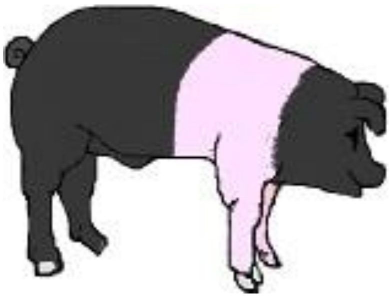
Animal & Plant Health Agency



SRUC

Great Britain pig quarterly report: disease surveillance and emerging threats

Volume 27: Quarter 1 of 2023 (January to March)

Highlights

- African swine fever in Europe update – page 4
- Differential diagnosis of negated notifiable disease report case – page 9
- Nervous signs due to porcine circovirus 2-associated disease – page 11
- PRRS remains an important endemic disease and 2022 dashboard update– page 14
- Swine dysentery diagnostic rate remains raised in the first quarter of 2023 – page 17
- Encephalomyocarditis virus in growing pigs in Italy – page 18

Contents

Introduction and overview 2

New and re-emerging diseases and threats 4

Unusual diagnoses or presentations 11

Changes in disease patterns and risk factors 12

Horizon scanning 18

Contact 19

References 19

Introduction and overview

This quarterly report reviews disease trends and disease threats for the first quarter of 2023, January to March. 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 first quarter of 2023 compared to the same quarter in 2022 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 1 of 2023

15 most frequent diagnoses in quarter 1 of 2023 (total 346)	15 most frequent diagnoses in quarter 1 of 2022 (total 329)
1. *Lawsonia* sp. associated disease	1. *Lawsonia* sp. associated disease
2. Salmonellosis – *S*. Typhimurium	2. PRRS - systemic
3. Porcine reproductive and respiratory syndrome (PRRS) - systemic	3. PRRS - pneumonia
4. *Streptococcus suis* disease	4. Rotavirus
5. PRRS - pneumonia	5. *Pasteurella multocida* pneumonia
6. *Pasteurella multocida* pneumonia	6. Colibacillosis - enteric
7. Swine influenza	7. Salmonellosis – *S*. Typhimurium
8. Swine dysentery – *B. hyodysenteriae*	8. *Streptococcus suis* disease
9. Colibacillosis - enteric	9. Swine influenza
10. Diagnosis not listed – enteric	10. *Brachyspira pilosicoli* colitis
11. *Brachyspira pilosicoli* colitis	11. Salmonellosis – other serotype
12. Gastric ulceration	12. Swine dysentery – *B. hyodysenteriae*
13. Pneumonia – other causes	13. *Mycoplasma hyopneumoniae* pneumonia
14. *Mycoplasma hyorhinis* serositis	14. Colibacillosis – oedema disease
15. Fetopathy due to PRRSV	15. Streptococcal meningitis

Note: that further diagnoses may be added for records for submissions made in quarter 1 of 2023 which are finalised at a later date.

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

Figures 1a to 1d: summary surveillance data for 496 submission records in quarter 1 of 2023 (502 in quarter 1 of 2022)

Figure 1a: pig age

Age Category	
Adult	70
Mixed	4
Neonatal	16
Postwean	267
Prewean	31
Unknown/other	108

Figure 1b: disease syndrome

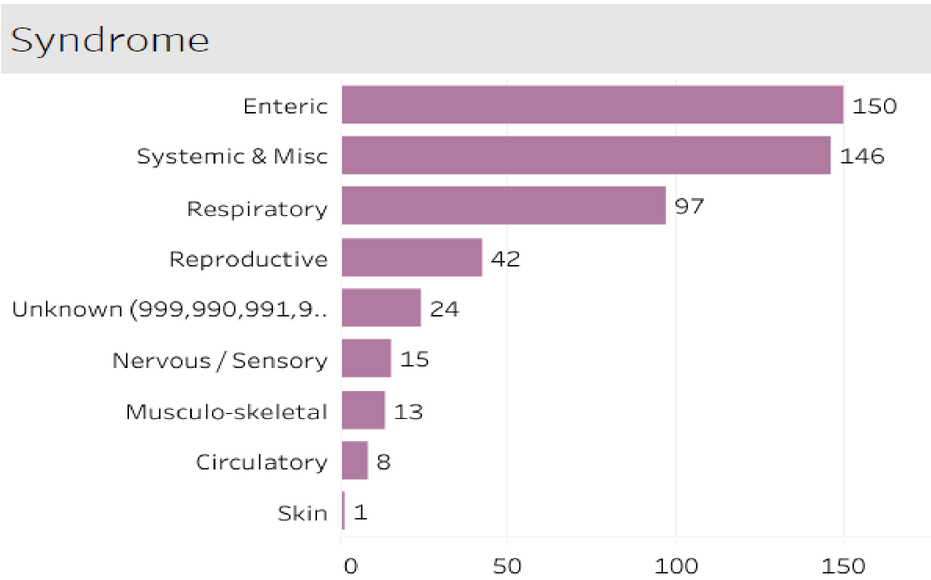


Figure 1c: submission type

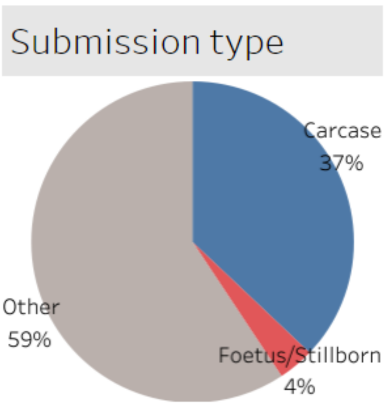
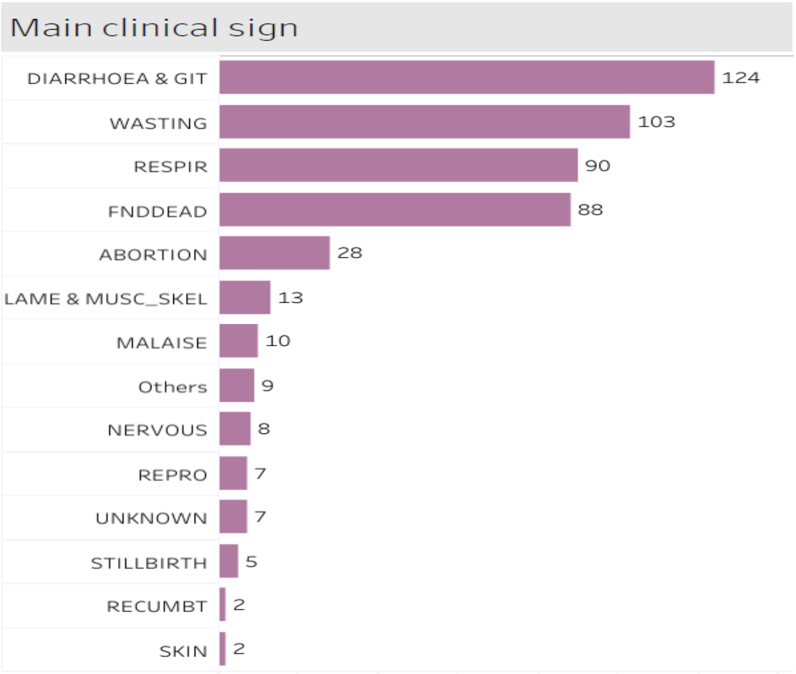


Figure 1d: main clinical sign reported



New and re-emerging diseases and threats

African swine fever in Europe update

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

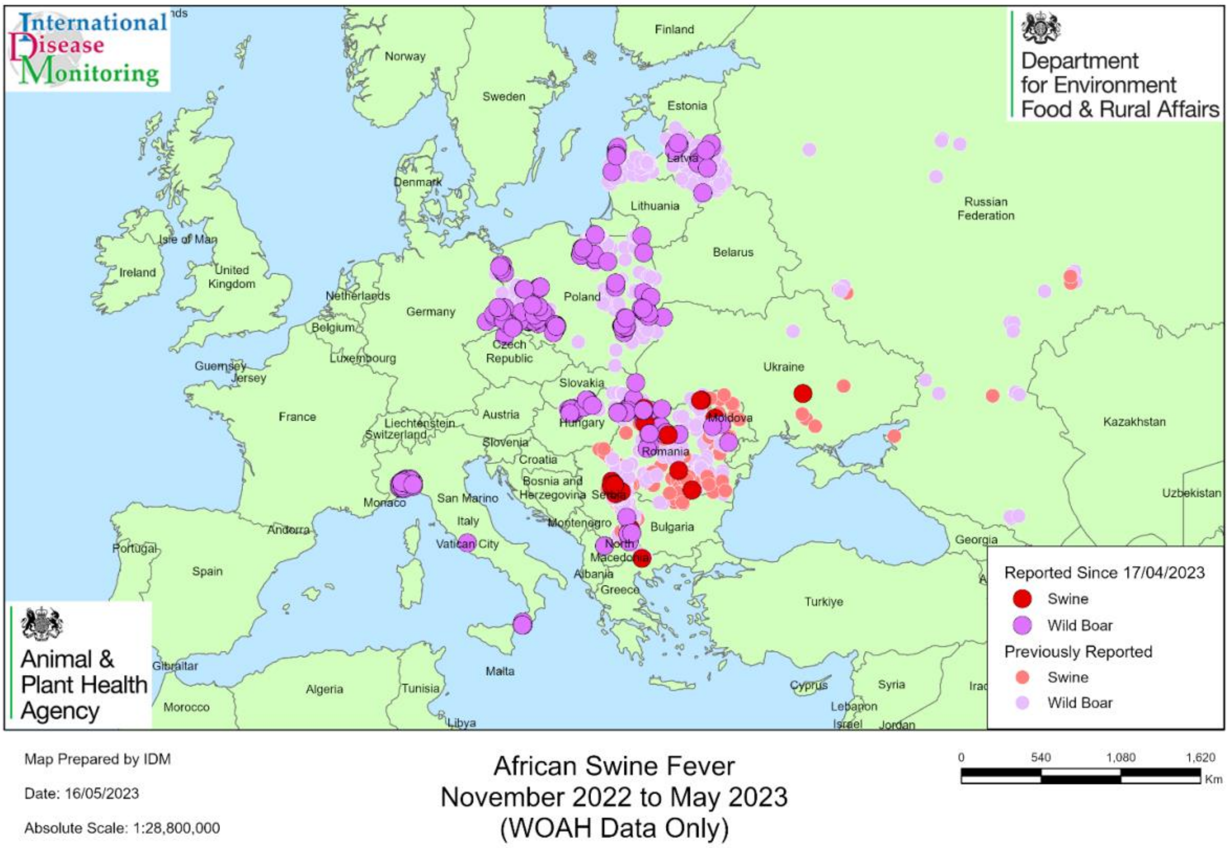
The latest updates on the ASF situation in Europe were issued in January, April, May and June 2023. Figure 2 shows cases reported to World Organisation for Animal Health (WOAH) from November 2022 to 16 May 2023 in domestic pigs and wild boar respectively.

Of particular note in Europe was spread of ASF in Greece and Italy and detection of ASF in two countries not previously affected.

In January 2023, the re-emergence of ASF was reported in two wild boar in the Serres region in Central Macedonia in Greece. The wild boar were found not far (around 7km) from the border with Bulgaria which has ASF infection in its wild boar. In early February 2020, there had been an outbreak of ASF in domestic pigs on one backyard farm which was controlled, that case occurred about 40 km south of the January 2023 detection of ASF in wild boar. Immediate measures included searching and testing of wild boar carcases, checks on pig farms in the affected area, and control of hunting and forestry activities.

No further cases in wild boar have been detected to date. However, in the May update an outbreak of ASF was described in domestic pigs on a breeding farm with 675 animals, also in the Serres region. This was the first report of ASF in domestic pigs in Greece since the February 2020 outbreak in the same region of Serres. Following this, four further outbreaks of ASF in domestic pigs were detected, all in herds of less than 100 pigs in new areas of Central Macedonia. Epidemiological investigations are ongoing to try and determine the most likely sources of infection.

Figure 2: ASF reports for domestic pigs and wild boar in Europe for November 2022 to May 2023 WOAH data only (mapped 16 May 2023)



In Italy, the May 2023 update described the detection of ASF in wild boar and subsequently ASF was confirmed on four pig small pig farms in a new area of Italy, in Calabria, southern Italy. This was the third region in Italy to be affected since the first mainland incursion in January 2022, the other affected regions being Piedmonte (north west) and Lazio (around Rome). It was suspected that disease was introduced via human-mediated means, and there is a major road trade route through the area.

The June update described ASF detection in wild boar in new areas of Italy, namely Campania and Lombardy (areas with a higher proportion of pig producers) and further wild boar cases and domestic pig outbreaks in Calabria. The likely pathways of introduction to these new areas of Italy are human-mediated transport of infected products or contaminated fomites, although movement of wild boar from nearby regions cannot be ruled out.

Control and surveillance measures in accordance with EU Regulations have been applied. Protection and surveillance zones have been implemented around the affected farm premises and the wild boar cases. There is currently no clear evidence of epidemiological links between cases in Calabria and Campania and disease clusters in northern or central Italy, however investigations continue and phylogenetic analysis of the viruses in the different areas is ongoing.

In December 2022, the Czech Republic reported their first case of ASF in wild boar since April 2018. Further ASF cases in wild boar have been detected since then. The 2022-23 cases have been close to the border with Poland, a more recent one was outside the current restriction zones and resulted in expansion of the zones. The Czech Republic had not reported any outbreaks in domestic pigs at the time of the June update.

A significant development was the detection of ASF for the first time in both Croatia and Bosnia and Herzegovina. Croatia reported ASF on five domestic pig farms in the south-east of the country. These farms are all small (less than 10 pigs) and area located around 30km from the outbreak in Bosnia and Herzegovina and are also close to the border with Serbia. Croatia has an active and passive ASF surveillance activities and biosecurity assessments of pig-keeping premises to improve biosecurity measures, along with public awareness campaigns

In Bosnia and Herzegovina, according to WOAH, the reported ASF outbreak was in one pig on a domestic pig farm in the north-east of the country, close to the borders with Serbia and Croatia. Several more outbreaks in domestic pigs in Bosnia and Herzegovina are thought to be due to be reported to WOAH.

It is interesting that these initial outbreaks in both countries have been detected in small herds of domestic pigs, rather than wild boar. At this stage it is unclear whether these introductions have resulted from movements of infected wild boar or through human-mediated transmission, and investigations continue.

Information from Germany shows progress in control of wild boar in the east of the country. There was an outbreak in domestic pigs in March 2023 in a small herd in Brandenburg, in an area where ASF virus was circulating in wild boar. There was a close relationship between the virus found in these domestic pigs and that in the wild boar nearby. This was the eighth outbreak of ASF in domestic pigs since the virus was first detected in Germany in 2020.

Wild boar cases continue to be reported in Germany but there was no significant large distance spread to the June update with all cases reported in the Saxony and Brandenburg regions and close to the border with Poland. The permanent double fences between Brandenburg and Poland, and between Saxony and Brandenburg are now completed (PAFF March 2022 Germany). Construction of a double fence between Saxony and western Germany is ongoing. With no evidence of ASFV infection from surveillance, four core areas, formed when ASF was first detected in wild boar in Brandenburg state, have been removed. Four of the original 11 core areas in Brandenburg state remain (Pig Progress, 2023).

ASF outbreaks continue in domestic pigs and wild boar cases continue to be detected in several other ASF-affected countries in Europe as detailed in the update reports.
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.

Several publications of interest include one on ASF virus genotyping from authors in Europe (Gallardo and others, 2023) and China (Yong and others, 2023). In the European paper, they assessed six variable regions of the ASFV genome to see if they could be used to distinguish between closely related genotype II ASFV strains circulating in Europe from 2007 to 2022. The study grouped European ASFV genotype II into 24 distinct groups by sequencing six independent ASFV genomic regions and represents some progress in the use of genetic analysis to assist epidemiological investigations, for example to determine the origin of outbreaks, or to link or rule out links between outbreaks. This use is hampered by the large size of the ASFV genome which makes whole genome sequencing difficult, as well as the low mutation rate of this DNA virus.

The authors of the paper from China analysed the whole genome sequence of ASFV from the first outbreak in China in August 2018 and compared it with other published ASFV genotype II genomes including nine from China obtained from September 2018 to October 2020. Their study suggested that there was a single introduction of the virus based on evidence of a single putative common ancestor for all ASFV genome sequences in China. Their analysis did not allow them to identify any countries as the origin for genotype II ASFV in China. There are significant gaps in the genome sequence data available from some regions.

ASF transmission in a small breeding herd in Vietnam was described in a recent paper (Le and others, 2023). This followed the progress of ASF from onset of clinical signs and used the data to describe the transmission dynamics for modelling work with the aim of providing a model to assist decisions by those working to control ASF in smaller scale pig herds. The authors suggested that the data could be used to estimate the number of pigs expected to show clinical signs at a given number of days following an estimated ASF incursion date. This may assist determination of the appropriate number of pigs to examine, to detect at least one with the disease.

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.

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.

The biggest risk for ASF virus entering the UK's pig population continues to be pigs or wild boar eating pork or pork products derived from infected animals. ASFV can survive for months in smoked, dried and cured meats, and for years in frozen meat.

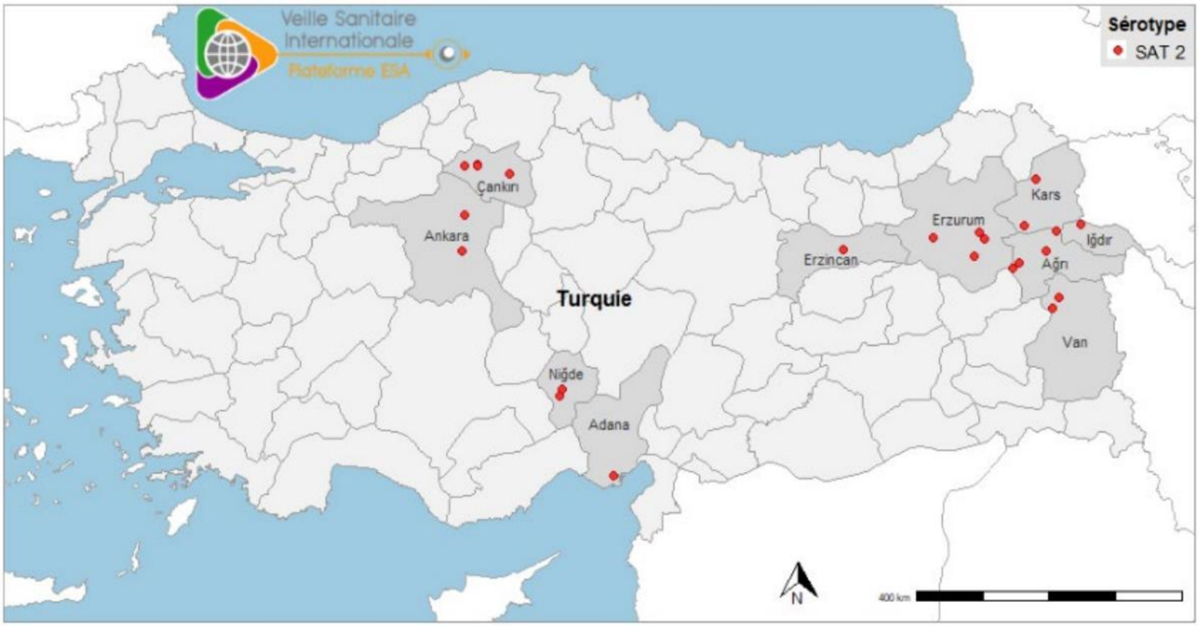
Meat and meat products brought into the UK from affected countries as personal imports and illegal imports represent the most significant risk of introduction of exotic notifiable diseases including ASF, Classical swine fever and foot and mouth disease (FMD), the commercial trade of such products is 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.

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.

Westward Spread of SAT-2 Strain of Foot-and-Mouth-Disease Virus

APHA has issued several disease outbreak assessments on foot-and-mouth-disease (FMD) in North Africa, the Middle East and Türkiye since February 2023. These describe the first reports of FMD serotype SAT-2 in Iran, then Türkiye and Jordan. These outbreaks are the first recorded in these countries due to topotype XIV of serotype SAT-2, closely related to SAT-2 strains collected from Ethiopia during 2022. Since then, FMDV serotype SAT-2 has spread within Türkiye from the east to central regions of the country (Plateforme 2023), and possibly further, with details of more recent outbreaks awaited (Figure 3). This westward spread of FMDV serotype SAT-2 is of concern to neighbouring countries with potential for spread in different directions. Türkiye is being provided with FMDV-SAT-2 vaccine by other countries as part of assistance with preventative measures. The outbreaks have affected ruminants (mainly cattle) at present, with no outbreaks reported in pigs, although pigs are not numerous in the countries affected with SAT-2 to date.

Figure 3: Map of Türkiye showing outbreaks of FMDV serotype SAT-2 in March 2023 (Plateforme 2023)



No further outbreaks of vesicular disease due to Seneca Valley virus (SVV) were diagnosed in Great Britain in 2022 since the five herds affected between June and September and described in the quarter 3 of 2022 report (APHA, 2022a). These cases all occurred during the warmer summer months of 2022, although the factors involved in clinical manifestation of disease due to SVV are not understood. A talk describing the SVV cases was given at the spring 2023 Pig Veterinary Conference by Donald King from the Pirbright Institute.

The key messages to pig keepers and veterinarians attending pigs are to be aware of what FMD and other notifiable diseases look like in pigs, for pigs to be inspected daily and if signs suspicious of vesicular disease are seen, to [report to APHA immediately](). Pigs should be seen moving to be able to detect lameness which is the most prominent feature in pigs, and snout and mouth lesions may go unnoticed.

Differential diagnosis negated notifiable disease report case

An investigation took place into a report of suspect swine fever during quarter 1 of 2023 and ruled out notifiable disease involvement. This case is described below.

Acquired thrombocytopenia in sow with haemorrhagic lesions

An adult pot-bellied sow in a small herd became lethargic and inappetant and blood was found at the perineum and oral cavity. She was mildly pyrexic (39.6°C) and was given pain relief and antibiotic treatment but worsened over two days and died. No other pigs were affected at the time. The pigs were fed pelleted pig food, ad lib hay and fresh vegetables and were accessible to the public. Postmortem examination at the Carmarthen Veterinary Investigation Centre revealed widespread petechial haemorrhages over the skin and in the subcutis, stomach, larynx and bladder (Figure 4). The spiral colon had haemorrhages across the serosal surface and intestinal contents were haemorrhagic. The lymph nodes were generally enlarged and red-black (Figure 5). The spleen and kidneys appeared unremarkable. The case was reported as suspect swine fever to APHA for official investigation in view of the widespread haemorrhagic and lymphoid lesions. Official investigation confirmed that no further pigs were affected and tissues from the affected sow tested negative for African and classical swine fevers, allowing restrictions to be lifted in less than 48 hours. Differential diagnostic testing was then progressed. There was no evidence of septicaemia or viral disease, including no ruminant pestivirus infection. Histopathology revealed profound megakaryocyte hypoplasia in the bone marrow and an acquired immune-mediated thrombocytopaenia was considered most likely and has been encountered previously in sporadic individual cases of haemorrhagic disease investigated in pigs (Bidewell and others, 2013). This case was described in the March 2023 APHA surveillance report in the Veterinary Record (APHA, 2023a).

Figure 4: haemorrhages over the bladder mucosa in sow with thrombocytopaenia

Figure 5: enlarged haemorrhagic lymph nodes in sow with thrombocytopaenia

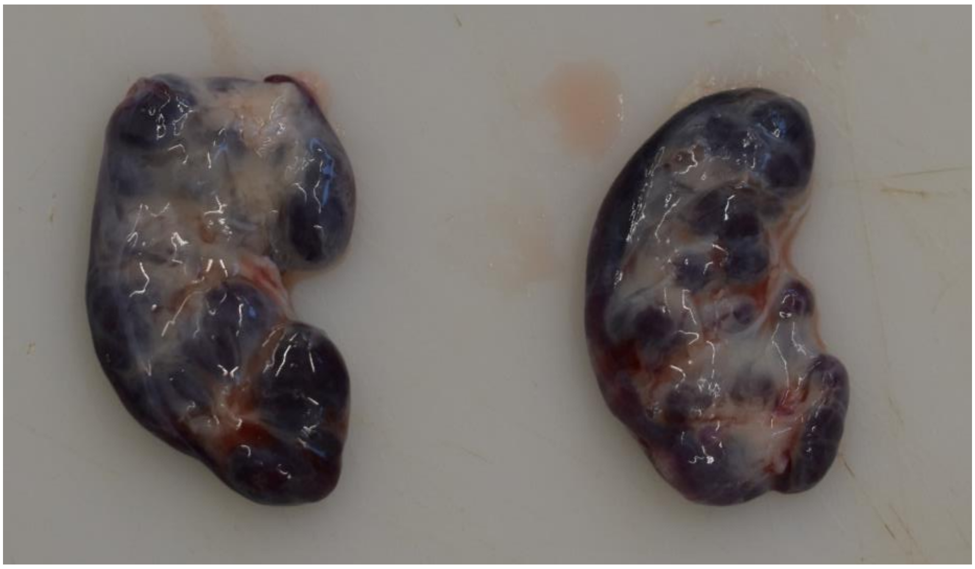


Table 2 lists the main differentials to consider when investigating porcine haemorrhagic disease. Complex disease outbreaks due to multiple pathogens in pigs can also sometimes result in pathology prompting reports of suspect notifiable disease.

Table 2: Main differential diagnoses to consider when investigating haemorrhagic disease in pigs (not an exhaustive list)

Differential diagnosis
SWINE FEVERS – Classical and African – report suspicion to APHA
Viraemia e.g. ruminant pestiviruses, PRRSV, porcine circovirus-associated disease - PCV2 or PCV3
Septicaemia (disseminated intravascular coagulation, microthrombi) – streptococci, *Klebsiella*, erysipelas, *Escherichia coli*, *Glaesserella parasuis* and others
Immune-mediated disease – porcine dermatitis and nephropathy syndrome, thrombocytopenic purpura, acquired megakaryocyte aplasia
Neoplasia – lymphoma, myeloma
Vitamin K deficiency – acquired or anticoagulant toxicity
Vasculopathies and coagulopathies from other causes

Cases of multifocal haemorrhages in pigs affecting the skin, mucosal and serosal surfaces and viscera with lymphoid lesions may raise concern when the lesions resemble those described for the porcine notifiable diseases, African and classical swine fevers. This concern is significantly increased where several pigs are unwell and pyrexic with mortality. Images of the clinical signs and pathology seen in ASF are available here: http://apha.defra.gov.uk/documents/surveillance/diseases/african-swine-fever-images.pdf.

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 in pigs (non-suspect) submitted to APHA are routinely tested by PCR for PED virus (PEDV) and transmissible gastroenteritis virus (TGEV) on a weekly basis. None have been positive for PED in over 1,450 diagnostic submissions tested under Agriculture and Horticulture Development Board (AHDB) Pork funding from June 2013 to March 2023.

Since February 2023, this enhanced surveillance using diagnostic PCR testing has incorporated testing for porcine deltacoronavirus (PDCoV) under the same funding; veterinary practitioners were informed of this added testing. This triplex PCR porcine enteric coronavirus batch testing is undertaken on all diagnostic submissions from pigs to APHA that involve diarrhoea and/or an enteropathy. This surveillance aims to detect any of these 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

Nervous signs and cerebellar pathology due to porcine circovirus 2-associated disease

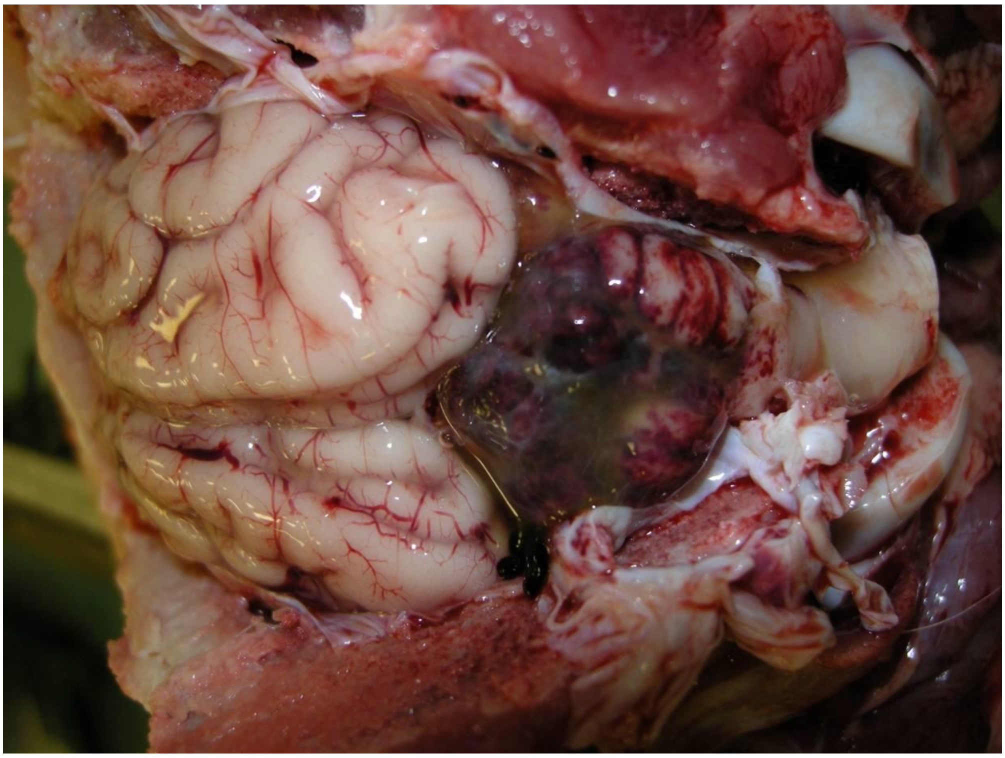
A three-week-old preweaned piglet was submitted to the Starcross Veterinary Investigation Centre from a small-scale rare breed breeding herd. It was the third to die from a litter of 12 after developing neurological signs despite antimicrobial treatment. No vaccines were used in the herd. Another older five-month-old pig was submitted that had been losing condition for several weeks and was coughing.

The preweaned pig was very underweight for its age with gelatinous yellow oedema within the mesocolon and minimal other gross findings. Given this finding and the history of nervous signs, a diagnosis of oedema disease might have been anticipated, however, histopathology found changes in all tissues, consistent with widespread systemic PCV2 disease (PCV2-D) which was confirmed by PCV2 immunohistochemistry, including in sections of the brain. There was severe acute, cerebellar polioencephalopathy with haemorrhages, oedema, and a vasculopathy with a mild, multifocal, subacute, non-suppurative meningoencephalitis, explaining the nervous signs. Nervous disease and cerebellar pathology due to PCV2 have been seen previously in APHA submissions (Figure 6) but are unusual.

The older pig was also confirmed as a case of PCV2-D with subacute granulomatous lymphadenitis and severe, multifocal, active chronic necrosuppurative, bronchointerstitial pneumonia and severe subacute, histiocytic interstitial pneumonia. This pig also had a lungworm infestation and pathology pointed towards concurrent bacterial and mycoplasmal involvement in the pneumonia, which was further evidenced by the detection of *Pasteurella multocida* in culture and *Mycoplasma hyopneumoniae* by DGGE-PCR.

PCV2-vaccination for disease control including sow vaccination is merited in this herd, given the unusually young age at which some of the pigs were affected. Early onset PCV2-D has been noted previously in unvaccinated herds like this one. This case was described in the May 2023 APHA surveillance report in the Veterinary Record (APHA 2023b).

Figure 6: Previous case of cerebellar pathology due to PCV2-disease with intense haemorrhage visible over cerebellum



Myocardial sarcocystosis detected incidentally

Sarcocystis cysts were an unusual incidental finding during histopathological examination of the heart of a gilt that died suddenly. Unlike in ruminants, this is a rare finding in hearts of pigs examined at APHA. Interestingly this pig had been imported into the UK and then kept in conditions unlikely to have permitted exposure to sources of infection, and it is therefore thought likely the pig arrived in the UK already infected. The literature describes three *Sarcocystis* species infecting pigs (Lindsay and others, 2019) with canine, feline or human as single definitive hosts. Apart from one report in the literature of fatal naturally acquired sarcocystosis in a pig due to *Sarcocystis miescheriana* (Caspari and others, 2011), clinical disease is not considered to be associated with natural infection with *Sarcocystis* species in pigs but cysts might be visible at postmortem examination and affect meat quality. The enhanced surveillance for porcine circovirus-associated disease continues at APHA. Histopathology is undertaken on the hearts of pigs, including foetuses, submitted for PME to monitor for any change in the number of PCV3-associated myocarditis cases detected. In spite of this enhanced surveillance since 2021, sarcocystosis currently remains a rare finding.

Conjunctivitis associated with bacterial meningoencephalitis

An APHA partner postmortem provider, the University of Surrey, received two dead pigs with red swollen conjunctivae and lymphohistiocytic and neutrophilic conjunctivitis was confirmed by histopathology (Figure 7). Severe meningoencephalitis was also diagnosed with *Streptoccocus* suis serotype 2 isolated as the likely primary cause. In this case, it was thought possible that the eye pathology reflected the pathology in the brain with potential extension of bacterial infection to the eyes. Conjunctivitis is not often seen as the primary condition in pigs, however there have been recent publications from the US and Germany describing significant conjunctivitis outbreaks due to *Mycoplasma hyorhinis* with dramatic ocular lesions (Resende and others, 2019; Hennig-Pauka and others, 2020). To date, outbreaks of this nature have not been diagnosed through the GB scanning surveillance network.

Figure 7: Ocular lesions likely secondary to severe meningoencephalitis

Tear staining and eye reddening are not uncommon as part of respiratory disease in pigs due to a variety of infectious causes including swine influenza. Marked reddening of the ocular mucous membranes is common in pig dying with septicaemia or meningitis. Poor air quality, dust and ammonia can also be involved or exacerbate ocular disease.

Where conjunctivitis is the primary clinical presentation or a prominent feature in multiple pigs, it is useful to take images and investigate by bacteriological culture and *Mycoplasma* DGGE/PCR on charcoal and plain conjunctival swabs, respectively, and histopathology (if pigs have died or are culled) in addition to full diagnostic investigation of other clinical signs or pathology found. It is worth noting that eyelid swelling can occur with acute oedema disease due to vascular damage caused by *Escherichia coli* Shiga toxin, where pigs present as sudden deaths and/or with nervous disease, and in the last quarterly report, ocular lesions were described in an individual pig due to multicentric lymphoma (APHA, 2022b).

Atypical porcine pestivirus-negative congenital tremor case

One pig submitted to Thirsk in a batch of four-day-old piglets to investigate the cause of diarrhoea was found to have rhythmic whole-body tremors consistent with congenital tremor (CT). The attending private veterinary surgeon indicated that the unit had sporadic congenital tremor cases, attributed to challenges to being able to acclimatise gilts through controlled exposure as they are introduced to the breeding unit in-pig. The CT-affected pig was otherwise bright and alert, was not pyrexic and did not have diarrhoea. Histopathology detected mild focal cerebellar dysplasia and changes suggestive of focal demyelination. Whilst changes were mild, they were supportive of type AII CT and the suspicion of atypical porcine pestivirus involvement in this piglet. However, brain and spinal cord tested negative for atypical porcine pestivirus (APPV) by PCR. Since its identification as a cause of congenital tremor in 2016, APPV has been detected by PCR in all other cases of CT type AII investigated at APHA to date and is currently the only virus that has been proven to fulfill Mokili's Metagenomic Koch's Postulates as a cause (Stenberg and others, 2020).

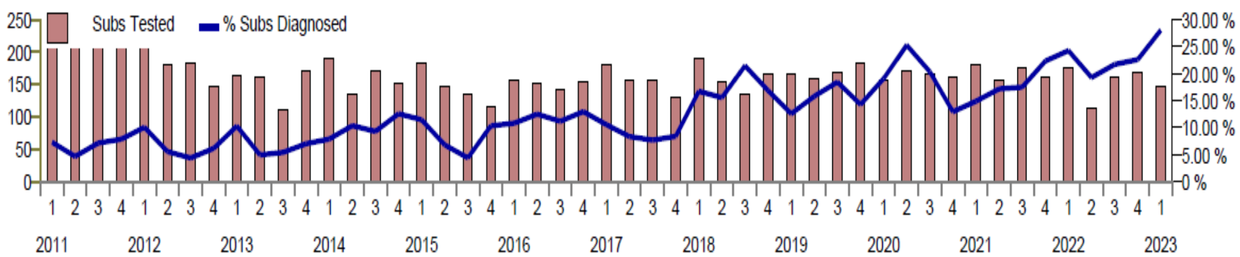
In view of the negative APPV result, virus discovery work by next generation sequencing was undertaken on brain and spinal cord and porcine circovirus 3 (PCV3) was detected. Its presence in both these tissues was confirmed by in situ hybridisation (ISH) and PCV3 PCR. The PCV3 was present in relatively low virus loads (based on fairly high PCR Ct values) and there was no myocarditis or multisystemic inflammation identified in this piglet, thus it did not fit criteria for a diagnosis of PCV3-associated disease. The PCV3 detected is of uncertain significance; PCV3 has been found previously at low viral loads in pigs without PCV3-associated disease and has been noted as an interesting but likely incidental finding.

Changes in disease patterns and risk factors

PRRS remains an important endemic disease and 2022 dashboard update

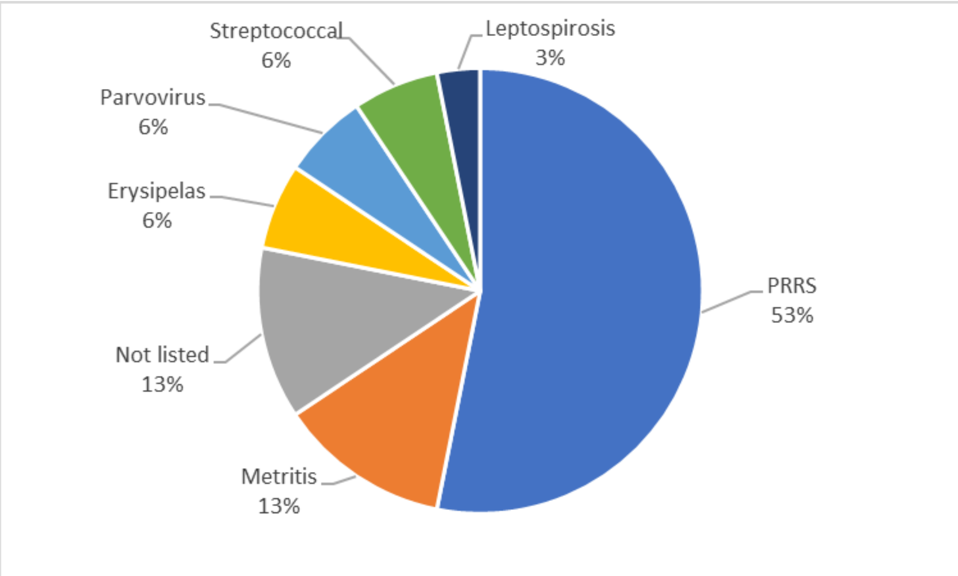
The diagnostic rate for porcine reproductive and respiratory syndrome (PRRS) in Great Britain has shown an increase in each of the last three quarters up to the first quarter of 2023 when the diagnostic rate exceeded the highest most recent peak in quarter 2 of 2020 (Figure 8). The data underline the 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.

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



Achieving diagnoses for reproductive syndrome submissions is often challenging and the diagnostic rate for this syndrome is always lower than for other syndromes such as respiratory, nervous and enteric. However, the data indicate that where diagnoses are achieved, PRRS is consistently the most frequent diagnosis made in submissions of stillbirth and foetopathy by some margin (Figure 9) and is a prominent cause of reproductive failure in submissions to the GB scanning surveillance network. Typically, abortions occur late in pregnancy, or may appear as premature farrowings. Litters are delivered with aborted foetuses, stillborn piglets at term sometimes with mummified piglets, and/or weak non-viable neonates. The morbidity varies greatly, and clinical signs in the sows themselves (other than delivering affected litters), described at the time of submission to the scanning surveillance network, also range widely from no signs, to marked malaise and inappetence, and sometimes sow mortality. PRRS is diagnosed as a cause of reproductive failure in both PRRSV-vaccinated and unvaccinated herds.

Figure 9: Pie chart showing the proportion of foetopathy diagnoses due to PRRS compared to other main reproductive syndrome diagnoses from January 2022 to March 2023* in submissions to the GB scanning surveillance network



*Note that the “not listed” category is a range of different diagnoses with no individual diagnostic codes in the VIDA database

The PRRS dashboard has been updated to include surveillance and diagnostic data for submissions diagnosed with PRRS in 2022. There were 142 diagnoses of PRRS recorded in VIDA from the Great Britain scanning surveillance network and the annual diagnostic rate shows an overall upward trend. All diagnoses made were due to PRRSV-1 and no PRRSV-2 has been detected in British pigs to date.

Concurrent diagnoses made in addition to PRRS in the same submission are collated in the dashboard. Taking 2021 and 2022 diagnoses combined, disease due to *Pasteurella multocida*, streptococcal disease (mainly *Streptococcus suis*), salmonellosis and swine influenza were the most frequently identified diseases concurrent with PRRS in that order of frequency. Most carcase submissions in 2022, in which PRRS was diagnosed, recorded diagnoses additional to PRRS; just nine recorded only a diagnosis of PRRS. Most submissions in 2022, in which no other diagnosis was made, were postal non-carcase submissions (30); these submissions may not allow full diagnostic investigation due to the limited material available. This underlines the value of the full diagnostic investigation that carcase submissions enable. As these frequent concurrent diagnoses illustrate, PRRS can act as a driver for antimicrobial use with bacterial disease prominent amongst the concurrent diagnoses which reflects, in part, the immunosuppressive nature of the PRRS virus. Full diagnostic investigations in disease outbreaks assist veterinarians in developing targeted disease control, including antimicrobial treatment and/or vaccination for other pathogens where appropriate.

Viruses in which the ORF-5 gene sequence has 98.5% or greater similarity to one of the live vaccines are termed “vaccine-like” and are analysed further by sequencing part of the nonstructural protein 2 (nsp2) to help identify any potential recombinants. All of the vaccine-like PRRSV from 2022 and 2023 examined so far 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 17 to 32% each year. Interestingly during quarter 1 of 2023, only 10% of the viruses sequenced from 50 submissions so far were vaccine-like, whether this is a longer-term trend will be kept under review.

The Swine Health Information Centre in the US brought together speakers at a webinar on emerging PRRS virus strains. This provided information on the PRRSV-2 L1C variant of RFLP 1-4-4 and PRRSV L1C 1-2-4 which have emerged and spread affecting US pig herds more severely and/or over more prolonged periods. A useful podcast is available with Daniel Linhares of Iowa State University which touches on features of the PRRS virus and how to increase the chances of controlling the disease and virus.

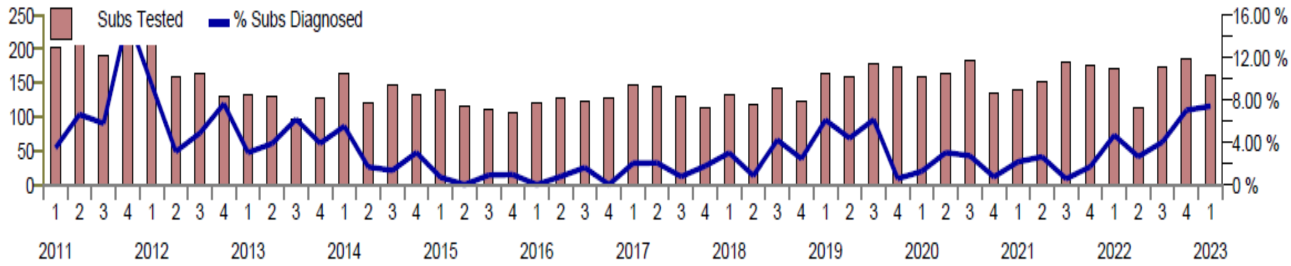
There was an informative talk at the European Symposium of Porcine Health Management in Thessaloniki, Greece in June 2023 describing the Rosalia strain, a PRRSV-1 with increased virulence affecting pig production in Spain (Mateu, 2023). This strain has been described in previous quarterly reports (APHA, 2022c) and was first detected in Spain in 2020, since when it has spread significantly, now being responsible for around 70% of new PRRS outbreaks. Over time the Rosalia strain has diversified and Rosalia-like strains have evolved containing virus segments from local PRRSV strains and some vaccine strains following recombination. The high replication rate of these strains, and the fact that many pigs are being infected, is also likely to be influencing their evolution in the field. Affected herds have experienced high abortion rates and high mortality especially in preweaned and nursery pigs. Sow mortality is significantly increased, with sows dying with pulmonary oedema due to the effect of the virus on the vascular system, with histopathology revealing perivasculitis lesions.

The presence of diverse and, sometimes, more pathogenic PRRSV-1 in parts of Europe, as well as PRRSV-2, emphasises the importance of preventing strains exotic to the UK from being introduced. The National Pig Association live pig import protocol has recommendations about testing for PRRSV and it has become a Red Tractor standard for assured pig premises to follow this protocol when importing live pigs. Imported pigs and semen should only be sourced from PRRSV-negative herds.

Swine dysentery diagnostic rate remains raised in the first quarter of 2023

There were more diagnoses of swine dysentery recorded during the first quarter of 2023 through the Great Britain scanning surveillance network following a general upward trend in the diagnostic rate during the last nine months of 2022 as described in previous quarterly reports and illustrated in Figure 10. Some of these cases resulted in alerts to raise awareness about swine dysentery outbreaks being issued by the pig industry’s Significant Diseases Charter.

Figure 10: Diagnostic rate of swine dysentery diagnoses by year and quarter as a percentage of diagnosable submissions to the Great Britain scanning surveillance network



There were nine diagnoses recorded in the first quarter of 2023 compared to 31 in the whole of 2022. The 2023 diagnoses have been in pigs in counties across England including Dorset, Lincolnshire, Leicestershire and Rutland, Norfolk, East Riding and North Lincolnshire and North Yorkshire. These can be seen on the interactive [GB pig disease surveillance dashboard](https://).

The back log of pigs of slaughter weight on pig farms in recent years, has resolved and is now superceded by different challenges as a result of increased feed and fuel costs due to the conflict in Ukraine and persistent issues in the first quarter of 2023 with the cost of pig production exceeding the price paid at slaughter for some pig producers. These issues have been suggested as having potentially impacted on swine dysentery control and be playing a role in the continued disease outbreaks.

The importance of practicing excellent biosecurity in preventing introduction and spread of exotic and endemic diseases, including swine dysentery, has been emphasised in communications. The industry has a webpage dedicated to swine dysentery and its control and there is NADIS guidance on swine dysentery.

More tiamulin-resistant *Brachyspira hyodysenteriae* sequence type 251 isolates detected

To assist in disease control and treatment choices, *Brachyspira hyodysenteriae* isolates undergo whole genome sequencing (WGS) and antimicrobial sensitivity minimum inhibitory concentration (MIC) testing by broth dilution, under APHA's pig disease and antimicrobial resistance surveillance projects, respectively.

Two *B. hyodysenteriae* isolates from submissions in the first quarter of 2023 were found to have MICs indicating clinical resistance to tiamulin. Clinical breakpoints are available for agar dilution (Duinhof and others, 2008). Clinical breakpoints for broth microdilution are usually considered to be one dilution lower than for agar dilution; thus for tiamulin the suggested clinical breakpoint for broth microdilution, and applied for these isolates, is >2 µg/ml (Pringle and others, 2012).

This brings the total number of isolates showing tiamulin resistance to seven, from those tested to date during 2020-2023n. The WGS result is pending for one of the 2023 isolates but the other was identified as sequence type (ST) 251, the same ST as previous isolates found to be tiamulin-resistant since 2020.

As well as these two 2023 isolates, another 2022 isolate from a swine dysentery case from a December 2022 submission was found to be clinically resistant to tiamulin, making a total of two tiamulin-resistant isolates detected in 2022.

The three tiamulin-resistant ST 251 isolates detected in 2020-21 were all found to be from a single pig premises in North Yorkshire (APHA, 2021). The data provided for the four most recent tiamulin-resistant isolates (two from the first quarter of 2023 and the two from 2022) indicates that they derived from samples from pigs on four other different premises in North Yorkshire and Lincolnshire.

Single-nucleotide polymorphism (SNP) on all ST251 isolates is being progressed to see how similar the isolates are, particularly those showing resistance, which will help provide evidence for epidemiological links and/or common source(s).

As well as showing clinical resistance to tiamulin, the 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.

Multi-drug resistance of this nature in *B. hyodysenteriae* isolates in British pigs is not a common finding and severely limits treatment options. The development of resistance in *B. hyodysenteriae* to antimicrobials commonly used in the control of swine dysentery is a recognised risk, particularly in situations where medication is used longer-term. Control of swine dysentery using alternative interventions (all-in, all-out management systems; cleaning and disinfection; and partial and total depopulation leading to eradication) is vital to prevent the development of wider antimicrobial resistance.

The multilocus sequence types of *Brachyspira hyodysenteriae* isolates, and the genes or SNPs associated with reduced antimicrobial susceptibility that they possess can be seen on the [MLST dashboard].

Horizon scanning

Encephalomyocarditis virus in growing pigs in Italy

A recent paper from Italy by Scollo and others (2023) describes disease due to encephalomyocarditis virus (EMCV) causing heart failure and deaths in growing pigs. This virus has been recognised since the 1950s as a cause of sudden death in young pigs, and also a cause of SMEDI-like disease (stillbirths and mummies). The main source of infection to pigs, which are considered a particularly susceptible species, is generally considered to be the local rodent population.

The paper describes an outbreak resulting in a high mortality rate in suckling piglets with sudden deaths also seen in the weaners, at a lower rate. The sudden deaths and any clinical signs (trembling, dyspnoea, pyrexia) seen were due to heart failure resulting from non-suppurative myocarditis. White necrotic foci were grossly visible in the myocardium. Effective control of rodents is key to resolving outbreaks. In the outbreak described, pigs were treated with acetylsalicylic acid for its anti-inflammatory and antithrombotic effects.

Although rodents are often present on pig farms, no diagnoses of disease due to EMCV have been diagnosed through the GB scanning surveillance network. Antibody to the virus has been found in pigs in the UK in the past (Taylor, 2013) but there have been no recent studies in the

UK. EMCV has not been detected in next generation sequence work undertaken in pigs within APHA.

Heart samples are retained frozen from pigs examined at APHA Veterinary Investigation Centres and are suitable for further investigation should non-suppurative myocarditis be found in multiple pigs in a submission and not be diagnosed as disease associated with PCV2 or PCV3.

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