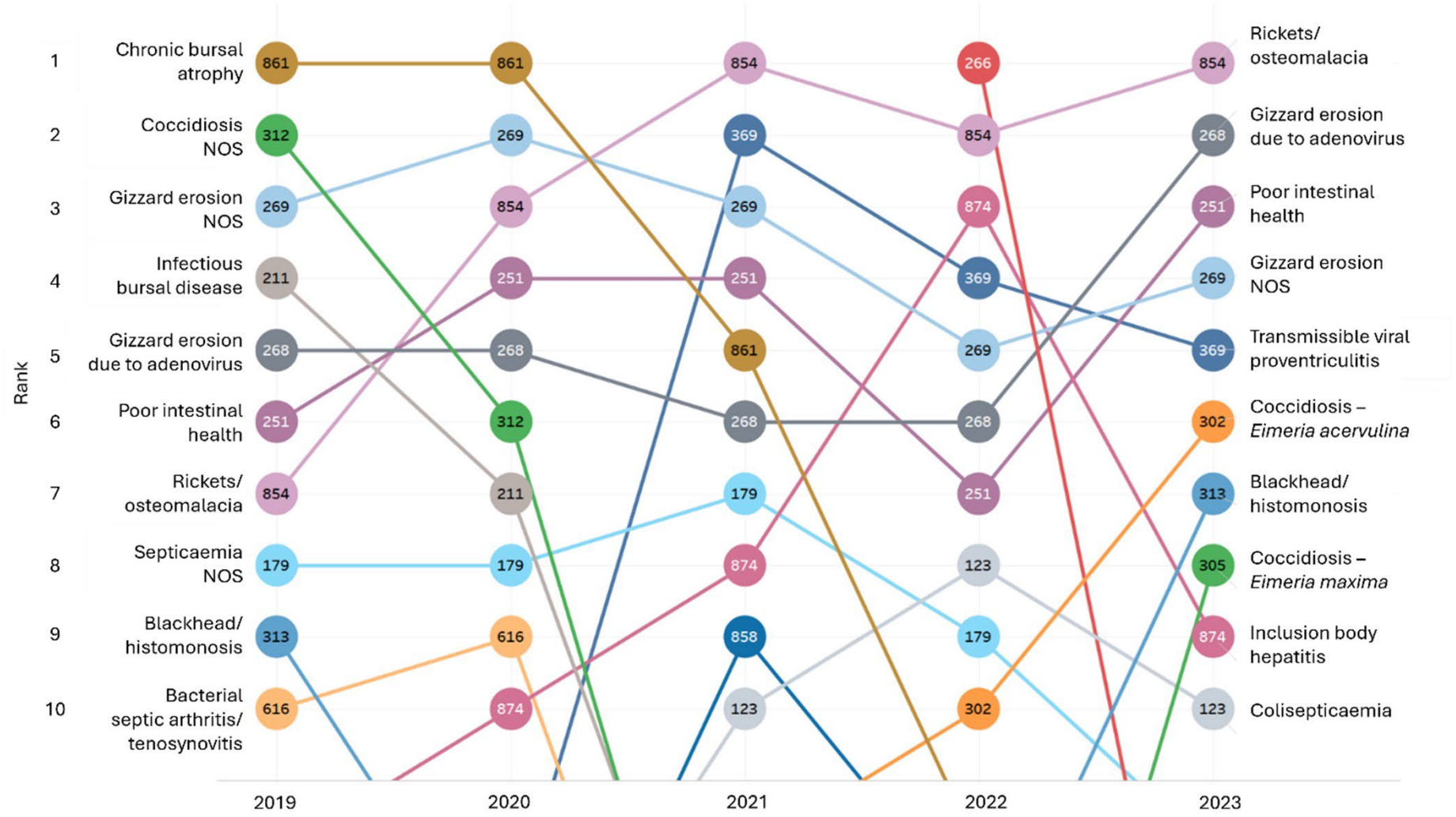

Figure 3: Top 10 diagnoses in commercial broiler and broiler breeder chickens, shown as a bump chart. Numbers within circles represent the APHA VIDA diagnostic codes. See Appendix 2, where the corresponding diagnoses are listed in full.

Layer

Chicken layers are selected based on species, purpose (layer or layer breeders), and a flock size equal to or above 350. Where these data are unavailable submissions are excluded from analysis. The top 10 diagnoses reached each year from 2019 are shown in Figure 4.

Most diagnoses in the top 10 for 2023 have previously been top 10 ranking diagnoses since 2019. Actual numbers of the diagnoses reached are very low, the majority having 2-15 submissions, and so large movements in the top 10 are likely not of significance. As with broiler chickens, changes to VIDA coding for coccidiosis mean that although coccidiosis due to *E. necatrix* and *E. tenella* look to have increased, overall, there is little change in coccidiosis in the last 5 years, the numbers of submissions contributing to these figures is also very low.

Histomonosis is a new entry although numbers of diagnoses reached are low (5), histomonosis is discussed later in this report.

Small flocks

This includes chickens kept as pets, on smallholdings and fancy flocks. All small flocks not kept as part of larger scale commercial food production. These are selected based on species, purpose (pet), or a flock size below 350 for layers and layer breeders, or below 2000 for broilers. The top 10 diagnoses reached each year from 2019 are shown in Figure 5.

As with layer chickens, numbers of the diagnoses reached are very low; diagnoses in 2023 each had between 2-17 submissions. Therefore, large movements, and introductions in the top 10's are likely not of significance. The top 4 diagnoses have been within the top 5 rankings since 2019. These are Neoplasm NOS, Egg peritonitis or salpingitis complex, Marek's disease, and helminthosis NOS. Infectious laryngotracheitis (ILT) has been intermittently within the top 10 over the last 5 years. The remaining diagnoses are new to the list, these are nephrosis/nephropathy, pneumonia NOS, tuberculosis, amyloidosis and curled toe paralysis.

Chicken - Layers

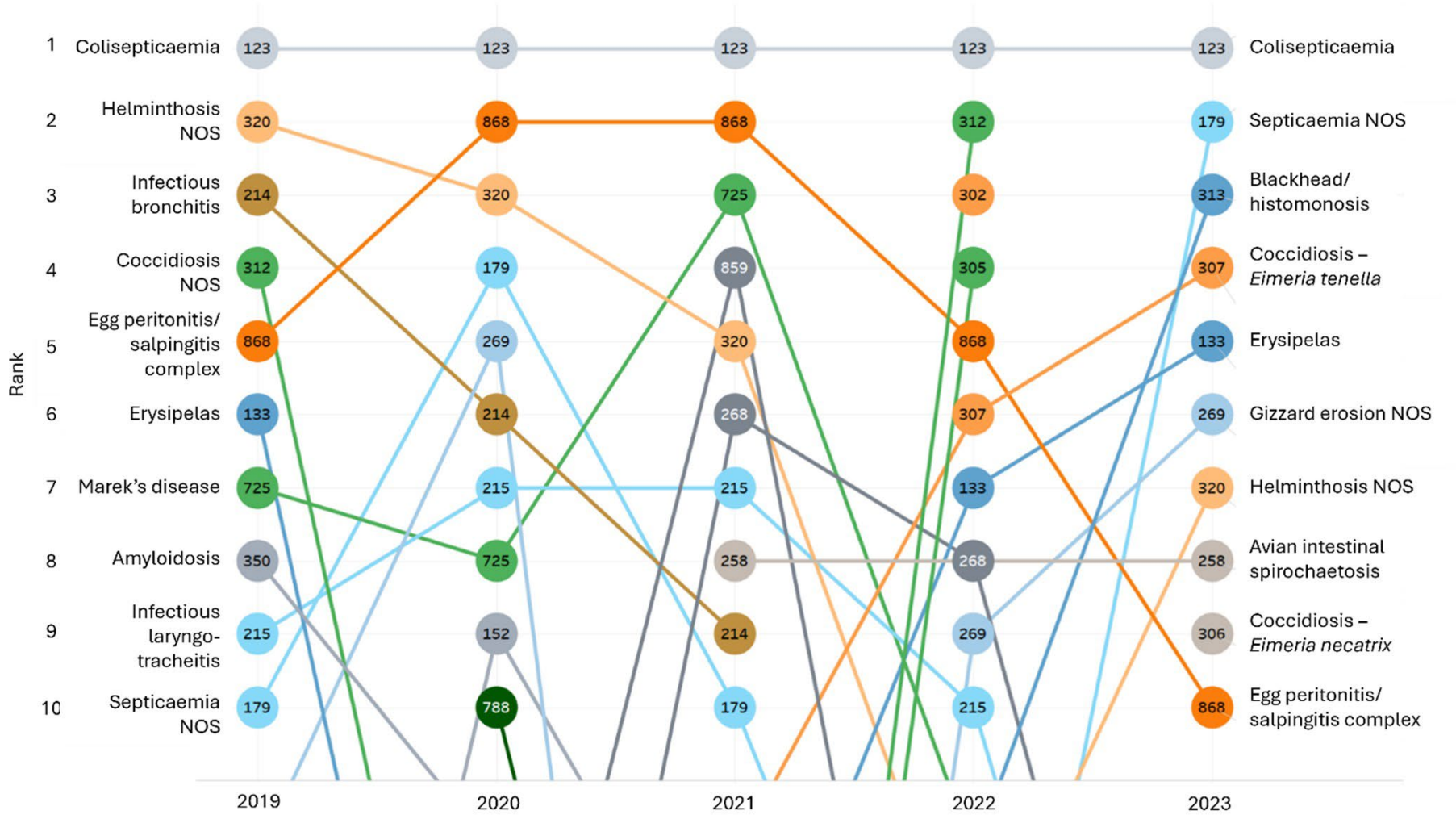

Figure 4: Top 10 diagnoses in commercial layer and layer breeder chickens, shown as a bump chart. Numbers within circles represent the APHA VIDA diagnostic codes. See Appendix 2, where the corresponding diagnoses are listed in full.

Chicken - Small Flocks

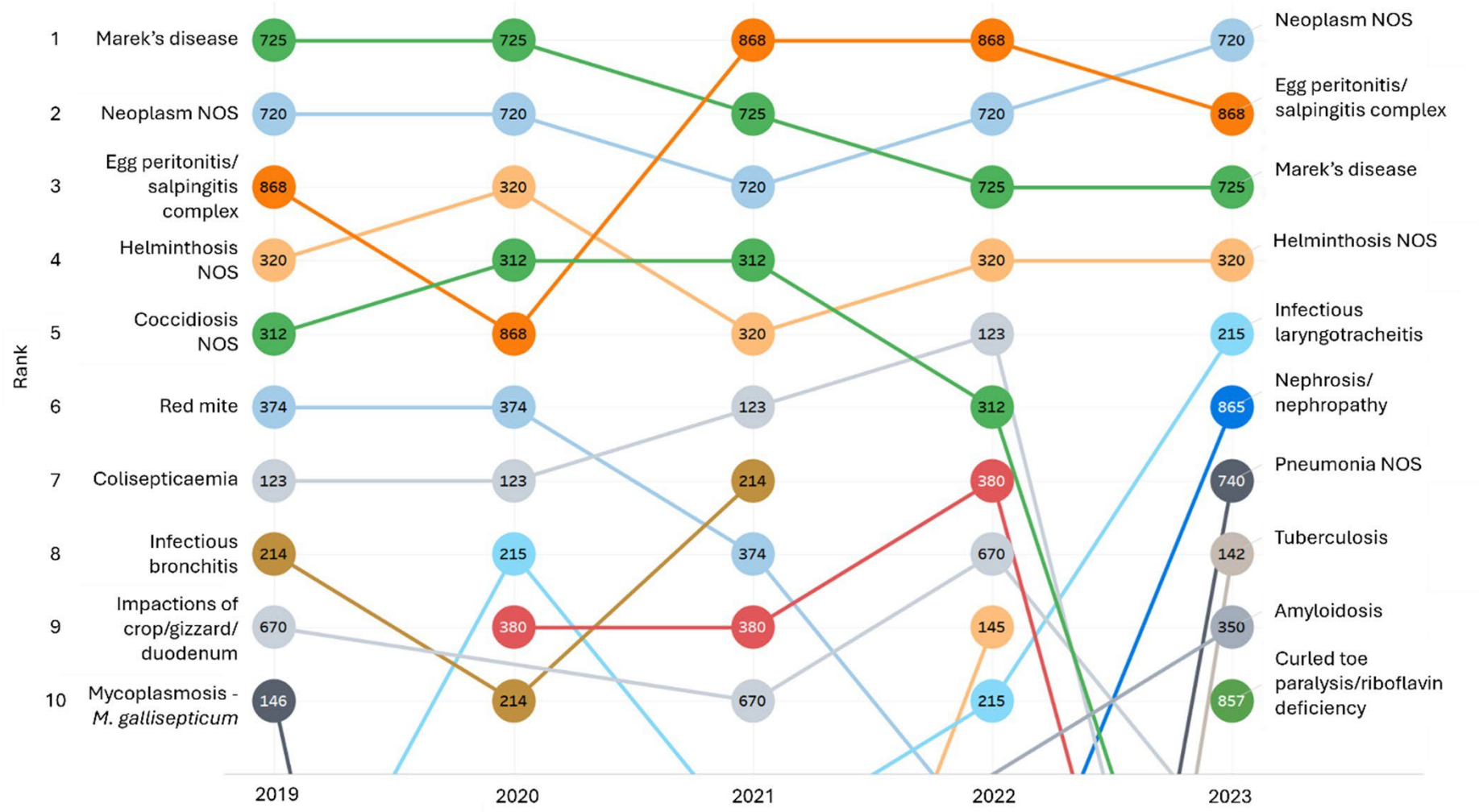

Figure 5: Top 10 diagnoses in pet and smallholder chickens, shown as a bump chart. Numbers within circles represent the APHA VIDA diagnostic codes. See Appendix 2, where the corresponding diagnoses are listed in full.

Turkeys

Tukey data is inclusive of all turkey species regardless of purpose or flock size. The top 10 diagnoses reached each year from 2019 are shown in Figure 6.

Submissions per diagnosis are between one and 6 for the 5-year period, therefore interpretation of this chart should be undertaken with caution. Common diagnoses over the last five years include histomonosis, coccidiosis, colisepticaemia, and erysipelas. All new entries to the list were single submissions, and so unlikely to be indicative of significant changes in disease presentations.

Gamebirds

Within the analysis gamebirds is inclusive of pheasant, partridge, and grouse, regardless of whether they are captive or wild. Released and wild gamebirds are collected as part of surveillance of avian influenza, these are included in analysis, with the exclusion of those that tested positive for avian influenza. The top 10 diagnoses reached each year from 2019 are shown in Figure 7.

Submissions per diagnosis range between one and 34, with a mean of 7 submissions per diagnosis. Four diagnoses are consistently within the top 10 diagnoses from 2019, these are coccidiosis, spironucleosis, rotavirus disease, and louping ill. Trauma/fracture NOS was the top diagnosis in 2022 and ranked 4 in 2023, submissions contributing to this diagnosis was mostly of single adult birds submitted for avian influenza surveillance. Septicaemia NOS is the only diagnosis not previously within the rankings, this is due to 5 submissions in 2023 from a range of species and presentations. The remaining diagnoses in the top 10 list 2023 are variably within the top 10 diagnoses list in the past 5 years.

Geese

Excluding wild birds, there were 9 diagnostic goose submissions in 2023, including pets and production birds. Diagnoses reached included Streptococcal infection NOS, helminthosis, cardiomyopathy and heart failure NOS, and mycotic pneumonia or air sacculitis. There were no changes in disease trends identified in these diagnoses.

Ducks

Excluding wild birds, there were 11 diagnostic submissions of ducks in 2023, including gamebirds, pets, and production birds. Multiple diagnoses were reached in some submissions. Diagnoses included duck virus enteritis, *Riemerella anatipestifer,* air sacculitis NOS and pericarditis NOS, and septicaemia NOS, Staphylococcal infection NOS, and cardiomyopathy and heart failure NOS. There were no changes in disease trends identified in these diagnoses. The case diagnosed with duck virus enteritis featured in a vet record disease surveillance report, which is linked to in Table 3.

Turkeys

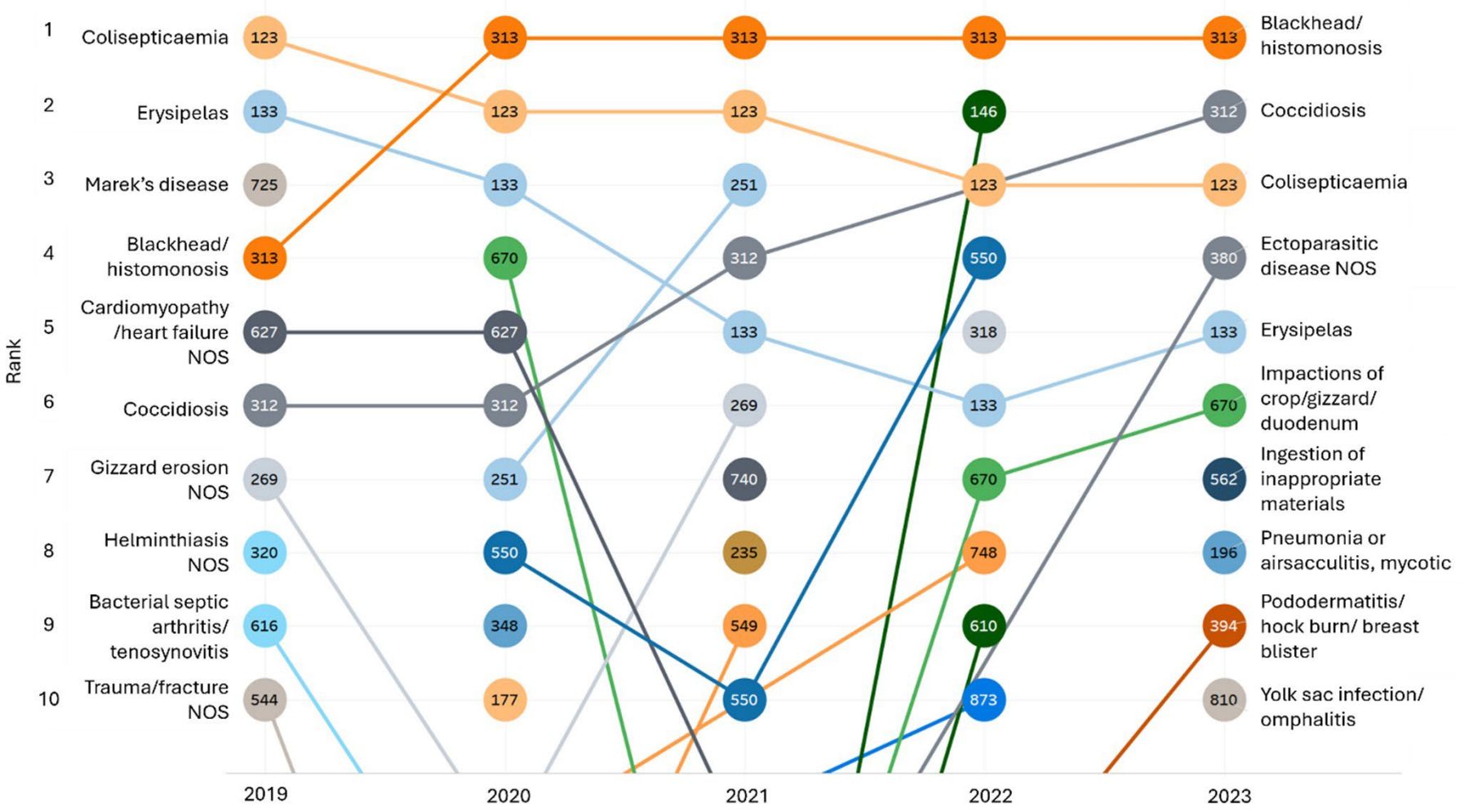

Figure 6: Top 10 diagnoses in turkeys, shown as a bump chart. Numbers within circles represent the APHA VIDA diagnostic codes. See Appendix 2, where the corresponding diagnoses are listed in full.

Gamebirds

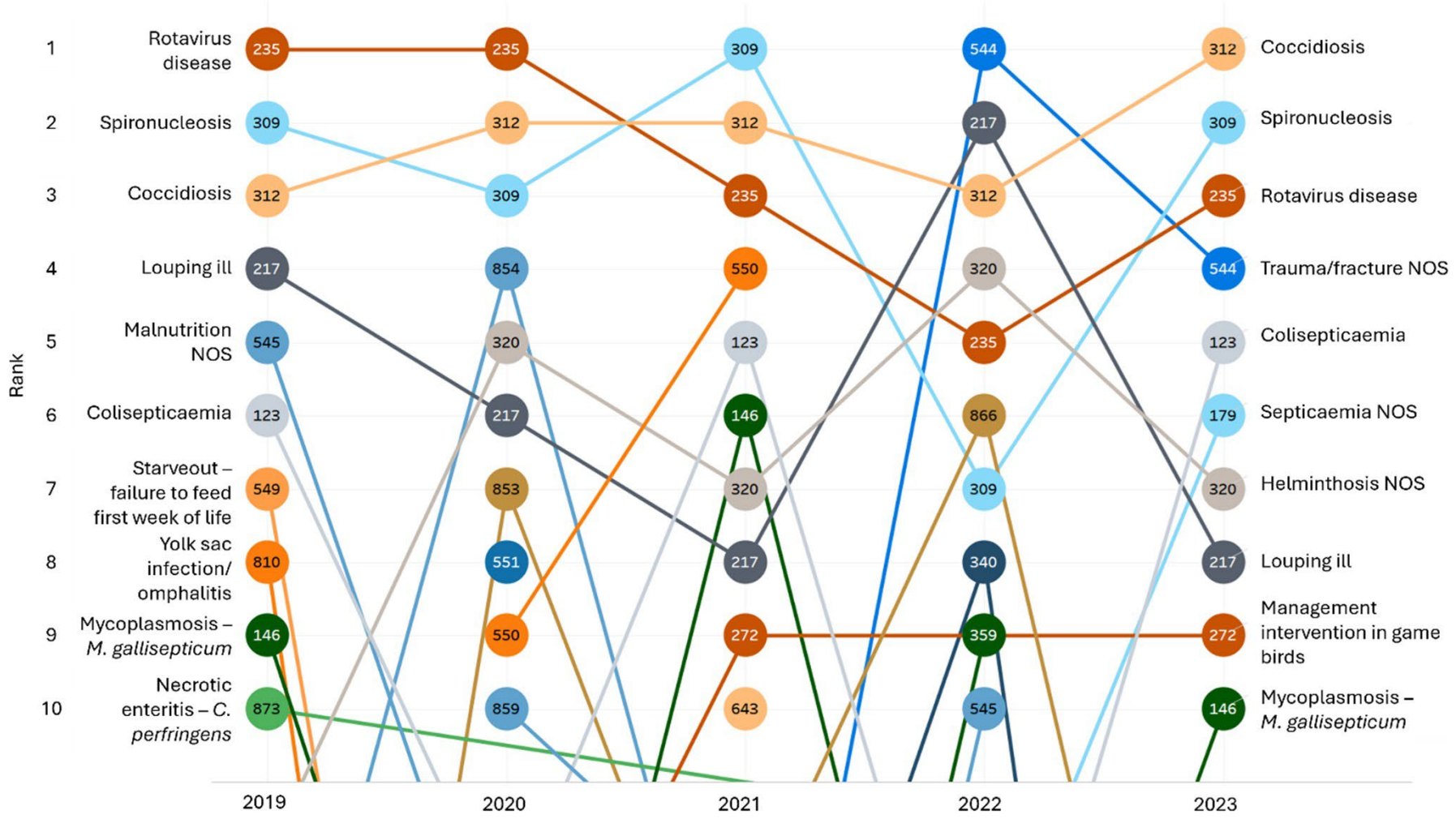

Figure 7: Top 10 diagnoses in gamebirds, shown as a bump chart. Numbers within circles represent the APHA VIDA diagnostic codes. See Appendix 2, where the corresponding diagnoses are listed in full.

New and re-emerging diseases and threats

Highly pathogenic avian influenza

HPAI is a notifiable disease in poultry in GB. The largest outbreak of HPAI H5N1 in GB started in October 2021. Unusually the outbreak persisted over the summers of 2022 and 2023. Numbers in 2023 were lower than previous years, and there was not a peak of cases in the fourth quarter. This lower number of cases mirrored the situation in Europe. HPAI H5N1 detections in GB wild birds in 2023 peaked in July. A range of species were affected. More information on HPAI in GB and internationally can be found in sources listed in Appendix 1.

Low pathogenicity avian influenza

A low pathogenicity avian influenza virus (LPAIV) was detected in broiler-breeders in Scotland in the first quarter of 2023 and was characterised as an H7N3 subtype. This presented with egg drop, decreased feed and water intake and smaller pale eggs. This spread across multiple houses on the site.

Test to exclude notifiable disease – chickens and turkeys

Vets can request 'test to exclude' (TTE) notifiable disease in chickens and turkeys in GB, where notifiable avian disease is a possibility but low on the differential list. The scheme started in May 2014 (Gibbens *et al.*, 2014) and is ongoing. 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 first 6 years of the scheme were reviewed by Reid *et al.*, (2021).

Information on and how to access TTE can be found in Appendix 1.

No TTE investigations were undertaken during 2023.

Pigeon paramyxovirus investigations

Pigeon paramyxovirus-1 (pAAvV-1, formerly PPMV-1) is notifiable in GB in all kept birds classified as poultry, including captive pigeons. Report cases are investigated by APHA. The wild bird monitoring scheme also tests for pAAvV-1 when appropriate.

The cases investigated in 2023 are summarised in Table 1. There were 10 pigeon report cases, 3 had positive PCRs, one had positive PCR and serology, and 2 were positive on

serology only. pAAvV-1 was also identified by PCR in a pigeon and a dove tested through the wild bird surveillance scheme. There was one pigeon tested as part of a statutory notifiable avian disease (NAD) report case and this was negative for pAAvV-1. The majority of testing was done in the first quarter of 2023.

Table 1: Summary information on investigated cases of pAAvV-1.

Quarter	Submission type	Species	Location	PCR	Serology	Virus isolation
1	Pigeon report case	Pigeon	Scotland	Positive	Not tested	Positive
1	Pigeon report case	Pigeon	England	Negative	Positive	Negative
1	“Found-dead” wild bird surveillance	Pigeon	England	Positive	Not tested	Not tested
1	“Found-dead” wild bird surveillance	Dove	England	Positive	Not tested	Not tested
1	Pigeon report case	Pigeon	England	Negative	Not tested	Negative
1	Pigeon report case	Pigeon	England	Positive	Not tested	Negative
1	Pigeon report case	Pigeon	England	Negative	Not tested	Negative
1	Pigeon report case	Pigeon	England	Positive	Not tested	Negative
1	Pigeon report case	Pigeon	Scotland	Negative	Positive	Negative
2	Statutory NAD report case	Pigeon	England	Negative	Not tested	Negative
3	Pigeon report case	Pigeon	England	Negative	Negative	Negative
3	Pigeon report case	Pigeon	England	Negative	Not tested	Not tested
4	Pigeon report case	Pigeon	England	Positive	Positive	Positive

Differential diagnosis of negated notifiable disease report cases in Great Britain

The Differential Diagnosis of Negated Notifiable Disease Report Cases (DDNRC) scheme was introduced in autumn 2018. The scheme offers differential diagnostic testing through the avian scanning surveillance project at APHA and its partners in cases where suspicion of NAD has been reported and subsequently negated on clinical grounds or by laboratory testing. DDNRC is also available for TTE cases if NAD has been ruled out by laboratory testing. The scheme is described in more detail by Welchman *et al.*, (2019).

Table 2: Details of DDNRC investigations undertaken on cases in 2023. Age is age recorded at time of DDNRC investigation.

Quarter	Species & Purpose	Country	NAD negation reason	Age	Clinical presentation	Diagnosis
1	Chicken - Broiler	England	Official testing	13 days	Sudden high mortality, decreased water intake, lethargy, respiratory distress.	No evidence of infectious disease detected, management issue suspected.
1	Duck - Broiler	England	Official testing	27 days	Tremors, swollen heads, incoordination, ocular discharge and soft faeces	Chronic systemic infection, with pericarditis, tracheitis and sinusitis
2	Chicken - Broiler	England	Official testing	39 days	Lethargy, swollen heads, cellulitis, lameness, mortality	Colisepticaemia. Bursal atrophy potentially from viral insult or stress
2	Muscovy duck - Pet	England	Official testing	Mixed ages	Mortality	Duck viral enteritis
3	Call duck - Pet	England	Official testing	4 months	Respiratory and neurological signs, increased mortality.	Tracheitis and bronchopneumonia due to unidentified infectious insult.

Quarter	Species & Purpose	Country	NAD negation reason	Age	Clinical presentation	Diagnosis
4	Red-legged partridge – Gamebird	England	Official testing	20 weeks	Sudden increase in sudden death.	Severe intestinal parasitism by nematodes (Heterakis spp.) causing dehydration
4	Partridge - Gamebird	England	Official testing	Adult	Increased mortality adult partridges.	Intestinal parasitism (coccidiosis, helminthosis) and mild acute hepatopathy

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

Colleagues in private veterinary practice are encouraged to submit samples to this scheme. To access the scheme then private veterinarians with a suitable case should call their nearest VIC, APHA Lasswade or the Avian Expert Group Lead.

Seven DDNRC investigations in different species took place in 2023, details of these are in Table 2. Investigations were across the year. Infectious disease was the likely cause of 6 of the incidents, one incident in broiler chickens was likely due to non-infectious causes. Identification of causal infectious agents was possible in 4 of the 6 incidents with likely infectious cause. Definitive identification was not possible in two due to the chronicity of lesions or samples for further testing being unavailable.

Unusual diagnoses

APHA and SRUC animal disease surveillance reports are published monthly in the Vet Record. These can be accessed freely online, see Appendix 1 – Other Resources for links to the APHA contributions. These cases are often of unusual diagnoses or investigations highlighting the importance of certain diagnostic modalities. A list of the cases that have been published this year, with links, can be found below in Table 3.

Table 3: Cases published in the APHA animal disease surveillance reports in the Vet Record (VR) with links.

Species & Purpose	Organisation	Case description	Linked VR volume and issue (V, I) numbers
Chicken - Broiler	APHA	Colisepticaemia in two-day-old broiler chicks	V192, I9
Chicken - Broiler	APHA	Histomonosis in broiler breeders	V192, I11
Chicken - Broiler	SRUC	Broiler ascites/pulmonary hypertension syndrome in commercial broilers	V193, I4
Chicken - Small flock	APHA	Renal hyperplasia in a smallholder hen	V192, I3
Chicken - Small flock	APHA	Wasting due to neoplasia in smallholder hens	V192, I5
Chicken - Small flock	APHA	Myeloid leukosis in a smallholder chicken	V192, I7
Chicken - Small flock	SRUC	Marek's disease in smallholder hen	V192, I6
Chicken - Small flock	SRUC	*Gallibacterium anatis* in a smallholder hen	V193, I4
Chicken - Small flock	SRUC	ILT in small laying hen flock	V194, I4
Turkey	APHA	*Candida albicans* pneumonia in turkey poults	V193, I7
Turkey	APHA	Histomonosis in turkeys	V193, I9
Gamebird	APHA	Necrotic enteritis and caecal coccidiosis in partridges	V193, I5
Gamebird	APHA	Mortality in red-legged partridges – Helminthosis due to *Heterakis* spp	V193, I11
Gamebird	SRUC	Spironucleosis due to adverse weather and stress in pheasants	V193, I6
Gamebird	SRUC	Salmonellosis in pheasant chicks	V193, I4
Goose	APHA	*Streptococcus gallolyticus* subspecies *pasteurianus* causing septicaemia in goslings	V193, I3
Duck	APHA	Duck virus enteritis	V193, I1

Species & Purpose	Organisation	Case description	Linked VR volume and issue (V, I) numbers
Pigeon	SRUC	Pigeon circovirus with bacterial pneumonia in racing pigeon	V193, I10
Peafowl	APHA	Necrotising enterotyphlitis in peafowl	V194, I1

Changes in disease patterns and risk factors

Coccidiosis in chickens and turkeys

Coccidiosis in poultry is caused by different *Eimeria* species, with pathogenicity and clinical presentation varying depending on the *Eimeria* species. APHA VIDA coding for coccidiosis in chickens changed in 2021, with the introduction of new codes differentiating the pathogenic species. Before this coccidiosis diagnoses were coded as 312 – coccidiosis NOS.

As highlighted under diagnostic trends, coccidiosis is seen frequently in chickens and turkeys. Over the past 5years, coccidiosis in broiler chickens has consistently been one of the top 10 most frequent over the past five years. Based on the submissions received in 2023, coccidiosis due to *Eimeria acervulina* was diagnosed more frequently than *Eimeria maxima* by APHA in broiler chickens. In submissions from layer chickens, coccidiosis was diagnosed in low numbers and often in mixed infections. These include diagnoses of *E. acervulina, E. maxima, E. necatrix* and *E. tenella*. Coccidiosis is consistently diagnosed in turkeys each year in small numbers though the species of Eimeria is not consistently recorded.

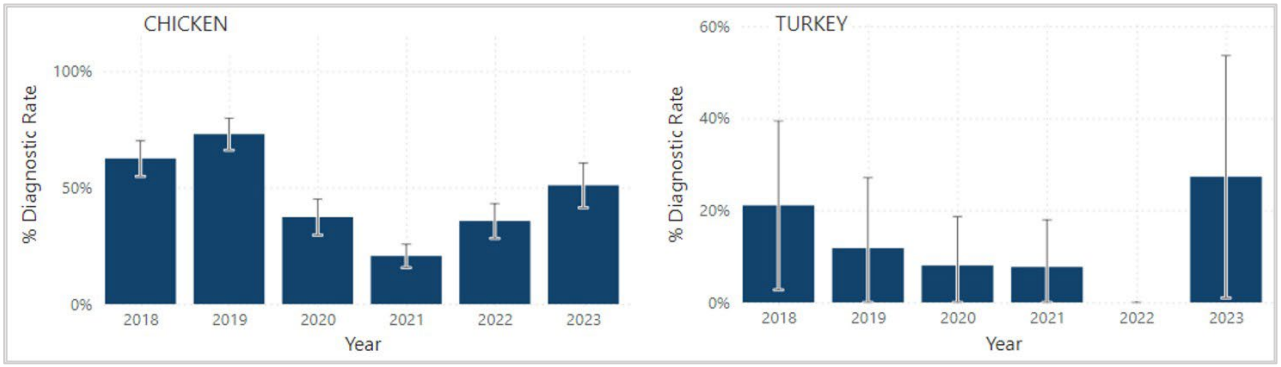

Figure 8: Diagnoses of coccidiosis by APHA scanning surveillance and SRUC in British chickens (left) and turkeys (right) as a percentage of diagnosable submissions in Great Britain.

Figure 8 shows the percentage of diagnosable submissions with coccidiosis in chickens and turkeys. Using percentage of diagnosable submissions to analyse trends reduces changes due to fluctuations in overall submission numbers. These graphs show an upward trend in coccidiosis diagnoses by APHA in chickens over the last 2years, and an increase in turkeys in 2023. As this is a percentage of diagnosable submissions, this could be due to better case selection or increased awareness or a change in submission patterns. Overall other data sources should be consulted to determine whether coccidiosis is increasing and if local control strategies therefore need revising.

Histomonosis

Histomonosis, also known as blackhead, is a condition caused by infection with the protozoan parasite *Histomonas meleagridis*. Case descriptions in chickens and turkeys can be found in the 2023 monthly surveillance reports which are listed in Table 3 (APHA, 2023a; APHA, 2023b). Infection causes increased mortality which is particularly severe in turkeys, and production losses due to morbidity. The range of gross lesions that might be seen with histomonosis in turkeys and chickens can be seen in Figure 9 and Figure 10.

Figure 9: Two livers in situ of turkeys. There are multiple distinct to diffuse, circular lesions covering the visible surfaces of the livers due to histomonosis. The centres of the lesions are darker, and range in colour from dark purple, red and tan. Source: APHA.

Figure 10: Caeca from a chicken with chronic typhlitis with caecal cores, due to histomonosis. Source: APHA.

Economic loss due to histomonosis is exacerbated as there are currently no effective treatments licensed in the UK. Cecal worms are important in disease transmission. Therefore, early diagnosis and good helminth control is important for control and prevention. Furthermore, beetles, in particular darkling beetles, as well as some other vermin can be vectors of *H. meleagridis* and therefore their control is an important part of the control strategy for this parasite (Barrow *et al.*, 2021).

As highlighted under Diagnostic Trends, histomonosis was new to the 2023 top 10 list in chicken broilers and layers and is a consistent feature in the top 10 diagnoses list for turkeys. Figure 11 shows the percentage of diagnosable submissions with histomonosis in chickens and turkeys. Within this there is an apparent increase in cases in 2023. In turkeys the percentage diagnosed has been increasing slowly over the last few years, although the significance of this is uncertain due to the low numbers diagnosed (less than 30 a year). Changes and potential increases in histomonosis in 2014 have been discussed in previous APHA surveillance reports (APHA, 2015; APHA, 2016). Understanding the prevalence is essential to inform timely and effective control strategies. Please contact the AEG if you are seeing an increase in histomonas.

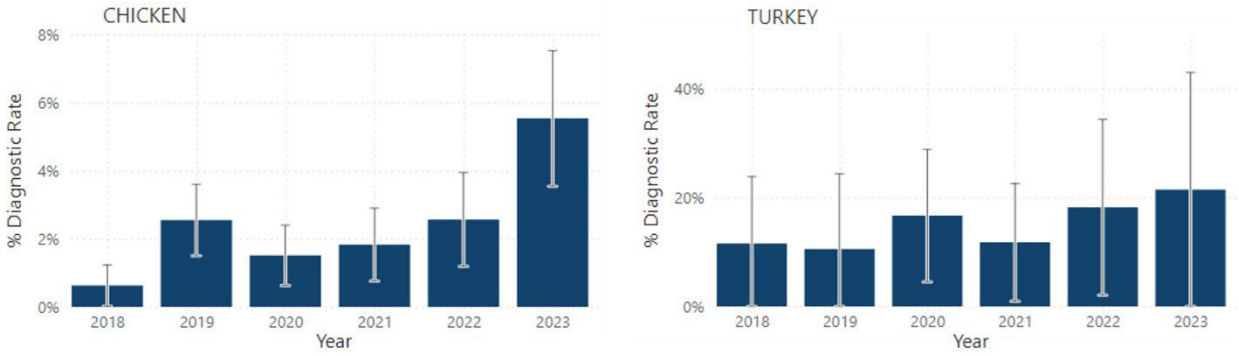

Figure 11: Diagnoses of histomonosis by APHA scanning surveillance and SRUC in British chickens (left) and turkeys (right) as a percentage of diagnosable submissions in Great Britain.

Horizon scanning

Horizon scanning consists of summaries of interesting cases or reports that may be new or re-emerging diseases or indicating changes in endemic disease trends.

Chickens

Increased colibacillosis in Danish broilers 2019-2020

Danish broiler production experienced a surge in late-onset mortality and slaughter condemnations from late 2019 through 2020, as reported by Kromann *et al.*, (2023).

During this period, increased mortality and condemnations were observed nationwide. Post-mortem examination (PME) and genomic testing compared outbreak isolates with non-outbreak isolates and international databases.

Disease was characterised as onset of clinical signs from 21 days, with increasing severity. Clinical signs included unilateral or bilateral locomotor problems. PME of affected birds identified cellulitis, arthritis, femoral head necrosis, pericarditis, perihepatitis and peritonitis as common features. Purulent bronchopneumonia, fibrinopurulent exudate on the dorsal pulmonary surface and massive necrosis of the liver also occurred frequently. Pictures of some of the lesions identified can be seen in Figure 12 and Figure 13, more are available in the paper. The main condemnation cause reported was fibrinopurulent cellulitis, which was present in almost half the birds examined.

Figure 12: Lesions present at post-mortem examination of broilers from *E. coli* outbreak identified by Kromann et al., (2023). Chronic hepatitis and the caput femoris displaying femoral head necrosis. From Kromann *et al.*, (2023) CC BY 4.0

Figure 13: Lesions present at post-mortem examination of broilers from *E. coli* outbreak identified by Kromann et al., (2023). Airsacculitis with fibrinopurulent exudate and marked hyperaemia/congested vessels. Enlarged spleen, and remnants of an abdominal air sac with purulent exudate adjacent to the intestines. From Kromann *et al.*, (2023) CC BY 4.0

E. coli ST23 and ST101 were the predominant strains from outbreaks. ST23 isolates form a monophyletic clade separate from available international isolates. ST101 outbreak isolates were within distinct subclades intermingled with international isolates. ST23 and ST101 were not significantly found in isolates from clinically healthy flocks. This suggests that the Danish outbreaks were due to introduction of virulent clone of *E. coli*. ST23 and ST101 isolates have been identified in British chicken and turkey meat and ceca samples. However, disease outbreaks investigated have not been associated with these strains, and there is no evidence of the isolates associated with the Danish outbreaks in GB. If unusual or severe disease is seen associated with *E. coli* please contact the AEG.

First detection of *Eimeria zaria* in Europe

Jaramillo-Ortiz *et al.*, (2023) reported the first detection of *Eimeria zaria* in Europe. *E. zaria* was detected on one farm each in Greece and Italy. The detection occurred within a study involving 56 broiler farms across Europe. The farms were sampled in the first week of production. At least one Eimeria species was identified on 69.6% of farms. *E. acervulina*, *E. tenella*, and *E. maxima* were most common, with *E. mitis* and *E. praecox* also widespread. *E. necatrix* was detected on one farm in France, while *E. brunetti* was not detected. *E. zaria* was first described in Australia in 2007/8, along with *E. lata* and *E. nagambie*. Since its initial description in Australia in 2007/8, *E. zaria*, along with *E. lat*a and *E. nagambie*, has been reported in sub-Saharan Africa, India, Venezuela, and more recently in the United States. *E. zaria* currently has uncertain economic significance. APHAs diagnostic testing for coccidiosis would not reliably detect *E. zaria* at this time, however the new variants were not detected in GB by (Jaramillo-Ortiz *et al.*, 2023). If you suspect new variants or changes in coccidiosis presentation or response to control measures, please contact the AEG.

Increased neoplasms in hens with extended laying periods

Buyse *et al.*, (2023) studied the effects of extended laying periods on neoplasm incidence in laying hens. Brown and white hens were examined for tumours at 86 weeks, 130 weeks and in hens that died or were euthanised between these time points. After 86 weeks, tumour prevalence rose significantly: 15.3% at 86 weeks, 40% in birds that died or were euthanised between 86 and 130 weeks, and 43% in surviving birds at 130 weeks. At 86 weeks, brown hens showed a higher incidence of tumours than white hens; however, beyond this age, no significant difference was observed. Adenocarcinoma was the most prevalent neoplasm and equally distributed among both hen lines. Leiomyomas were most frequently observed in the brown hens. Increasing laying periods may pose a concern for the health and welfare of birds due to the rise in neoplasm incidence.

Turkeys

Novel strain variant of *Mycoplasma gallisepticum* not detected by *mgc2*-endpoint PCR in Italian turkeys

The *mgc2* gene is a common species-specific target for *Mycoplasma gallisepticum* PCR and can be used to type the species. Matucci ***et al.***, (2023) reported that a 2019 sample from Italian turkeys tested negative on *mgc2*-endpoint PCR, suggesting that this strain may be missed during routine screening. The turkeys had mild respiratory disease including coughing, wheezing and tachypnoea. Post-mortem examination identified mild fibrinous airsacculitis in affected birds. *M. gallisepticum* was cultured from tracheal swabs, identified by 16S-rRNA DGGE and gene sequencing. The *mgc2* gene was not detected by *mgc2*-endpoint PCR but was by *mgc2* real time PCR. This false negative was due to missing bases in the primer sequence. These findings highlight the need for robust diagnostic approaches, including bacterial culture and multi-target real-time PCR, to detect novel *M. gallisepticum* variants effectively. APHA use a real time PCR that targets a different region of the *mgc*2 gene, and so testing by APHA should detect this variant, although please contact the AEG if you have concerns over test results.

Ducks

Description of avian pox virus in Cherry Valley breeder ducks in China

Cui ***et al.***, (2023) reported the first case of avian pox due to waterfowl-derived avian pox in Cherry valley breeder ducks. Avian pox is caused by avian pox virus, and although it can affect all species is mainly considered a disease of chickens, turkeys and other terrestrial birds. Avian pox generally has a low mortality, but it can cause production loss through reduced feed intake and weight loss. The 4b core protein has good antigenic conservation and species differentiation. This protein is used to group and subgroup the virus into species specific groups. Group A5 is the waterfowl-derived subgroup.

Since 2021, cherry valley breeder ducks in the Shandong province in Northern China have had clinical signs consistent with avian pox. Cui ***et al.***, (2023) isolated the virus from an outbreak and identified to be waterfowl-derived avian pox virus. The virus caused significant lesions when inoculated into duck embryos, these signs included thickened allantoic membranes, and localised white spots on the allantoic membrane. The virus was also proven to cause clinical disease as it caused avian pox lesions when experimentally inoculated into ducklings. Lesions included raised pox scab tissue in orbital and beak edges.

Avian pox has not been detected by APHA in domestic or wild ducks in the UK. The AEG would be interested to learn more if there are suspect cases in domestic ducks. A case of avian pox in a smallholder hen was described in quarterly report for Q3 2022.

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Appendix 1 – Other Resources

APHA scanning surveillance

Animal disease scanning surveillance at APHA

APHA Veterinary Investigation Centres and Surveillance Pathology Partners

APHA disease surveillance monthly reports – Vet record links

GB poultry statistics

Poultry industry statistics

Egg statistics

Avian influenza

Avian influenza latest situation in:

- England
- Wales
- Scotland

Epidemiology reports for GB: Avian influenza (bird flu): epidemiology reports - GOV.UK

World Organisation for Animal Health: Avian Influenza - WOAH - World Organisation for Animal Health

European Food Safety Authority: https://www.efsa.europa.eu/en/topics/topic/avian-influenza

U.S. Department Of Agriculture: 2022–2024 Detections of Highly Pathogenic Avian Influenza (usda.gov)

Test to exclude notifiable disease in chickens and turkeys

Test to Exclude Notifiable Diseases in Poultry

Salmonella

Salmonella in animals and feed in Great Britain - GOV.UK

Appendix 2 – Top 10 diagnosis tables

Chicken

Broiler

Table 4: APHA diagnoses of diagnostic broiler chicken submissions ranked 1-10 over 5 years. With rank 1 being the diagnosis identified the most.

Rank	2019	2020	2021	2022	2023
1	Chronic bursal atrophy	Chronic bursal atrophy	Rickets/ osteomalacia	*Enterococcus cecorum*	Rickets/ osteomalacia
2	Coccidiosis NOS	Gizzard erosion NOS	Transmissible viral proventriculitis	Rickets/ osteomalacia	Gizzard erosion - adenovirus
3	Gizzard erosion NOS	Rickets/ osteomalacia	Gizzard erosion NOS	Inclusion body hepatitis	Poor intestinal health
4	Infectious bursal disease	Poor intestinal health	Poor intestinal health	Transmissible viral proventriculitis	Gizzard erosion NOS
5	Gizzard erosion - adenovirus	Gizzard erosion - adenovirus	Chronic bursal atrophy	Gizzard erosion NOS	Transmissible viral proventriculitis
6	Poor intestinal health	Coccidiosis NOS	Gizzard erosion - adenovirus	Gizzard erosion - adenovirus	Coccidiosis – *Eimeria acervulina*
7	Rickets/ osteomalacia	Infectious bursal disease	Septicaemia NOS	Poor intestinal health	Blackhead/ histomonosis
8	Septicaemia NOS	Septicaemia NOS	Inclusion body hepatitis	Colisepticaemia	Coccidiosis – *Eimeria maxima*
9	Blackhead/ histomonosis	Bacterial septic arthritis/ tenosynovitis	Osteomyelitis or spondylitis	Septicaemia NOS	Inclusion body hepatitis
10	Bacterial septic arthritis/ tenosynovitis	Inclusion body hepatitis	Colisepticaemia	Coccidiosis – *Eimeria acervulina*	Colisepticaemia

Layer

Table 5: APHA diagnoses of diagnostic layer chicken submissions ranked 1-10 over 5 years. With rank 1 being the diagnosis identified the most.

Rank	2019	2020	2021	2022	2023
1	Colisepticaemia	Colisepticaemia	Colisepticaemia	Colisepticaemia	Colisepticaemia
2	Helminthosis NOS	Egg peritonitis/ salpingitis complex	Egg peritonitis/ salpingitis complex	Coccidiosis NOS	Septicaemia NOS
3	Infectious bronchitis	Helminthosis NOS	Marek's disease	Coccidiosis - *Eimeria acervulina*	Blackhead/ histomonosis
4	Coccidiosis NOS	Septicaemia NOS	Cannibalism	Coccidiosis - *Eimeria maxima*	Coccidiosis - *Eimeria tenella*
5	Egg peritonitis/ salpingitis complex	Gizzard erosion NOS	Helminthosis NOS	Egg peritonitis/ salpingitis complex	Erysipelas
6	Erysipelas	Infectious bronchitis	Gizzard erosion dt adenovirus	Coccidiosis - *Eimeria tenella*	Gizzard erosion NOS
7	Marek's disease	Infectious laryngo-tracheitis	Infectious laryngo-tracheitis	Erysipelas	Helminthosis NOS
8	Amyloidosis	Marek's disease	Avian intestinal spirochaetosis	Gizzard erosion dt adenovirus	Avian intestinal spirochaetosis
9	Infectious laryngo-tracheitis	Pasteurellosis	Infectious bronchitis	Gizzard erosion NOS	Coccidiosis - *Eimeria necatrix*
10	Septicaemia NOS	Urolithiasis	Septicaemia NOS	Infectious laryngo-tracheitis	Egg peritonitis/ salpingitis complex

Small flocks

Table 6: APHA diagnoses of diagnostic small flock chicken submissions ranked 1-10 over 5 years. With rank 1 being the diagnosis identified the most.

Rank	2019	2020	2021	2022	2023
1	Marek's Disease	Marek's Disease	Egg peritonitis/ salpingitis complex	Egg peritonitis/ salpingitis complex	Neoplasm NOS
2	Neoplasm NOS	Neoplasm NOS	Marek's Disease	Neoplasm NOS	Egg peritonitis/salpingitis complex
3	Egg peritonitis/salpingitis complex	Helminthosis NOS	Neoplasm NOS	Marek's Disease	Marek's Disease
4	Helminthosis NOS	Coccidiosis NOS	Coccidiosis NOS	Helminthosis NOS	Helminthosis NOS
5	Coccidiosis NOS	Egg peritonitis/ salpingitis complex	Helminthosis NOS	Colisepticaemia	Infectious laryngo-tracheitis
6	Red Mite	Red Mite	Colisepticaemia	Coccidiosis NOS	Nephrosis / nephropathy
7	Colisepticaemia	Colisepticaemia	Infectious bronchitis	Ectoparasitic disease NOS	Pneumonia NOS
8	Infectious bronchitis	Infectious laryngo-tracheitis	Red Mite	Impactions of crop/gizzard/ duodenum	Tuberculosis
9	Impactions of crop/gizzard/ duodenum	Ectoparasitic disease NOS	Ectoparasitic disease NOS	Mycoplasmosis NOS	Amyloidosis
10	Mycoplasmosis - *M. gallisepticum*	Infectious bronchitis	Impactions of crop/gizzard/ duodenum	Infectious laryngo-tracheitis	Curled toe paralysis / riboflavin deficiency

Turkeys

Table 7: APHA diagnoses of diagnostic turkey submissions ranked 1-10 over 5 years. With rank 1 being the diagnosis identified the most.

Rank	2019	2020	2021	2022	2023
1	Colisepticaemia	Blackhead/ histomonosis	Blackhead/ histomonosis	Blackhead/ histomonosis	Blackhead/ histomonosis
2	Erysipelas	Colisepticaemia	Colisepticaemia	Mycoplasmosis - *M. gallisepticum*	Coccidiosis
3	Marek's Disease	Erysipelas	Poor intestinal health	Colisepticaemia	Colisepticaemia
4	Blackhead/ histomonosis	Impactions of crop/gizzard/ duodenum	Coccidiosis	Adverse environment NOS	Ectoparasitic disease NOS
5	Cardiomyopathy and heart failure NOS	Cardiomyopathy and heart failure NOS	Erysipelas	Cryptosporidiosis	Erysipelas
6	Coccidiosis	Coccidiosis	Gizzard erosion NOS	Erysipelas	Impactions of crop/gizzard/ duodenum
7	Gizzard erosion NOS	Poor intestinal health	Pneumonia NOS	Impactions of crop/gizzard/ duodenum	Ingestion of inappropriate materials
8	Helminthiasis NOS	Adverse environment NOS	Rotavirus disease	Infectious sinusitis NOS	Pneumonia or airsacculitis, mycotic
9	Bacterial septic arthritis/ tenosynovitis	Cellulitis (usually E.coli, scratching)	Starveout - failure to feed in first week of life	Myopathy NOS	Pododermatitis/ hock burn/breast blister
10	Trauma/fracture NOS	Fungal Infections NOS	Adverse environment NOS	Necrotic enteritis - *Clostridium perfringens*	Yolk sac infection/ omphalitis

Gamebirds

Table 8: APHA diagnoses of diagnostic gamebird submissions ranked 1-10 over 5 years. With rank 1 being the diagnosis identified the most.

Rank	2019	2020	2021	2022	2023
1	Rotavirus disease	Rotavirus disease	Spironucleosis	Trauma/fracture NOS	Coccidiosis
2	Spironucleosis	Coccidiosis	Coccidiosis	Louping ill	Spironucleosis
3	Coccidiosis	Spironucleosis	Rotavirus disease	Coccidiosis	Rotavirus disease
4	Louping ill	Rickets/ osteomalacia	Adverse environment NOS	Helminthosis NOS	Trauma/fracture NOS
5	Malnutrition NOS	Helminthosis NOS	Colisepticaemia	Rotavirus disease	Colisepticaemia
6	Colisepticaemia	Louping ill	Mycoplasmosis - *M. gallisepticum*	Coronavirus nephritis	Septicaemia NOS
7	Starveout - failure to feed in first week of life	Skeletal defects NOS	Helminthosis NOS	Spironucleosis	Helminthosis NOS
8	Yolk sac infection/ omphalitis	Adverse environment - asphyxiation	Louping ill	Syngamus species infection	Louping ill
9	Mycoplasmosis - *M. gallisepticum*	Adverse environment NOS	Management intervention in game birds	Hepatic trichomonosis	Management intervention in game birds
10	Necrotic enteritis – *C. perfringens*	Cannibalism	Meningitis/ encephalitis NOS	Malnutrition NOS	Mycoplasmosis - *M. gallisepticum*

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