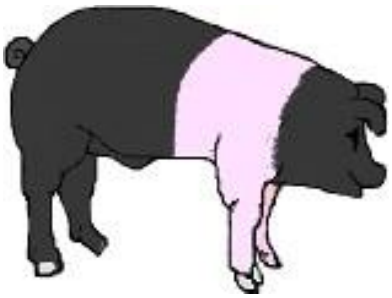
Animal & Plant Health Agency



SRUC

Great Britain pig quarterly report: disease surveillance and emerging threats

Volume 27: Quarter 4 of 2023 (October to December)

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Introduction and overview

This quarterly report reviews disease trends and disease threats for the fourth quarter of 2023, October to December. 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 Pig Expert Group networks.

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 annexe available on GOV.UK.

Pig disease surveillance dashboard outputs

Diagnoses made most frequently in the fourth quarter of 2023 and in the whole of 2023 through the Great Britain (England, Wales and Scotland) scanning surveillance network are listed in table 1. These can be interrogated further using the interactive pig disease surveillance dashboard which was launched in October 2017.

Table 1: Great Britain scanning surveillance 15 most frequent diagnoses in quarter 4 of 2023 and for the whole of 2023

15 most frequent diagnoses in quarter 4 of 2023 (total 409)	15 most frequent diagnoses in 2023 (total 1346)
1. Colibacillosis - enteric	1. Salmonellosis – *S*. Typhimurium
2. Salmonellosis – *S*. Typhimurium	2. Colibacillosis - enteric
3. Porcine reproductive and respiratory syndrome (PRRS) - systemic	3. *Lawsonia* sp. associated disease
4. *Streptococcus suis* disease	4. PRRS - systemic
5. *Brachyspira pilosicoli* colitis	5. *Brachyspira pilosicoli* colitis
6. *Lawsonia* sp. associated disease	6. *Streptococcus suis* disease
7. Swine influenza	7. PRRS - pneumonia
8. Swine dysentery – *B. hyodysenteriae*	8. Swine influenza
9. PRRS - pneumonia	9. Swine dysentery – *B. hyodysenteriae*
10. *Glaesserella parasuis* disease	10. *Glaesserella parasuis* disease
11. *Myco. hyopneumoniae* pneumonia	11. Pneumonia other cause
12. *Pasteurella multocida* pneumonia	12. Streptococcal disease (non-*S. suis*)
13. Endocarditis	13. Digestive disease – not listed
14. Streptococcal disease (non-*S. suis*)	14. *Pasteurella multocida* pneumonia
15. *Trueperella pyogenes* disease	15. Rotavirus

Note: that further diagnoses may be added for records for submissions made in quarter 4 of 2023 which are finalised at a later date.

Surveillance data for diagnostic submissions in quarter 4 of 2023 are illustrated in Figure 1.

Figures 1a to 1d: summary surveillance data for 613 submission records in quarter 4 of 2023 (448 in quarter 4 of 2022)

Figure 1a: pig age

Age Category	
Adult	92
Mixed	5
Neonatal	18
Postwean	346
Prewean	34
Unknown/other	118

Figure 1b: disease syndrome

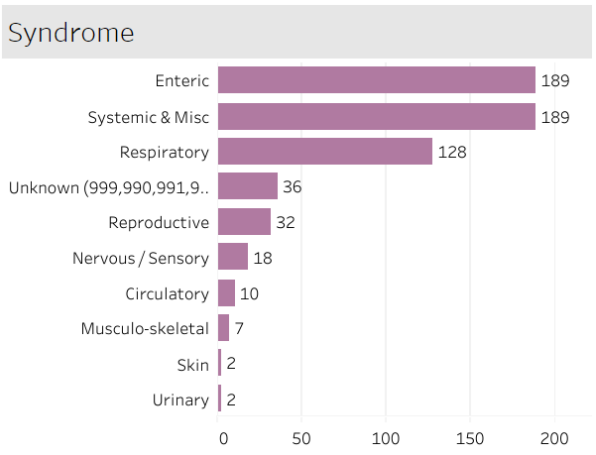


Figure 1c: submission type

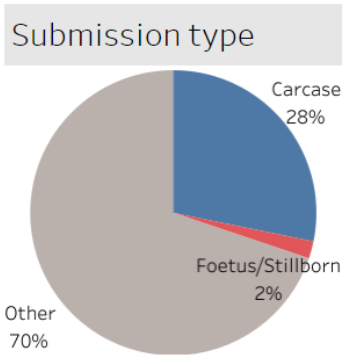
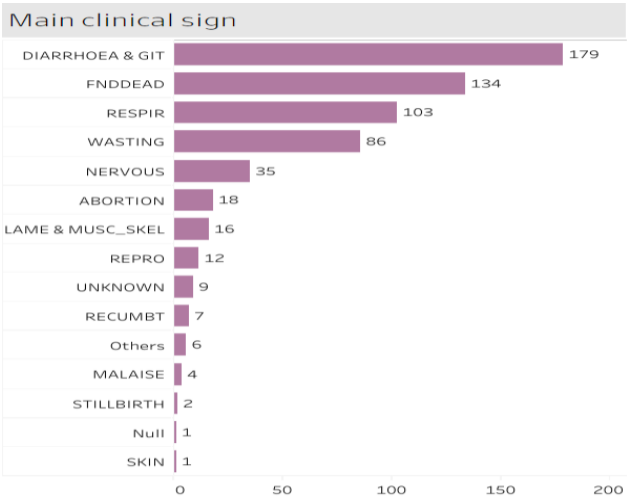


Figure 1d: main clinical sign reported



Figures 2a to 2d: summary surveillance data for 2,081 submission records for the whole of 2023 (1,737 in 2022)

Figure 2a: pig age

Age Category	
Adult	299
Mixed	13
Neonatal	85
Postwean	1,116
Prewean	127
Unknown/other	441

Figure 2b: disease syndrome

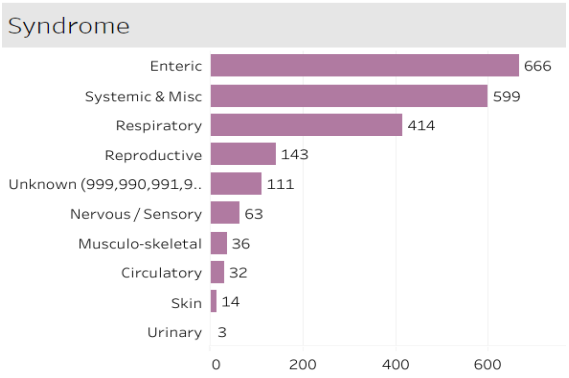


Figure 2c: submission type

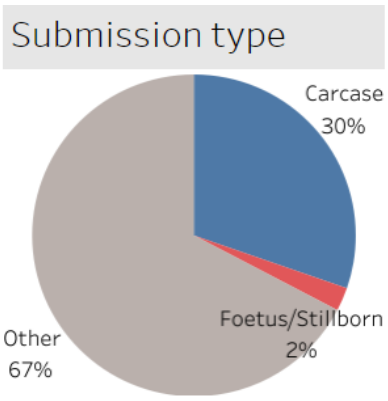
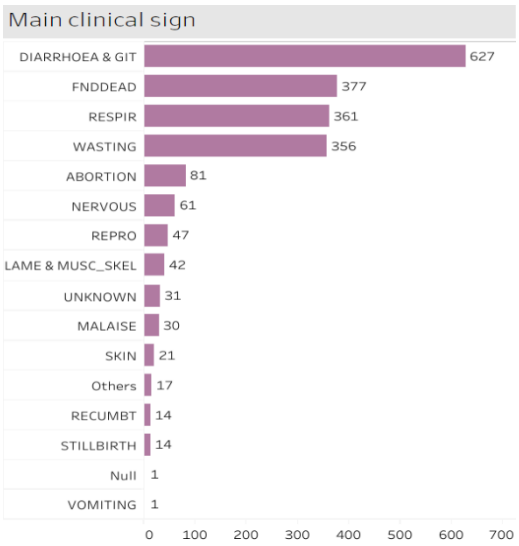


Figure 2d: main clinical sign reported



These diagnostic submissions are voluntary and subject to several sources of bias.

The profile of submissions for the fourth quarter of 2023 was similar to that of the same quarter in 2022 in that the most frequent main clinical sign was diarrhoea and gastro-intestinal, and the most frequent syndrome was enteric.

Total Great Britain (GB) diagnostic submissions for quarter 4 of 2023 were higher than in the same quarter in 2019 to 2022, being 42% higher than the average for these previous quarters. This was due to a rise in non-carcase submissions with the balance of submission types changing from being 41% carcases in quarter 4 of 2022 to 28% carcases in quarter 4 of 2023. This can affect the number of diagnoses achieved as carcases enable full diagnostic investigation however, that effect appears to have been offset by the increased number of submissions with 409 diagnoses made in quarter 4 of 2023 compared to 314 diagnoses in quarter 4 of 2022.

Data for diagnostic submissions for the whole of 2023 also shows an increase in the number of submissions and diagnoses made, in spite of a reduction in the number of carcase submissions, with 2023 seeing a lower carcase submission throughput than any of the years 2019 to 2022. There may be more on-farm postmortem examinations being undertaken, and whilst the diagnostic rate tends to be lower for such submissions compared to carcase submissions, they may generate useful engagement with private veterinarians resulting in further submissions. There is guidance available for veterinarians on sampling and testing pigs affected with different disease syndromes and they are encouraged to contact their regional Veterinary Investigation Centre and discuss investigations with Veterinary Investigation Officers at APHA and SRUC.

The most frequent diagnoses made in quarter 4 of 2023 and the whole of 2023 feature several diseases occurring higher in the list than previously, namely enteric colibacillosis, swine influenza and swine dysentery, and each of these diseases are discussed later in this report.

New and re-emerging diseases and threats

African swine fever

Updated assessments continue to be published on African swine fever (ASF) on GOV.UK.

The most recent updates on the ASF situation in Europe were issued in August and September 2023, and January 2024. Several developments were described, one being that on September 6th 2023 Sweden's National Veterinary Institute released information that ASF has been detected for the first time in Sweden in an adult wild boar found dead on August 27th just south-east of Fagersta (Västmanland County), a small town around 145km (90.1 miles) north west of Stockholm. Since August 25th, a total of six wild boar had been found dead (plus one sick and euthanased) in the area. The nearest detections of ASF to Sweden according to WOAH were in Latvia and Poland, over 400km away and separated by the Baltic Sea. Given the long distance from the nearest ASF-affected region, a human-mediated route was considered most likely and subsequent information indicated that there was a landfill site in the affected area that was frequented by wild boar through which it is likely that they accessed discarded ASF-infected material from elsewhere. Investigations and control measures were put in place including searching for, and testing, wild boar carcases and a website was provided for the public and hunters throughout Sweden to report findings of dead wild boar (www.rapporteravilt.sva.se). Public access to the affected area was prohibited. The animal health authorities in Sweden encouraged pig producers to review their biosecurity and contact a vet if there is disease or increased mortality. The APHA International Disease Monitoring team ASF update has more information. Sweden has detected ASF in 67 wild boar, all around the site of the first detection in September 2023 centred on the rubbish dump. The most recent detection was in late November 2023 and assuming no more are found, Sweden will apply for country freedom from ASF in late 2024/early 2025.

A September 2023 Promed item referenced an Italian veterinary news item describing the detection of genotype 2 ASF virus in a small herd of domestic pigs in Sardinia, which has historically been infected with genotype 1 ASF virus. As genotype 2 is present in several regions of the mainland of Italy, introduction from one of those regions, or an ASF-affected area in another country, by human-mediated means is considered the most likely means of entry into Sardinia.

Over the summer of 2023, Europe reported a significant increase of ASF outbreaks in domestic pigs, reaching nearly 1,000 reports. Of these, 189 occurred in Croatia and 397 occurred in Bosnia and Herzegovina and outbreaks continue in the Balkan states, mainly affecting backyard pigs. ASF was also detected for the first time in wild boar in Montenegro, close to the border with Bosnia and Herzegovina.

ASF is still circulating in wild boar across much of eastern Europe and in northern Italy. The EU-funded VACDIVA project is progressing with a trial to assess the use of an experimental ASF vaccine delivered by oral bait in wild boar in Hungary.

A publication on ASF in wild boar and domestic pigs in Europe shows a higher winter occurrence in wild boar in some countries, although there is variation by country (Rogoll and others, 2023). In contrast, domestic pig ASF outbreaks tend to show a peak over summer months. The paper discusses the different factors which may be influencing the data.

Maps showing information on the European Union (EU) ASF restriction zones are available.

Monthly IDM summaries are also included in the disease surveillance items in the Veterinary Record. The Swine Health Information Centre (SHIC) global reports include a round-up of ASF each month.

Global ASF Research Alliance (GARA) is to establish and sustain global research partnerships that will generate scientific knowledge and tools to contribute to the successful prevention, control and, where feasible, eradication of ASF. Their news and activities are accessible on the GARA website.

In December 2023 a recombinant of genotype I and II ASFV was detected in pork product at the Taiwan border. This new ASFV strain was first detected in pigs in China in 2022 and has been found in various regions of China, including Jiangsu, Henan, and Inner Mongolia. This finding is described in the January 2024 SHIC global report which indicates the particular concern around this strain which is highly pathogenic and transmissible and against which the newly developed virulence gene-deleted ASF vaccines are ineffective. It should also be noted that Italy has genotype I and II in Sardinia and genotype II in several regions of mainland Italy, thus it is not impossible that a similar recombinant event could happen in Europe independently.

A Pig World item in January 2024 included information from the Dover Port Health Authority (DPHA) which estimated that 90% of illegal meat trade enters UK at Dover (Driver, 2024). DPHA staff seized over 57 tonnes of illegal meat since September 2022 order including 5.5 tonnes of illegal meat over the weekend before Christmas 2023. This illustrates the main risk for introduction of ASF virus into the UK and entry into the UK's pig population which is pigs or wild boar eating ASFV-infected pork or pork products derived from affected countries. ASFV can survive for months in smoked, dried and cured meats, and for years in frozen meat.

Meat and meat products brought into the UK from affected countries as personal imports and illegal imports represent the most significant risk of introduction of exotic notifiable diseases including ASF, Classical swine fever and foot and mouth disease (FMD), the commercial trade of such products is not permitted from ASF-affected areas. The Government announced new restrictions on the movement of pork and pork products into Great Britain to help safeguard pigs from the threat of ASF. These came into force from 1 September 2022 and mean it is no longer legal to bring non-commercial pork or pork products weighing over two kilograms in from EU member states and European Free Trade Association states unless they are produced to the EU's commercial standards. This does not apply to commercial imports. It remains illegal to trade in pork or wild boar meat from ASF-affected areas or to bring in meat products from Asia or Africa.

Information on ASF is disseminated to veterinary practices and Pig Veterinary Society members. The assistance of veterinary practitioners in raising awareness about ASF amongst their pig-keeping clients in the UK is vital, together with advising them on resolving biosecurity weaknesses to reduce the risk of introduction.

Pig keepers are reminded that it is illegal to feed pigs catering, kitchen or domestic waste, or meat or meat products. Providing dedicated clothing and boots for staff and visitors, limiting visitors to a minimum, and preventing outside vehicles or equipment which may be contaminated from coming on to the farm, are also all valuable procedures to reinforce. Images of the clinical signs and pathology of ASF are available. Suspect cases must be reported promptly to APHA and this is followed by an official veterinary investigation.

Porcine epidemic diarrhoea and other porcine enteric coronavirus surveillance

Porcine Epidemic Diarrhoea (PED) due to any PED virus strain remains notifiable in England and Scotland and suspicion of disease, or confirmation of infection, must be reported (Defra, 2015 and Scottish Government, 2016). No more suspect incidents of PED have been reported since the case in May 2022 on a small pig premises in England in which PED was ruled out and iron deficiency anaemia was diagnosed.

Enhanced surveillance for PED continues and diagnostic submissions from cases of diarrhoea and/or enteropathy in pigs (non-suspect PED) submitted to APHA have been routinely tested by PCR for PED virus (PEDV) and transmissible gastroenteritis virus (TGEV) on a weekly basis. None has been positive for PEDV or TGEV in over 1,500 diagnostic submissions tested under Agriculture and Horticulture Development Board (AHDB) Pork funding from June 2013 to December 2023.

This enhanced surveillance has included testing for porcine deltacoronavirus (PDCoV) since February 2023 under the same funding and no PDCoV has been detected to date. This surveillance aims to detect any of these three porcine enteric coronaviruses, should they occur as a new and (re-)emerging cause of porcine diarrhoea in pigs and thus a potential threat to pig health and welfare. The last diagnosis of PED and of TGE recorded in the Great Britain national diagnostic database (VIDA) was in 2002 and 1999, respectively. PDCoV has not been detected to date.

Unusual diagnoses or presentations

Actinobacillus rossii abortion

Abortion in a mature sow was investigated in a small pig herd which had been closed for three years and was part of a mixed livestock smallholding. The sow was due to farrow in three weeks and was not unwell. No vaccination was practiced.

Seven aborted piglets and placentae were submitted showing a slight sequential decrease in fetal size and there was a necrotic placentitis visible in one of the placentae. *Actinobacillus rossii* was isolated from the foetal stomach contents of two of the three piglets on which cultures were undertaken. No other infectious agents of abortion were identified.

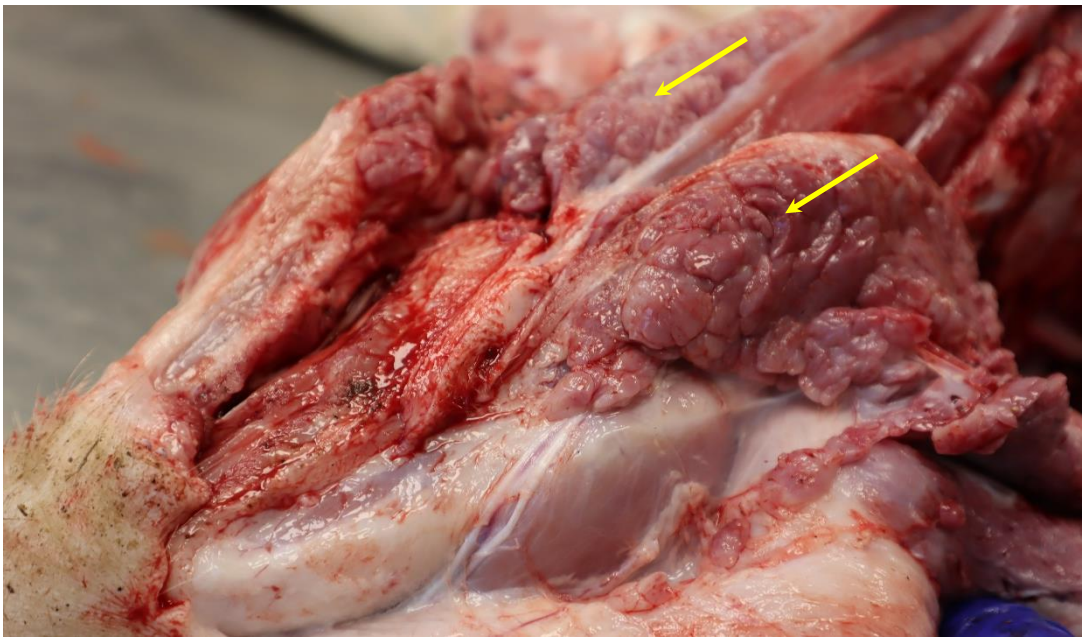
This organism is an inhabitant of the porcine vagina and is usually a sporadic cause of bacterial abortion although a paper from Australia (Holyoake and others, 2017) describes an outbreak. *Actinobacillus rossii* has been implicated in abortions in pigs previously at APHA (APHA, 2020).

A. rossii is as an inhabitant of the porcine vagina and RTX toxin genes have been identified in strains of *A. rossii* (Mayor and others, 2006). Possession of these virulence factors may contribute to the organism's ability to act as a sporadic cause of porcine abortion. This organism is not known to be of zoonotic significance and there is no recognised risk to the wider pig industry. It is worth noting that *A. ros*sii can be confused with *Pasteurella pn*eumotropica in culture. There is a publication which references a personal communication reporting *A. rossii* isolation from a cluster of abortions (20/2500 sows) on a unit which also experienced decreased conceptions rates and increased vaginal discharges. Wet bedding and feeding of liquid whey were suspected to have been contributory factors in those abortions (Holyoake and Thompson, 2017).

Unusual pathology in porcine circovirus 2-associated disease

An unusual manifestation of porcine circovirus 2-associated disease (PCV2-AD) was identified in a PCV-2 vaccinated 15-week-old pig during investigation of an ongoing problem of post-weaning wasting resulting in unevenly sized pigs within the batch. The pig was in poor body condition with enlargement of inguinal and mesenteric lymph nodes and noticeable enlargement of the salivary glands (Figure 3) which were sufficiently big to cause visible external swelling. Histopathology confirmed a granulomatous lymphadenitis suspicious of disease due to PCV2 and multifocal chronic active (suspected pyogranulomatous) sialodacryoadenitis. The histopathological lesions in both lymph node and salivary gland were confirmed as being due to PCV2 by immunohistochemistry (IHC) with abundant and intense PCV2 labelling. Salivary gland pathology in PCV2-AD is an unusual finding; there is literature supporting PCV2 antigen presence and associated morphological changes within the salivary glands of infected animals most commonly during the viraemic stages of infection or in cases of systemic PCV2-AD. *Brachyspira pilosicoli* colitis was diagnosed in the other pigs examined from the farm and they were not affected by PCV2-AD. It is thought likely that the pig with PCV2-AD had inadvertently been missed during vaccination of the batch. This case was described in the December 2023 APHA surveillance report in the Veterinary Record (APHA, 2024a).

Figure 3: Salivary gland enlargement (arrowed): unusual pathology confirmed due to PCV2-AD

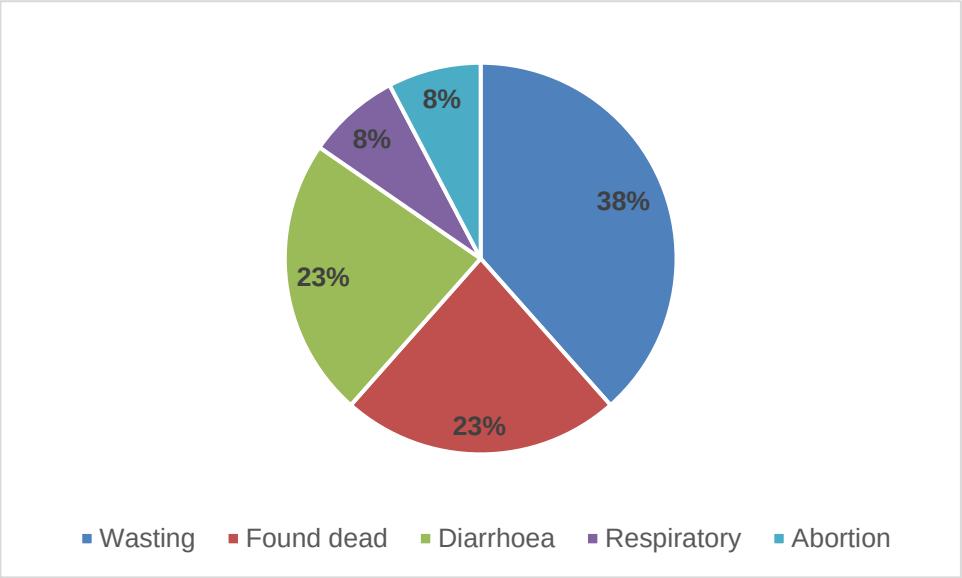


Since widescale vaccination of commercial pigs was implemented from 2007, disease due to PCV2 has reduced dramatically. Diagnoses are still recorded through the GB scanning surveillance network, some involving small non-vaccinating pig herds. In commercial herds, there are occasional individual pig cases of PCV2-AD identified where it is likely a few pigs missed the routine vaccination given to the rest of the batch. Larger outbreaks are also sometimes identified where it is known, or suspected, that the whole batch was not vaccinated, including where problems are identified or suspected with vaccine storage or administration, or the vaccination protocol such as the timing. If PCV2-AD outbreaks were to be confirmed in multiple vaccinated pigs and there is no explanation found for the apparent vaccine failure, it is important that these are reported to the Veterinary Medicines Directorate.

During 2023 there were 13 diagnoses of PCV2-AD which, although not numerous, is the most in a single year since 16 diagnoses were made in 2014, with numbers of incidents diagnosed ranging from four to ten between 2015 and 2022. Diagnoses in 2023 were all in postweaned growing pigs apart from one PCV2-associated foetopathy diagnosis in a small unvaccinated herd. The main clinical signs reported are shown in Figure 4. In one unvaccinated herd with respiratory disease in pigs of finishing age, nervous signs in three-week-old piglets confirmed due to PCV2 were described in a previous quarterly report (APHA, 2023a). The diagnostic rate and numbers of diagnoses of PCV2-AD will be kept under review in the next quarters. An update on the genotypes of PCV2 detected in GB diagnoses of PCV2-AD was given in the last quarterly report (APHA, 2023b) with PCV2d predominantly detected and occasional detections of PCV2b. An overview and update on PCV2-AD was given at a Young Pig Vet CPD event and to scanning surveillance vets in November 2023.

A SHIC/AASV webinar on porcine circoviruses is available that was held recently by the Swine Health Information Center in collaboration with the American Association of Swine Veterinarians which reviewed trends and emerging issues regarding the different porcine circoviruses.

Figure 4: Main clinical signs reported in PCV2-AD incidents diagnosed through the GB scanning surveillance network



Tentative diagnosis of hypocalcaemia in highly productive lactating sows

A tentative diagnosis of hypocalcaemia was made in highly productive lactating sows on an outdoor weaner-producer unit. Shaking, weakness, incoordination and recumbency were described within two to three weeks of farrowing affecting up to four percent of multiparous sows in several batches. Clinical signs were not alleviated by anti-inflammatory or antimicrobial treatment, and due to the continued inability to arise, affected sows were euthanised on welfare grounds.

Gross findings in two submitted sows were generally unremarkable and ocular fluid from both sows was tested for calcium. The brains could not be examined due to the method of euthanasia. The spinal cord was removed from the second sow and histopathology revealed

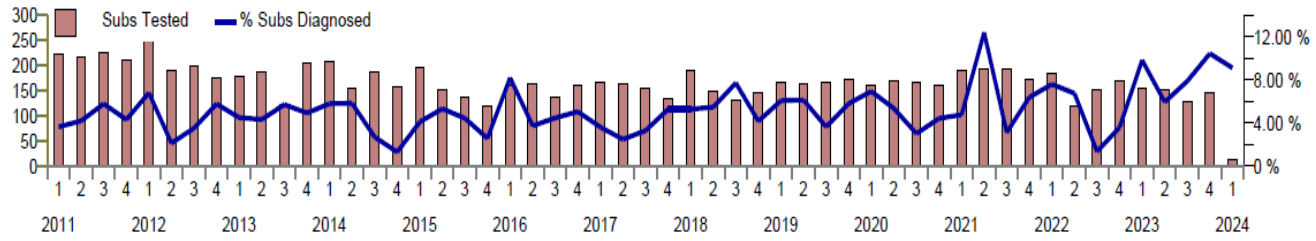
subtle minimal, multifocal Wallerian-type degeneration of the white matter, although suboptimal preservation limited evaluation. Whilst the clinical significance of these histopathological changes in the spinal cord was uncertain, differentials include mechanical causes (e.g., compression, trauma, etc.) or toxic-metabolic causes such as vitamin B5, B6 or E deficiency and copper deficiency). Alongside this, in both sows, ocular fluid calcium concentrations were found to be lower than the serum calcium reference range for pigs (1.4 and 1.5 mmol/l). In the absence of good data on correlation between ocular fluid and serum calcium concentrations in pigs, it was recommended that bloods from live affected sows be tested. This was done by the private vet involved and showed serum calcium concentrations of 2.45 and 2.42 mmol/l (SRUC reference range 2.74-2.82). The vet indicated that oral treatment with a calcium supplement was initiated and feed was top-dressed with a calcium supplement for three days from days 10-12 post-farrowing as prevention. Information from the farm was that subsequent batches saw "few if any cases" following these interventions. It was not possible to confirm hypocalcaemia or rule out some of the differentials in the submitted sows, however the clinical findings and response to treatment supported a tentative diagnosis of hypocalcaemia which is not a common clinical presentation in pigs compared to ruminants. Calcium and other minerals in the ration were analysed and reported to be adequate. Full diagnostic investigation including examination of brains and spinal cords from further cases, should they arise, would help investigate further. This was presented at the Pig Veterinary Society's clinical club by the private veterinarian.

Changes in disease patterns and risk factors

Rise in swine influenza diagnoses and diagnostic rate

The diagnostic rate for disease due to swine influenza A virus (SwIAV) in the last quarter of 2023 and for the whole of 2023 was higher than in quarter 4 of 2022 and in 2022 respectively, as the seasonality of diagnoses shows in Figure 5. Forty-nine diagnoses were made in 2023 compared to 30 in 2022, similar to 2021 when 50 diagnoses were made and a peak in the diagnostic rate occurred in the second quarter of the year (APHA, 2021). Anecdotal information from veterinarians attending pigs in Great Britain supports a higher incidence of disease, particularly in the latter part of 2023.

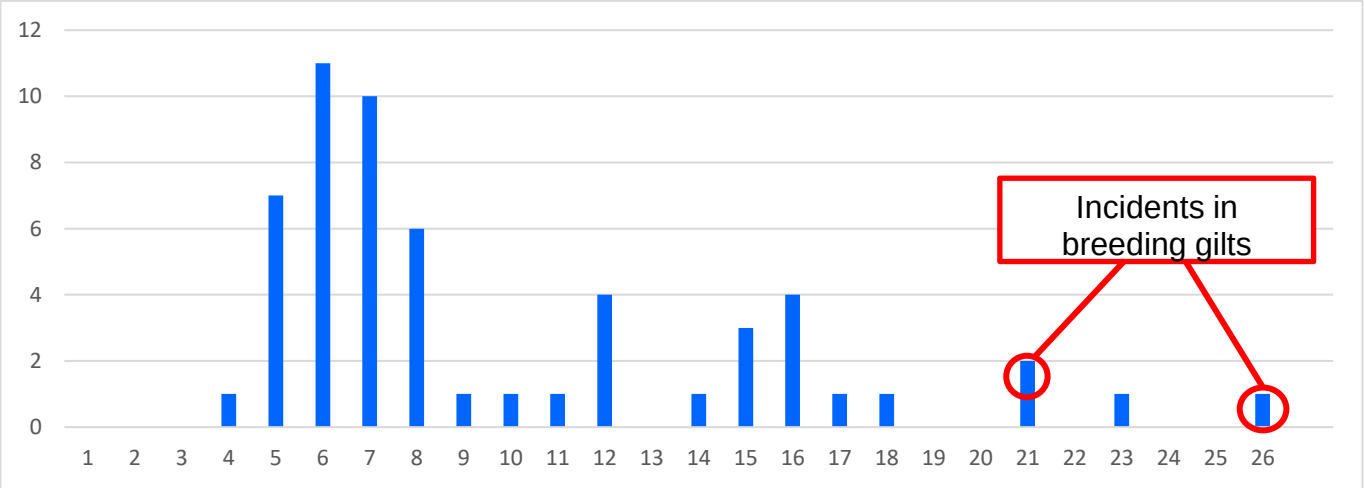
Figure 5: Diagnostic rate of swine influenza by year and quarter as a percentage of diagnosable submissions to the Great Britain scanning surveillance network



Surveillance data for swine influenza diagnoses made in 2021 to 2023, showed that respiratory disease was given as the main clinical sign in 68% of diagnosed incidents in 2023, with wasting and pigs found dead being the next most common main signs described. Figure 6 illustrates the distribution of pig ages at the time of diagnosis of swine influenza for 2022 and 2023, where

specific pig ages were given (ten submissions only identified pigs as being postweaned and nine did not provide any information on pig age).

Figure 6: Pig ages at the time of swine influenza diagnosis in submissions to the Great Britain scanning surveillance network in 2022 and 2023



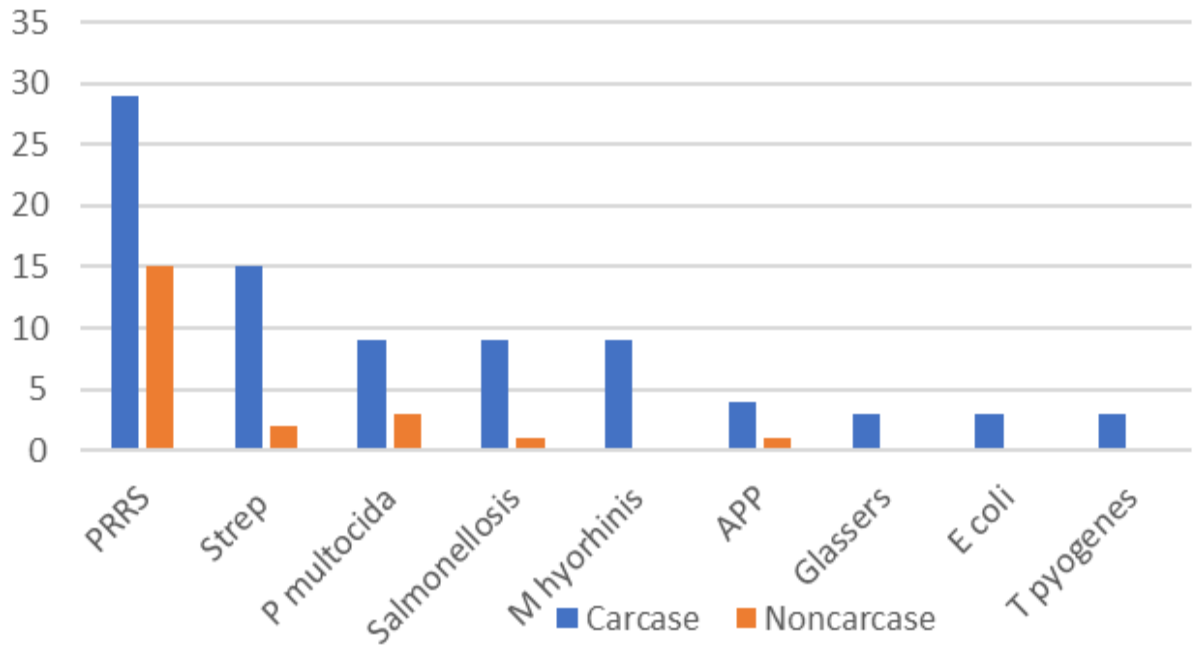
The age profile shown in Figure 6 is supported by observations in the field with most cases occurring in the first four weeks after weaning, likely associated with amplification of SwIAV following infection being introduced into groups of weaners mixed at weaning, either from infection of a number of litters by sows during lactation, or by lateral spread on units from other groups of growing pigs. A second smaller increase in the number of diagnoses occurs from 12-16 weeks old which may be associated with moving and mixing of pigs at the finisher stage. Another risk period is when replacement breeding stock are introduced into herds in which active SwIAV infection is being maintained but they have no pre-existing immunity to the circulating strains. Two such incidents feature in Figure 6. This situation prompts some herds to vaccinate replacement breeding pigs for SwIAV either before arrival or during their quarantine period.

Where pigs were submitted for full diagnostic investigation and swine influenza was diagnosed, concurrent diagnoses were made in 92% of submissions while concurrent diagnoses were made in only 27% of postal (non-carcase) submissions reflecting the more limited nature of the submitted material and testing. Figure 7 shows the most frequent concurrent diagnoses made in pigs affected with swine influenza diagnosed through the scanning surveillance network. SwIAV is not immunosuppressive in the way that porcine reproductive syndrome and PCV2-AD are, and, in uncomplicated swine influenza, the mortality rate is generally low. If the health status and environmental conditions are good and affected individual pigs usually recover within 5-7 days. However, the respiratory tract pathology, in particular airway damage due to SwIAV, may lead to secondary bacterial infection and if intercurrent infections develop or there are other issues, disease can be more severe with a longer recovery period and increased mortality rates.

The features of several swine influenza outbreaks diagnosed at APHA were highlighted in monthly surveillance reports in the Veterinary Record (APHA, 2024b; APHA 2024c) with reminders to veterinarians attending pigs of the Government-funded SwIAV PCR testing available at APHA at no charge for pigs with respiratory disease in the United Kingdom. The SwIAV subtypes identified as endemic in GB pigs remain pandemic 2009 lineageH1N1 (1A.3.3.2) and H1huN2 (1B.1.1) and, less frequently identified, avian-like H1N1 (1C.2.2).

Figure 7: Most common concurrent diagnoses✶ in pigs diagnosed with swine influenza in the Great Britain scanning surveillance network in 2021 to 2023

✶only showing concurrent diagnoses made more than three times



Presentations on swine influenza diagnosis, pathology and surveillance findings were given at a Young Pig Vet CPD event, to scanning surveillance vets, at a pharmaceutical vet meeting and at the Pig Veterinary Society (PVS) spring conference. The PVS presentations are available to members on the PVS website.

Detection of influenza D virus in pigs and cattle in Great Britain

The APHA Mammalian Influenza Research team tested pig respiratory samples archived from the swine influenza A virus surveillance project for influenza D virus (IDV) RNA by PCR and made the first four detections of IDV RNA in April, June and October 2023 and January 2024, in three different regions of England. Table 2 indicates the numbers of samples tested and positive in both pig and cattle submissions for respiratory disease. IDV virus has been successfully isolated from both species and full genome sequencing indicates that the 2023 pig and cattle isolates are similar to IDV strains sequenced from other European countries.

Table 2: Influenza D virus (IDV) detections in cattle and pigs in Great Britain

Species (Sample date interval)	Submissions (samples)	IDV positive
Cattle (Nov 2022 – Feb 2024)	435 (529)	14 (17)
Pig (Mar 2023 – Feb 2024)	285 (751)	4 (5)

Influenza D virus (IDV) was first identified in 2011 in pigs with influenza-like signs in the USA (Hause and others, 2013). IDV is not notifiable or reportable and there is currently no data to indicate that it has zoonotic potential; IDV has not been detected in humans to date and robust serological assays are lacking for use in people and livestock. IDV is structurally similar to influenza C virus (ICV) that infects humans. ICV and IDV do not have pandemic potential and differ from A and B influenza viruses in terms of virus structure and genetic makeup . IDV is globally distributed and its presence has been confirmed in North America, Europe (France, Italy, Germany, Denmark, Luxembourg, Republic of Ireland, Northern Ireland and now Great Britain), Turkey and Asia. IDV detections have mainly been in cattle and pigs, although a wide range of other mammalian species such as sheep, goats, horses and camelids are thought to be susceptible and it is thought that cattle may act as the main livestock reservoir (Kwasnik and others, 2023).

The clinical impact of IDV infection in a field setting is uncertain and remains poorly understood. An IDV review by Kwasnik and others (2023) indicates that experimental infection in pigs showed that IDV replicated in the upper respiratory tract, with detectable virus shedding in nasal swabs although no clinical signs of infection were observed. IDV could be another contributory agent in bovine and porcine respiratory disease complex, either by causing pathology in its own right and/or by increasing susceptibility to, or exacerbating disease caused by, other respiratory pathogens. In the four detections in GB pigs, the virus was detected by RT-PCR and the presence of IDV was confirmed by sequencing, with high Ct values all over 30 indicating that viral loads were low. The features of the pig submissions in which IDV was detected are provided in Table 3, infection appears likely to be incidental in the two detections in pre-weaned pigs, and in the 15-week-old pigs there was complex respiratory disease with other significant viral and bacterial pathogens involved. In the fourth incident, only nasal swabs were submitted and it was not possible to assess the clinical significance. Disease data will be compiled as further cases are detected through continued IDV PCR testing.

Table 3: Information about the four pig submissions in which IDV was detected

Month and year	Submission	Clinical signs	Comments
April 2023	Nasal swabs postweaned pigs	Respiratory and pigs found dead	Flu D detected in 2/4 pools. Negative for influenza A
June 2023	Three dead 15-week-old pigs	Respiratory and sudden deaths	Flu D detected in 1 of 3. PRRSV and Strep suis 2 identified in lung, plus APP and influenza A in the batch
October 2023	Three dead two-week-old pigs	Good pigs found dead	Flu D detected in 1 of 3. *Klebsiella pneumoniae* septicaemia diagnosed
January 2024	Three dead four-day-old pigs	Poor pigs found dead from gilt litter	Flu D detected in 1 of 3. Starvation diagnosed, no evidence infectious disease

Single detection of swine influenza H1huN2variant in a person

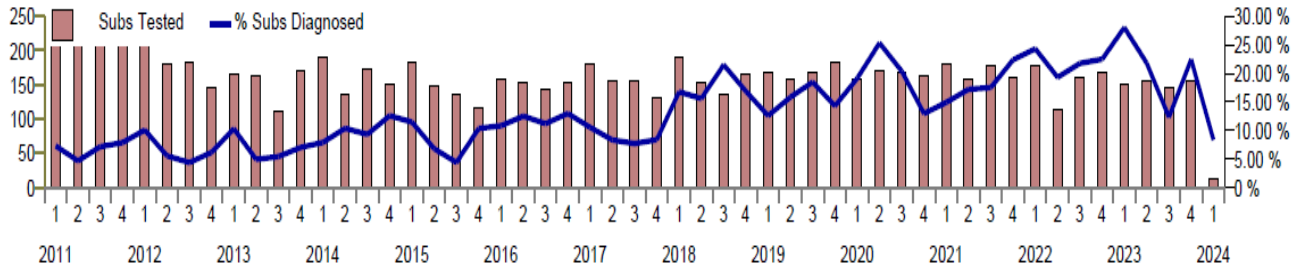
In November 2023, the UK Health Security Agency (UKHSA) announced the detection of influenza A(H1huN2) variant (H1N2v) in one person in North Yorkshire. The individual had mild clinical signs and recovered fully. The case was identified through community surveillance conducted by UKHSA and certain general practitioners. This is the first detection of H1N2v in a person in the UK, however, there have been H1N2v detections elsewhere in the world including Europe, the Americas and Asia https://www.gov.uk/government/news/ukhsa-detects-human-case-of-influenza-ah1n2v, usually related to known pig contact. There was rapid UKHSA liaison with APHA (swine influenza, One Health and scanning surveillance teams), Defra and the UK Chief Veterinary Officer and APHA provided viruses derived from swine influenza surveillance and characterised through Defra-funded research and OFFLU VCM activities that reports to the WHO and recommends candidate vaccine viruses that are maintained as part of influenza pandemic preparedness activities. A summary of anonymised recent findings from swine influenza surveillance in pigs was provided to UHHSA. APHA communications were provided to the Pig Expert Group, Pig Vet Society and VIC newsletters reminding vets of free swine influenza surveillance and the Code of Practice for swine influenza in pigs.

An update from the UKHSA on the investigation confirmed that no further cases in people were identified in the region through enhanced UKHSA surveillance and that no direct or indirect contact with pigs was identified for the one affected person. Phylogenetic analysis revealed that the haemagglutinin (HA) gene in the virus from the person was closely related to swine influenza A clade 1B.1.1 and the internal gene cassette derived from the 1A.3.3.2 pdm09 lineage. The virus detected was very similar to a reassortant present in pigs in the UK since late 2009 (Howard and others, 2011) and clustered closely with contemporary H1huN2 viruses detected in pigs in the same region. There was no evidence of a new reassortment.

Monitoring of vaccine-like PRRSV detected in pigs in Great Britain

The diagnostic rate for porcine reproductive and respiratory syndrome (PRRS) in Great Britain rose again in quarter 4 after two successive reductions in quarter 2 and 3 of 2023 but remained lower than the peak in the first quarter of 2023 when the diagnostic rate exceeded the highest most recent peak in quarter 2 of 2020 (Figure 8). The data underline the importance of PRRS as an endemic pathogen in GB pigs. PRRS is the priority for disease control in the pig component of the Animal Health and Welfare pathway alongside a focus on biosecurity improvement to control endemic pig diseases and help prevent the introduction of exotic disease threats. No PRRSV-2 has been detected in UK pigs to date.

Figure 8: Diagnostic rate of PRRS by year and quarter as a percentage of diagnosable submissions to the Great Britain scanning surveillance network



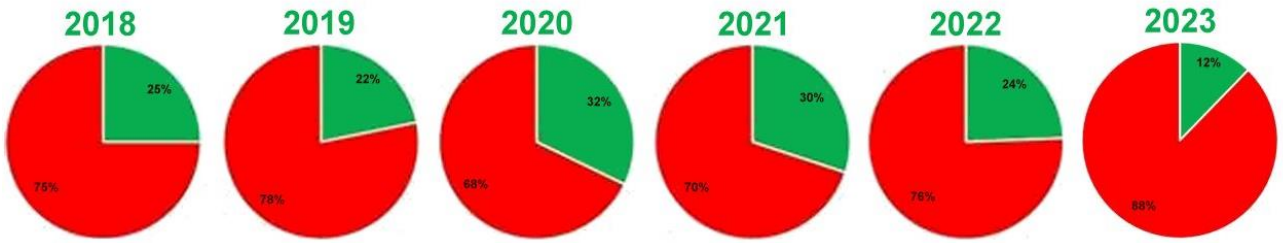
In the years from 2020 to 2023, the annual diagnostic rate for PRRS has remained fairly stable ranging from 17.9 to 22.2% of diagnosable submissions, while actual numbers of diagnoses ranged from 121 to 138 each year. More surveillance and diagnostic information is available through the interactive PRRS dashboard.

As part of PRRS surveillance at APHA, ORF-5 gene sequencing is undertaken under pig disease surveillance funding on the sample with the lowest Ct value (likely highest viral load) in each PCR-positive submission to monitor diversity in the PRRSV detected and to check there have been no introductions of exotic PRRSV-1 strains into the UK. This monitoring of PRRSV diversity was described in the report for quarter 2 of 2023 (APHA, 2023c).

Viruses in which the ORF-5 gene sequence has 98.5% or greater similarity to one of the live PRRSV vaccines are termed “vaccine-like”. As the ORF-5 sequence analysis is based on just 4% of genome, vaccine-like viruses are analysed further by sequencing part of the nonstructural protein 2 (nsp2) to help identify any potential recombinants. Since a recombinant PRRSV-1 vaccine (or vaccine-like) and field virus was described in pigs in England (Frossard and others, 2013), no further recombinants have been found. All of the other vaccine-like PRRSV examined to date have had nsp2 and ORF5 sequences that are consistent and do not raise concern that they represent potential recombinants.

The proportion of sequenced PRRSV that are found to be vaccine-like has ranged from 22 to 32% in the years 2018 to 2022 as illustrated in Figure 9. In 2023, only 12% of the PRRSV sequenced at APHA were found to be vaccine-like. This parameter will be kept under review and it is possible that this change, in part, reflects issues with the supply of certain live vaccines.

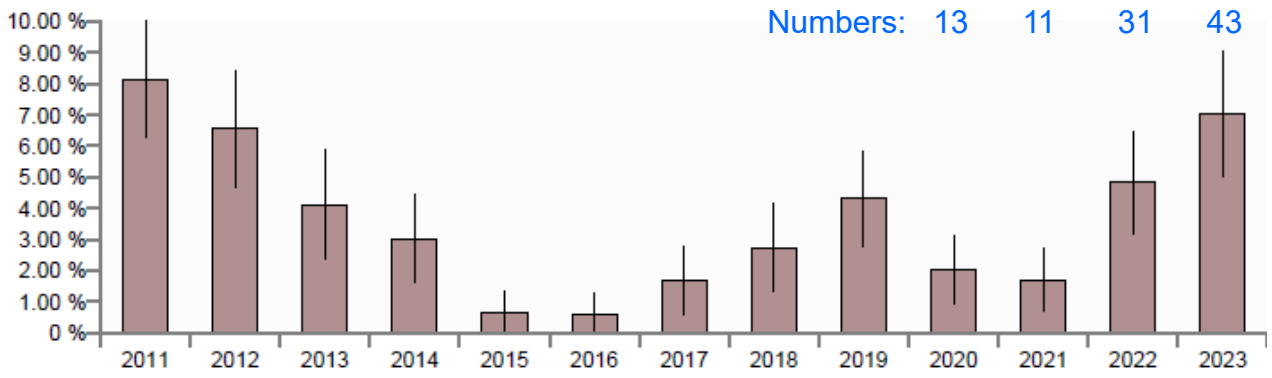
Figure 9: Proportions of field PRRSV strains compared to vaccine-like strains identified each year based on ORF-5 sequencing (red represents field strains, green represents vaccine-like strains)



Swine dysentery diagnoses continue into quarter 4 of 2023

The annual diagnostic rate and number of diagnoses per year of swine dysentery caused by *Brachyspira hyodysenteriae* rose in 2024 as shown in Figure 10. A number of these were reported to the pig industry’s Significant Diseases Charter which issued alerts to raise awareness about swine dysentery outbreaks. Diagnoses in 2023 were made in pigs in counties across England and also in Scotland and Wales. These can be seen on the interactive GB pig disease surveillance dashboard.

Figure 10: Diagnostic rate of swine dysentery by year as a percentage of diagnosable submissions to the Great Britain scanning surveillance network
(numbers of diagnoses shown in blue)



Whole genome sequencing (WGS) and minimum inhibitory concentration (MIC) testing by broth microdilution is undertaken on a representative *B. hyodysenteriae* isolate from a submission from each premises (where successfully isolated and provided to APHA) under funding from APHA's pig disease scanning surveillance project. WGS allows multilocus sequence typing (MLST) which is a tool for characterisation of isolates of a bacterial species and analyses sequence data of seven conserved genes in each *B. hyodysenteriae* isolate resulting in a combination of alleles known as a sequence type (ST) for each isolate. The multilocus sequence types of *B. hyodysenteriae* isolates from pigs in Great Britain, and the genes or SNPs associated with reduced antimicrobial susceptibility that they possess, are represented on the B. hyodysenteriae MLST dashboard. The STs for around 140 isolates from 2017 to 2023 are shown on this dashboard with 28 different STs. The number of different STs detected each year from 2017 to 2023 ranges from 5-10 (Table 4), with several novel allelic profiles being identified every year which are submitted to the pubMLST database and allocated a new ST.

Table 4: *Brachyspira hyodysenteriae* STs identified each year 2017 to 2023

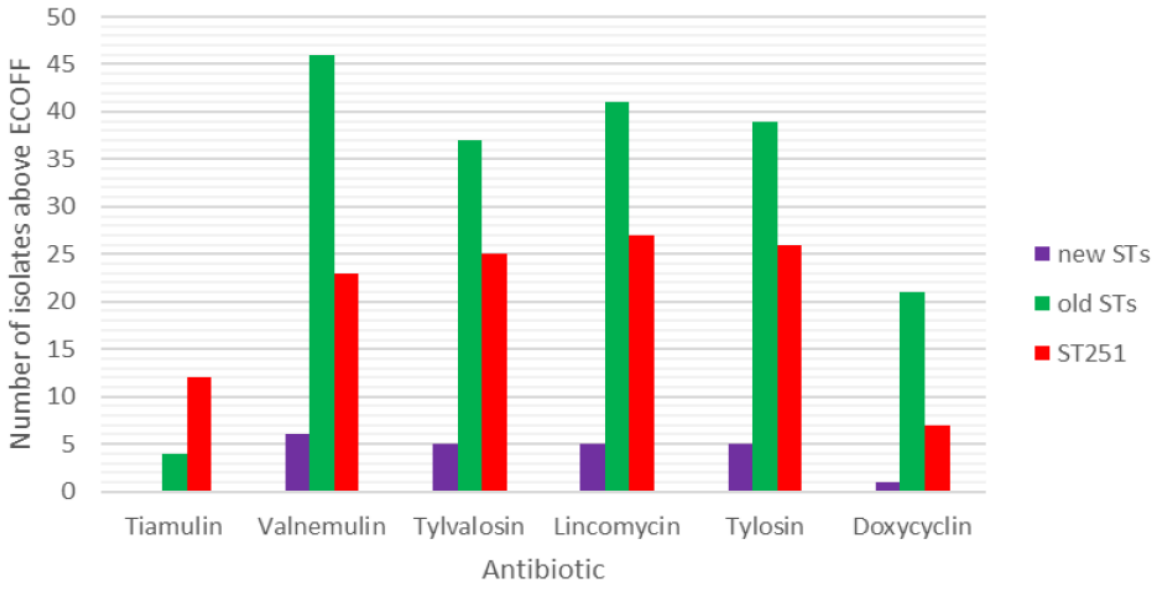
Note that the STs of further 2023 isolates yet to be sequenced may become available

Year of isolation	Isolates sequenced	Number of different STs	New ST identified
2017	6	5	2
2018	18	5	2
2019	61	8	2
2020	23	10	5
2021	12	5	1
2022	31	7	4
2023	24	10	3

The antimicrobial sensitivity testing has shown several *B. hyodysenteriae* isolates with MIC concentrations exceeding the breakpoint for clinical resistance, these isolates also had MIC values for other licensed antimicrobials tested at or above clinical breakpoint values which is of concern. The other licensed antimicrobials tested were valnemulin, tylvalosin, lincomycin and tylosin. All the tiamulin-resistant isolates identified from 2020 to 2023 to date (none were identified from 2017 to 2019) have been ST251 and from pigs in the north-east of England. Prior to these, the most recent isolate with multi-drug resistance was identified in 2016 and was ST8.

If the MIC data on antimicrobial susceptibility from ST251 are not included, analysis of MICs of isolates before 2017 ("old" STs) compared to those from isolates from 2017 to 2023 ("new" STs) indicates that the new STs tend to have lower MICs (Figure 11), indicating higher sensitivity than old STs, thus apart from ST251-associated cases, there is no evidence that AMR is a main factor influencing swine dysentery diagnoses made in 2017 to 2023.

Figure 11: Antimicrobial susceptibility in *B. hyodysenteriae* isolates: number with MIC above the epidemiological cut-off (ECOFF) for each antimicrobial tested



Rise in diagnostic rate for enteric colibacillosis

The diagnostic rate for disease associated with *Escherichia coli* in pigs increased in the last quarter of 2023 as shown in Figure 12. The majority of diagnoses (86%) were enteric colibacillosis, with a small number of oedema disease and one colisepticaemia. The main clinical sign was diarrhoea in most submissions, with wasting or pigs found dead next most frequent, but few in number. The distribution of enteric colibacillosis diagnoses by country and quarter of 2023 is shown in Table 5. Scotland saw a proportionately higher increase in diagnoses than England, and anecdotal information provided suggests that diagnostic initiatives undertaken during the last half of 2023 may have influenced the number of diagnoses there. Diagnoses also increased in England during 2023 and this may, in part, reflect the effect of the removal of zinc oxide from pig feed as a means of controlling post-weaning diarrhoea since product authorisation expired in June 2022. The UK Veterinary Medicines Directorate (VMD) granted an extension in the UK, allowing the industry to use up any product purchased before the authorisation expired in June 2022. The diagnostic trend for enteric colibacillosis will be kept under review in subsequent quarters.

Figure 12: Diagnostic rate of disease due to E. coli by year and quarter as a percentage of diagnosable submissions to the Great Britain scanning surveillance network

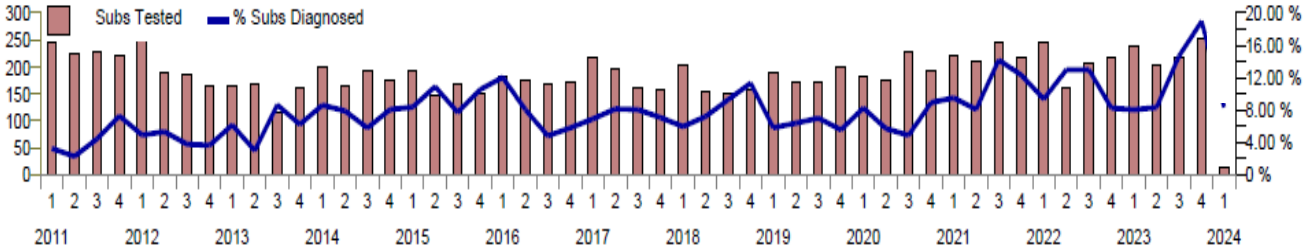


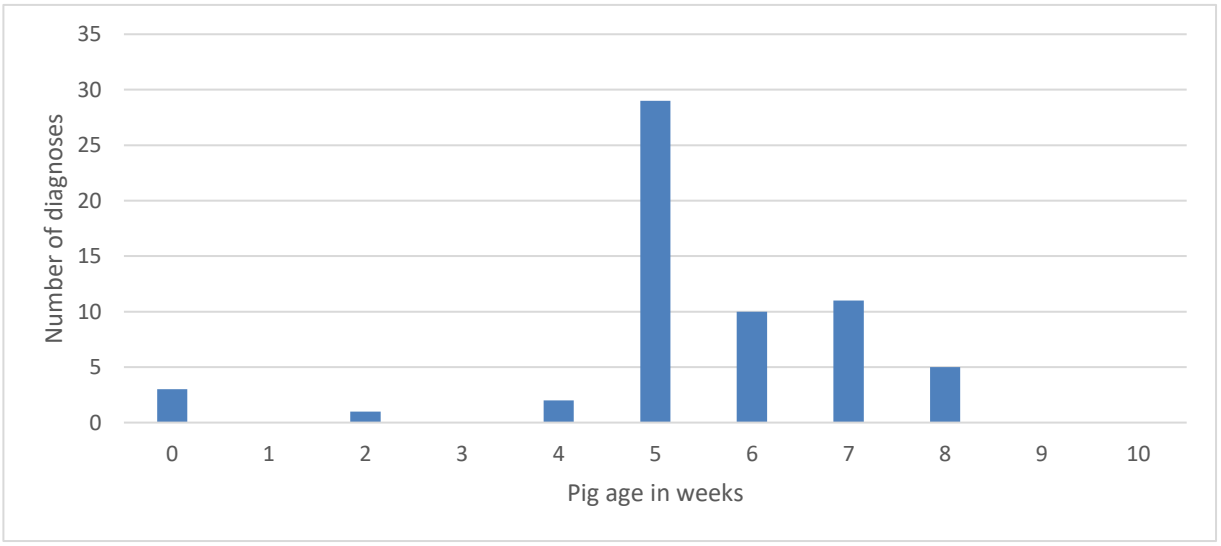
Table 5: Number of enteric colibacillosis diagnoses by country and 2023 quarter

No country information was provided for six submissions.

	Country			
2023	**England**	**Scotland**	**Wales**	**All GB**
Quarter 1	10	0	1	11
Quarter 2	11	0	0	11
Quarter 3	20	5	1	26
Quarter 4	29	12	0	41
Whole year	70	17	2	89

Figure 13 illustrates the age range (in weeks) of pigs at the time they were diagnosed with enteric colibacillosis during 2023, where this information was provided. A few cases were diagnosed in neonatal piglets, and one in two-week-old pigs, but the majority of cases were in post-weaned pigs and in five and six-week-old pigs likely to be in the first two weeks after weaning.

Figure 13: Enteric colibacillosis 2023 diagnoses by age in weeks (where given)



Most 2023 diagnoses were made in postal samples (85%) with additional diagnoses made in only 13% of those samples. Additional diagnoses were made in 57% of the carcase submissions in which enteric colibacillosis was diagnosed reflecting the fuller diagnostic investigation enabled by post-mortem examination. The additional diagnoses made mostly represented other enteric diseases, namely rotavirus, salmonellosis, *Brachyspira pilosicoli* and *Lawsonia*-associated disease, as well as oedema disease, porcine reproductive and respiratory syndrome (PRRS) and one case of pneumonia due to *Mycoplasma hyopneumoniae*.

Several incidents of enteric colibacillosis diagnosed in the last quarter of 2023 were described in the February 2023 Veterinary Record surveillance report (APHA, 2024d). The isolation of *Escherichia coli* in cultures of pig faeces or intestines is normal and although enteropathogenic *E. coli* are often haemolytic, they can also be non-haemolytic in pigs. To establish the clinical significance of the predominant *E. coli* isolated and make a diagnosis of colibacillosis in pigs with enteric disease, it is essential that the isolates are further investigated to determine whether they have virulence genes and/or antigens associated with pathogenic strains. The *E. coli* virulence gene PCR is used for this and the most common profile identified in recent APHA cases was detection of the genes encoding the fimbrial antigen F18 and the heat stable enterotoxin STa.

Porcine circovirus-3 associated disease update

Two further porcine circovirus 3 (PCV3)-associated reproductive disease cases were confirmed during 2023 when non-suppurative myocarditis was found in stillborn piglets with PCV3 nucleic acid detected by *in situ* hybridsation. These were described in the January 2024 Veterinary Record surveillance report (APHA, 2024e). In both incidents, piglets were delivered dead at, or very near to full-term.

APHA undertakes routine histopathology on three foetuses in each aborted or stillborn litter as surveillance for non-suppurative myocarditis lesions in foetopathy cases as a useful early indication of possible involvement of PCV2, PCV3 or other viruses. Case definitions for PCV3 disease have been proposed (table 8 in Saporiti and others, 2021) and the findings in these two cases fulfilled the criteria for a diagnosis of PCV3-reproductive disease. APHA has previously investigated a small number of incidents in which PCV3 was found to be associated with foetopathy with multisystemic non-suppurative inflammation and periarteritis, one of which was described in the quarter 4 of 2018 pig surveillance report (APHA 2018). In that outbreak, arthrogryposis was a feature in some piglets.

The other manifestation of porcine circovirus 3 (PCV3)-associated disease diagnosed at APHA is systemic disease (Saporitis and others, 2021). Enhanced surveillance for PCV3 cases began in 2021, using histopathology as an initial screen to detect non-suppurative myocarditis, which is then investigated further for porcine circovirus 2 or 3 involvement using immunohistochemistry (IHC) or *in situ* hybridisation (ISH) respectively. Hearts from foetuses, pigs or plucks received by APHA VICs for PME and diagnostic testing have been examined routinely by histopathology for three successive years. The numbers of PCV3-associated foetopathy and systemic disease cases diagnosed are summarised in Table 6. There are low numbers of foetopathy outbreaks confirmed. No outbreaks of systemic disease have been diagnosed and only individual cases of non-suppurative myocarditis, often with periarteritis, associated with PCV3 nucleic acid labelling

by ISH have been confirmed. PCV2 was not detected in these pigs by IHC. Only single postnatal pigs were affected in batches of two or three pigs examined in these submissions. One of the 2023 individual systemic cases which had illthrift and anaemia had typical multisystemic vascular lesions and also a mild encephalitis and PCV3 ISH confirmed the diagnosis with staining particularly strong in the CNS. The findings from this enhanced surveillance, which continues, indicate that there is a low level of PCV3 systemic cases in APHA submissions to date and provide a useful baseline to monitor for changes.

In addition to the cases diagnosed through the enhanced surveillance of APHA submissions in Table 6, an interesting case of combined porcine circovirus 2 and 3-associated myocarditis was investigated by SRUC in one eight-week-old pig, this is first to be confirmed involving both viruses. There was minimal history and only fixed heart was submitted from the pig which had been found dead. The private vet noticed during on-farm postmortem examination that there was white discolouration of the myocardium. Particularly severe inflammation was found by histopathology and both PCV2 IHC and PCV3 ISH were positive in association with the inflammatory heart lesions.

Table 6: Summary of PCV3-associated disease cases diagnosed through enhanced surveillance of APHA submissions

LN = lymph node, CT = congenital tremor

Year	Reproductive PCV3 cases	Systemic PCV3 (myocarditis) cases	Other	Age range postnatal cases
Pre-2021	3	3	-	-
2021	3	7	1 (LN +ve)	3 to 14 weeks
2022	0	2	1 (LN +ve)	4 to 7 weeks
2023	2	3	1 (CT-like)	4 days to 8 weeks
Comments	Outbreaks	All are single individual pigs in batches	One CT-like clinical signs with positive brain and spinal cord. Two cases with PCV3 positive lymph nodes and negative hearts	

There is a detailed description of the 2021 postnatal PCV3 sytemic cases in the report for quarter 1 of 2022 (APHA, 2022). A narrated APHA presentation giving key features of PCV3 and APHA surveillance findings up to June 2021 is available on this link: https://youtu.be/dST0n9ymGHA. There was also an informative webinar of porcine circoviruses including PCV3 held jointly by SHIC/AASV in February 2024 covering porcine circovirus challenges and emerging trends which can be accessed through the SHIC webinar-podcast link.

Horizon scanning

Septicaemia due to *Streptococcus equi subsp zooepidemicus* in North America

Webinar update: https://iastate.app.box.com/s/guezoj1nslu7hwk0se2m96zdq37r93x0

The first cases of high mortality due to septicaemic streptococcal infection in adult sows and finishers in the United States due to *Streptococcus equi* subspecies *zooepidemicus* were described in 2019. This resulted in an alert being sent to GB scanning surveillance vets to raise awareness. Since then several further outbreaks have occurred in the US and Canada and items have been included in past pig quarterly disease surveillance reports. Outbreaks have also been recorded in pigs in south-east Asia. An SHIC factsheet on Streptococcus equi subsp. zooepidemicus is found here. Genetic analysis of some but not all of the North American isolates from the US and Canada indicates that they are sequence type ST-194 with close genetic sequence similarity to ST-194 isolates from pigs in China involved in high mortality outbreaks in the 1970s. This strain of *S. equi* subsp. *zooepidemicus* ST-194 appears to be particularly virulent to pigs.

The disease outbreaks in pigs in North America have been severe with sudden onset and progression of malaise, inappetence, recumbency, pyrexia and rapid death of multiple sows or finishers, sows may also abort. The severity of clinical disease and some of the pathology (e.g. splenomegaly, congested and haemorrhagic lymph nodes and tonsils, oedematous gall bladder) could result in outbreaks being reported as suspect notifiable disease (swine fever). A recent SHIC webinar was held "Addressing *Streptococcus equi* subsp. *zooepidemicus* in December 2023 and is available through the SHIC webinar-podcast link. APHA and SRUC are keen to hear from anyone who has diagnosed disease in pigs in Great Britain due to *Streptococcus equi* subsp. *zooepidemicus* outside the GB scanning surveillance network.

To date the Pig Expert Group, APHA and SRUC have not been alerted to pig disease outbreaks due to *S. e*qui subsp. *zooepidemicus* through submissions or from investigations outside the GB surveillance network. There are isolations of *S. equi* subsp*. zooepidemicus* archived at APHA from a variety of animals. This is not a notifiable disease or a reportable pathogen and is not pig-specific; it infects other mammals, particularly horses, and can also infect humans. *S. equi* subsp*. zooepidemicus* is endemic in UK horses in which it is associated with respiratory disease, abortion and other opportunistic infections.

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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.

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