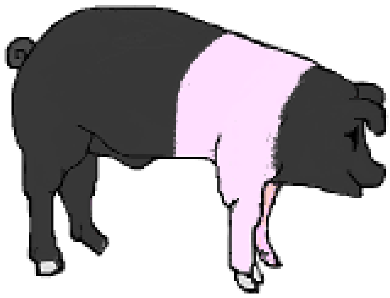
Animal & Plant Health Agency



SRUC

# GB pig quarterly report

## Disease surveillance and emerging threats


### Volume 24: Q1 – January to March 2020


## Highlights

- **Summary update on African Swine Fever – page 3**
- **Porcine reproductive and respiratory syndrome 2019 diagnoses – page 8**
- **Ampicillin-resistant *Actinobacillus pleuropneumoniae* – page 10**
- **Early spring outbreak of *Klebsiella pneumoniae* septicaemia – page 11**
- **Coal tar toxicity incident – page 12**
- **Haemorrhagic tracheitis syndrome investigations North America – page 14**

### Contents




Editor: Susanna Williamson,
APHA Bury St Edmunds
Phone: + 44 (0) 1284 724499
Email: Susanna.williamson@apha.gov.uk

# Introduction and overview

This quarterly report reviews disease trends and disease threats for the first quarter of 2020, 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:
https://www.gov.uk/government/publications/information-on-data-analysis.

## Pig disease surveillance dashboard outputs

Diagnoses made in the first quarter of 2020 compared to the first quarter of 2019 through the GB scanning surveillance network are illustrated in Figures 1a and 1b. These can be interrogated further using the interactive pig disease surveillance dashboard which was launched in October 2017 and can be accessed from this link:
http://apha.defra.gov.uk/vet-gateway/surveillance/scanning/disease-dashboards.htm

**Figure 1: GB scanning surveillance most frequent diagnoses in Q1-2020 and Q1-2019**

1a: Diagnoses in Q1-2020 (total 203)

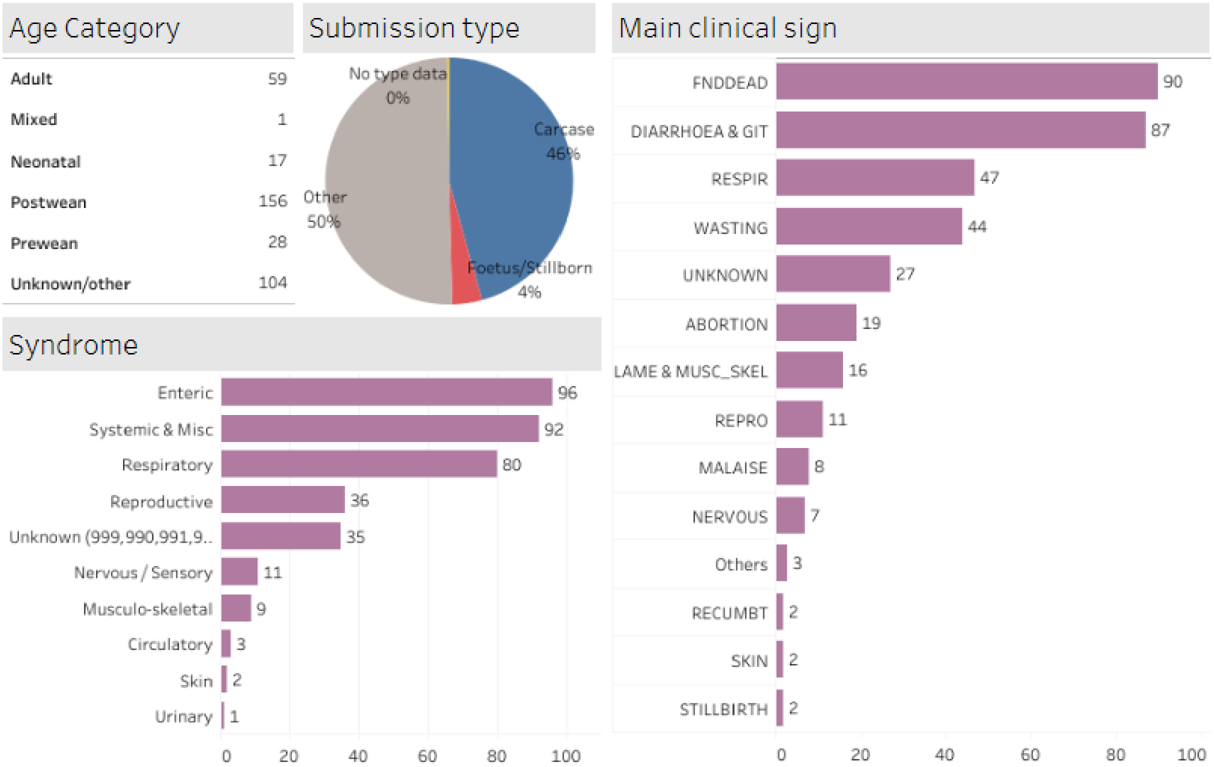
| | |
|---|---|
| Pneumonia -PRRS | 17 |
| Streptococcoccus suis | 13 |
| Swine influenza | 11 |
| Rotavirus | 10 |
| PRRS - systemic | 9 |
| Salmonellosis -S Typhimurium | 8 |
| Proliferative enteropathy (Lawsonia sp.) | 7 |
| Colibacillosis - enteric | 6 |
| Pneumonia -other cause | 6 |
| Brachyspira pilosicoli | 5 |
| Pneumonia - Pasteurella multocida | 5 |
| Pneumonia -Mycoplasma hyopneumoniae | 5 |
| Salmonellosis -other | 5 |
| Arthritis - other cause | 4 |
| Colibacillosis - oedema disease | 4 |
| Meningitis -streptococcal | 4 |
| Pneumonia - Actinobacillus pleuropneumoniae | 4 |
| Trueperella pyogenes infection | 4 |
| Abortion/Fetopathy-PRRS | 3 |
| Colisepticaemia | 3 |
| Erysipelas | 3 |
| Haemophilus parasuis systemic disease (inc Gl.. | 3 |

1b: Diagnoses in Q1-2019 (total 275)

| | |
|---|---|
| Streptococcoccus suis | 33 |
| Pneumonia -PRRS | 14 |
| Rotavirus | 13 |
| Meningitis -streptococcal | 12 |
| Swine influenza | 11 |
| Brachyspira hyodysenteriae (swine dysentery) | 10 |
| Proliferative enteropathy (Lawsonia sp.) | 10 |
| Brachyspira pilosicoli | 9 |
| Gastric ulceration | 8 |
| PRRS - systemic | 8 |
| Mulberry heart disease | 7 |
| Salmonellosis -monophasic ST-like variants | 7 |
| Pneumonia - Pasteurella multocida | 6 |
| Pneumonia -other cause | 6 |
| Streptococcal infection | 6 |
| Clostridium perfringens necrotic enteritis | 5 |
| Coccidiosis | 5 |
| Colibacillosis - oedema disease | 5 |
| Colisepticaemia | 5 |
| Erysipelas | 5 |
| Exudative epidermitis (Greasy pig disease) | 5 |
| Helminthosis | 5 |

Note that diagnoses made in low numbers are not shown and that further diagnoses may be added if records for submissions made in Q1-2020 are finalised at a later date. The surveillance data for all diagnostic submissions to the GB scanning surveillance network in the first quarter of 2020 from an enhanced pig disease surveillance dashboard are summarised in Figure 2.

**Figure 2: Summary data for 365 submission records in Q1-2020 (399 in Q1-2019)**




These diagnostic submissions are voluntary and subject to several sources of bias. The profile of submissions for the first quarter of this year is broadly similar to that of Q1 of 2019 in that systemic, respiratory and enteric syndromes are the most commonly submitted and diagnosed. Total GB diagnostic submissions for the quarter (326) were comparable to the totals for the same quarter in 2016 to 2019 (range from 312 to 341) although there has been trend of increased non-carcase submissions to SRUC VS and reduction in non-carcase submissions to APHA over this time period. Fifty per cent of diagnostic submissions in Q1-2020 were of pigs carcases or foetuses for post-mortem examination which provide best opportunity for full diagnostic investigation. Four of the five most common diagnoses in Q1-2019 are also in the top five diagnoses in Q1-2020; namely disease due to *Streptococcus suis*, PRRS, rotaviral enteritis and swine influenza. Only two diagnoses of swine dysentery were made in Q1-2020, whereas it was the sixth most frequent diagnosis in Q1-2019 (swine dysentery). The geographical areas where free carcase collection is offered for delivery to post-mortem examination sites within the APHA network were expanded in 2017. The availability of this service is regularly publicised and there is regular uptake of the service.

# New and re-emerging diseases and threats

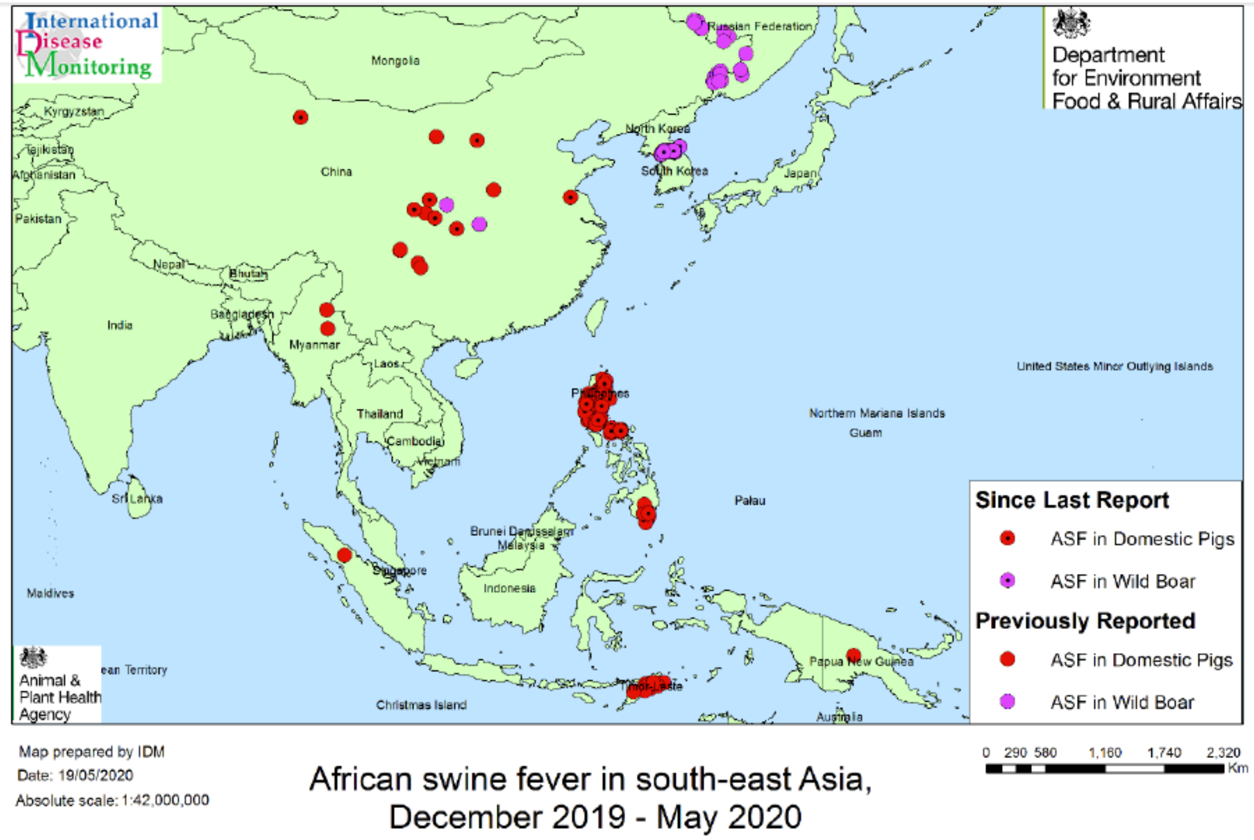
Please refer to the annexe on Gov.UK for more information on the data and analysis.

## Summary update of African swine fever in South East Asia and Europe

Updated assessments continue to be published on African swine fever (ASF) in South East Asia and Oceania, and in Europe including Belgium: https://www.gov.uk/government/collections/animal-diseases-international-monitoring.

In South East Asia, ASF has been confirmed in China, Mongolia, Vietnam, Cambodia, Hong Kong, North Korea, South Korea, Laos, Myanmar, Philippines, East Timor, Indonesia and Bali. During Q1-2020, outbreaks have been reported in domestic pigs in the Philippines (North and South), China, Myanmar and East Timor. Cases in wild boar continue to be detected and reported in China and South Korea. Those in South Korea remain close to its border with North Korea. ASF was also confirmed for the first time in domestic pigs in Papua New Guinea, the first ASF to be reported in Oceania (Figure 3). There have also been unofficial reports of outbreaks in domestic pigs as well as cases in wild boar in north east India.

**Figure 3: ASF cases reported in South East Asia and Oceania since December 2019 (map as on 19-05-20)**

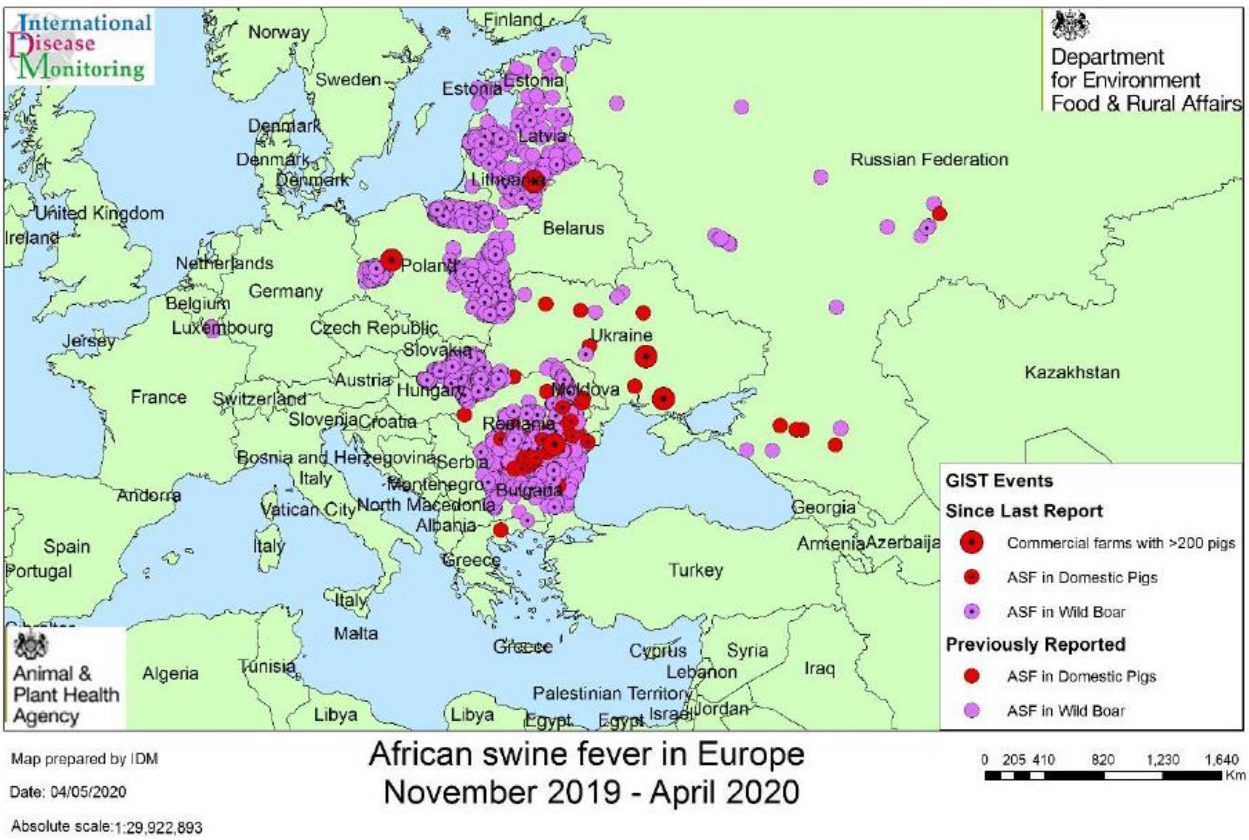



In Papua New Guinea (PNG), confirmed outbreaks of ASF in domestic pigs have caused deaths in free-range pigs in villages. Control measures have been implemented with the disease area declared within the Southern Highlands, and restrictions in the movements of pig and pig products. The source of these outbreak is uncertain, one possibility is that pigs had access to infected meat in village rubbish. The outbreak in PNG highlights the increased risk to Australia, and the Australian Government has responded including funding for increased border controls.

The wide geographic range of countries with confirmed reports of ASF in SE Asia and Oceania demonstrates the potential for further spread into and within the domestic pig and wild suid populations in these areas and the continuing risk of entry of ASF virus in products of animal origin from affected regions. The full reports on ASF in south-east Asia and Oceania from the International Disease Monitoring Team include actions to reduce the risk of ASF introduction to the UK and are available at:
https://www.gov.uk/government/publications/african-swine-fever-in-pigs-in-china

In Eastern Europe (Figure 4), during Q1-2020, Poland reported ASF in domestic pigs on a large commercial holding and linked holding in the west of the country around 100km from the German border. These reports in domestic pigs follow detection of multiple ASF cases in wild boar in western Poland subsequent to the significant westward spread of ASF in Poland in early November 2019. Germany remains on high alert with intensified wild boar hunting and ASF surveillance, and some fencing has been put in place.

**Figure 4: ASF cases reported in Europe since November 2019 (map as on 04-05-20)**




Elsewhere in Eastern Europe, outbreaks in domestic pigs have continued to be reported in Bulgaria, Romania, Moldova and Ukraine, and a few in west Russia. Further cases have been reported in wild boar in the Baltic countries, though there appears to be a seasonal decrease, and Hungary has also reported significant numbers of wild boar ASF cases. Greece has not reported any further outbreaks since ASF was confirmed in a small herd of 32 domestic pigs in early February 2020. Control measures including culling, cleansing and disinfecting, movement restrictions and tracings were implemented. ASF has been present in Bulgaria close to the borders with Greece and North Macedonia for several months in wild boar and domestic pigs. Belgium was detecting ASF virus DNA in “bones-only” wild boar carcases on an approximately monthly basis until March 2020 since when no further reports have been made. Belgium remains officially free of ASF in domestic pigs. Updates on the ASF situation in Europe are available at: https://www.gov.uk/government/publications/african-swine-fever-in-pigs-and-boars-in-europe.

Information on ASF outbreaks has been 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 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 remains pigs or wild boar eating infected pork or pork products derived from infected animals. The ASF virus can survive for months in smoked, dried and cured meats, and for years in frozen meat. The greatest risk is from meat products brought into the UK from affected countries as personal imports; the commercial trade of such products is not permitted from ASF- affected areas. Pig keepers are reminded that it is illegal to feed pigs catering, kitchen or domestic waste or meat/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. An ASF poster is available for pig keepers summarising this information: http://apha.defra.gov.uk/documents/surveillance/diseases/african-swine-fever-poster.pdf

Several recent publications looking at risk pathways for the introduction of ASF virus into unaffected countries are worth highlighting. Two focussed on the risk related to illegal smuggling of pork/pork products in air passenger luggage; one estimated the risk of introduction of ASF virus into the US through this route (Jurado and others, 2020). This reported that the mean risk by this route had increased by 183.33% from the risk estimated prior to disease spreading into Western Europe or Asia. This particularly related to flights from China and Hong Kong and entry to certain US airports. The other publication studied the risk of ASF virus introduction by this route into Japan and assessed the risk of actual exposure of domestic pigs and wild boar to the imported material (Ito and others, 2020). This is similar to the approach of the qualitative risk assessment for introducing ASF to the UK pig population from European Member States via human-mediated routes published in November 2018 (Defra, 2018).

One publication related to animal feed/feed ingredients as a potential risk pathway for introduction of ASF virus to new areas, which is the subject of an EFSA Scientific Opinion in progress. This paper was a comprehensive review by US authors of the information available on the risk of viral transmission in feed and included an overview of mitigating strategies to address the risk (Dee and others, 2020).

ASF has persisted in wild boar populations in several Eastern European EU member states since first introduced in 2014. A publication by Martínez-Avilés and others (2020) describes an increasing trend of finding potential survivors from infection (as shown by hunted wild boar with confirmed PCR negative and antibody positive results) in several Eastern EU countries suggesting possible circulation of ASF virus with reduced virulence. This could affect patterns of persistence and transmission. They indicate the need for further research and surveillance into these findings and highlight several caveats around interpretation of the data. The paper raises questions about the consequences on ASF epidemiology particularly relating to whether, and for how long, wild boar affected with lower virulence ASF virus could infect other animals. Surveillance for early detection of ASF in wild boar in unaffected countries is based primarily on testing wild boar found dead.

Assessment of the risk of ASF spread in Europe is also linked to the wild boar-domestic pig interface and a preliminary analysis of this interface in Europe was published by the ENETWILD consortium (2020). This is a technical output which aims to define the spatial interface between wild boar and domestic pigs in Europe, to allow assessment of the risk of ASF spread. The starting point is analysis of potential areas of overlap between wild boar and domestic pig across Europe. The report describes data on wild boar distribution and various sources of data on domestic pigs in Europe. The output is a risk map for potential spatial interface which is validated using situations where reliable and precise data are available for both domestic pig distribution and wild boar populations.

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: https://www.gov.uk/guidance/african-swine-fever and http://apha.defra.gov.uk/documents/surveillance/diseases/african-swine-fever-images.pdf

## Porcine epidemic diarrhoea surveillance

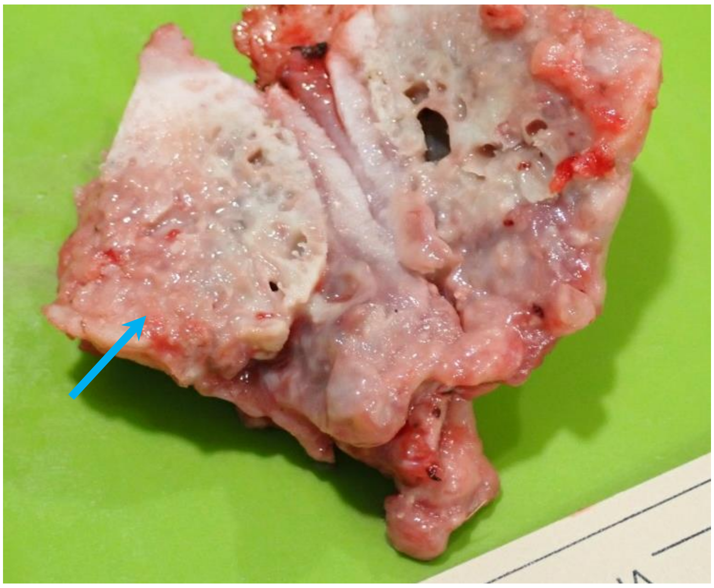
Since the emergence of virulent porcine epidemic diarrhoea (PED) from mid-2013 in the USA and elsewhere, the virulent PED virus strain has only been reported in pigs in the Ukraine on the European continent. However, disease due to reportedly less virulent strains (known as INDEL strains) has been diagnosed in pigs on several continents, including countries in Europe and these continue to occur. PED due to any strain remains notifiable in England and Scotland and suspicion of disease, or confirmation of infection, must be reported (Defra, 2015; Scottish Government, 2016). The last diagnosis of PED recorded in the GB diagnostic database (VIDA) was in 2002 on a farm in England. No suspect incidents of porcine epidemic diarrhoea (PED) have been reported in England or Scotland since January 2018. 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 on a weekly basis. None have been positive for PED in over 1030 diagnostic submissions tested under AHDB Pork funding from June 2013 to December 2019. APHA instructions and the pig industry-led PED control contingency plan are being updated. A PED exercise planned in 2020 will be rearranged due to Covid-19. Further information on PED is available on this link: https://pork.ahdb.org.uk/health-welfare/health/emerging-diseases/pedv.

# Unusual diagnoses or presentations

## Neurological disease associated with otitis media in gilts

Unusual neurological signs were investigated in five gilts and a sow. The clinical signs were sudden in onset and were initially suggestive of middle ear disease (head tilt), progressing to unusual behaviour such as attempting to climb the wall, ear twitching and recumbency. Four cases deteriorated rapidly while the other two were milder and improved to some extent, but were left with neurological deficits. Gross pathology was suggestive of bacterial infection of the middle and inner ear and associated meningitis; the dura mater was thickened and the cerebral surface was congested. The left tympanic bulla was enlarged and discoloured and the ventral part of the bulla contained pale-green purulent material (Figure 5). No bacterial pathogens were isolated from the meninges or left tympanic bulla, however histopathology identified a chronic bacterial osteomyelitis of the tympanic bulla, with Gram-stained sections suggesting possible involvement of bacteria of the Pasteurellaceae family.

**Figure 5: Otitis media: section through the tympanic bulla to show suppurative osteomyelitis (arrowed)**

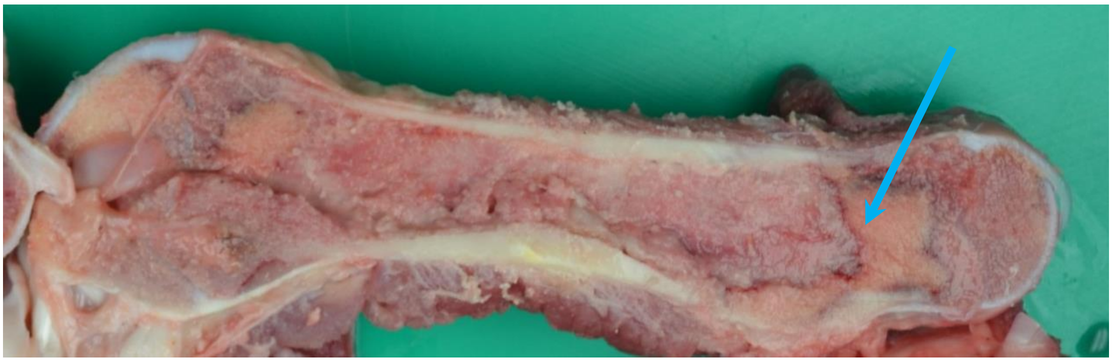


Sectioning of the cranium is required to confirm middle/inner ear disease and where multiple pigs are affected, the involvement of swine influenza virus and/or pathogenic *Mycoplasma* species should also be investigated in addition to culturing for other bacterial pathogens. No porcine reproductive and respiratory syndrome virus (PRRSV), swine influenza virus or pathogenic *Mycoplasma* species were detected in this case.

## Lymphoma in a grower pig with musculoskeletal disease

Neoplasms are not commonly diagnosed in pigs and of those detected, multicentric lymphoma in young pigs is one of the most commonly described. A case in a three-month-old pig was diagnosed at the Royal Veterinary College (RVC, a partner postmortem provider) with an unusual clinical presentation of sudden loss of hindlimb function. The liver, spleen and lymph nodes were markedly enlarged and were pale or had multifocal pale white lesions. To investigate the clinical signs, the hindlimb bones were sectioned revealing lesions within the tibia and femur illustrated in Figure 6. Histopathology confirmed multicentric large cell lymphoma as the cause of these lesions in the bones and other viscera and this should be considered a potential cause of bone disease in individual growing pigs, histopathology allowing lesions to be differentiated from osteomyelitis.

**Figure 6: Multicentric lymphoma within femur of a growing pig (sagittal section, one lesion arrowed). Image kindly provided by the RVC**



# Changes in disease patterns and risk factors

Please refer to the annexe on Gov.UK for more information on the data and analysis.

## Porcine reproductive and respiratory syndrome dashboard update

Surveillance findings on diagnoses of porcine reproductive and respiratory syndrome (PRRS) are publicly available in an interactive dashboard format. This PRRS-specific dashboard has been updated to add 2019 data from the GB Veterinary Investigation Diagnosis Analysis (VIDA) database. All diagnoses were due to infection with PRRSV-1; no PRRSV-2 has been detected in submissions from GB pigs to date. Approximately three quarters of all diagnoses of PRRS in 2019 involved systemic or respiratory disease in post-weaned pigs in which the most common clinical signs reported (as either the main or a secondary sign) were wasting, respiratory signs and found dead. The dashboard also shows concurrent diagnoses made in submissions in addition to PRRS. The most frequent of these vary from year-to-year but for combined data from 2012 to 2019, streptococcal disease (mainly *Streptococcus suis*), disease due to *Pasteurella multocida* and salmonellosis were the three most frequent. These concurrent diagnoses in part reflect the immunosuppressive nature of PRRS and show how PRRS can act as a driver of antimicrobial use. In 2019, swine influenza features in the three most frequent diagnoses in carcase submissions as shown in Figure 7. This emphasises the importance of full diagnostic investigations in disease outbreaks. Carcase submissions allow fuller diagnostic investigation than postal submissions and help veterinarians to develop and prioritise targeted disease control. The dashboard can be accessed via this link:

https://public.tableau.com/profile/siu.apha#!/vizhome/Porcinereproductiveandrespiratorysyndrome/PRRS

**Figure 7: Diagnoses concurrent with PRRS in 2019 carcase submissions to GB surveillance network (only showing those recorded at least three times)**

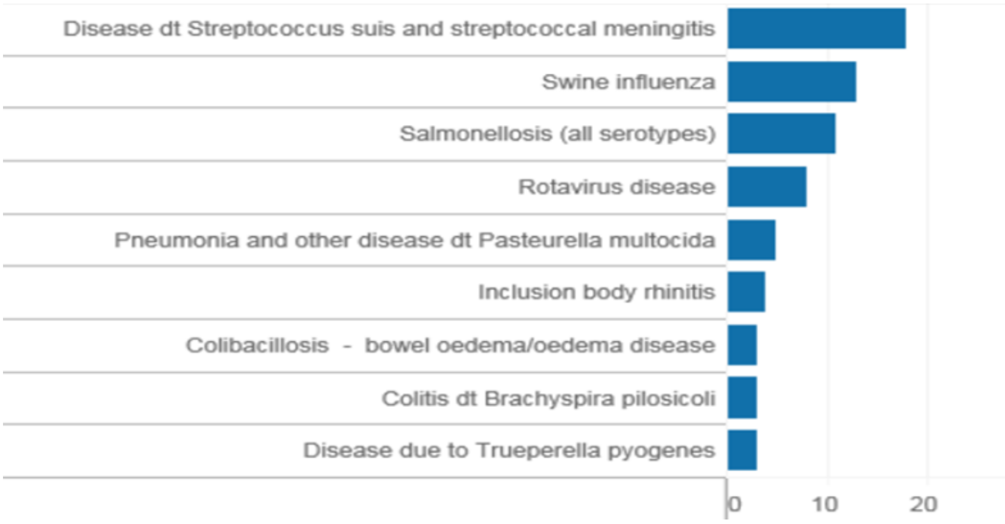
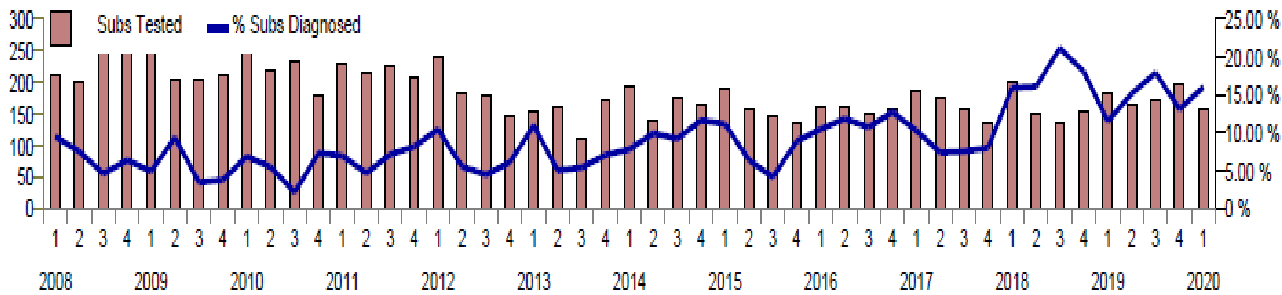



Figure 8 illustrates the quarterly diagnostic rate of GB PRRS including the first quarter of 2020. The tendency for a seasonal rise in PRRS diagnoses during the cooler winter months observed in 2008 to 2015 has not been a clear feature in this data since 2016.

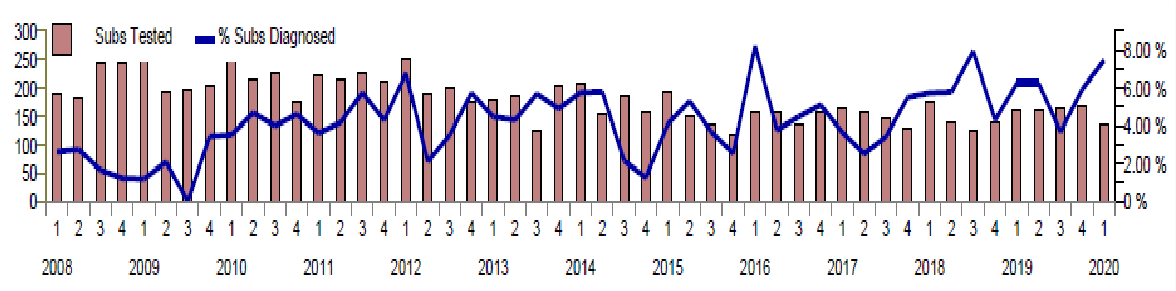
**Figure 8: GB PRRS diagnoses by quarter as a percentage of diagnosable submissions**




## Rise in the diagnostic rate of swine influenza

The diagnostic rate of swine influenza in the GB surveillance network rose over the last two quarters to 7.5% of diagnosable submissions in Q1-2020 (Figure 9), although the number of diagnoses in Q1-2020 was very similar to the same quarter in 2018 and 2019. Where the virus strain was successfully identified, pandemic H1N1 2009 (pH1N109) and reassortant H1N2 (H1N2) were detected. These strains have been predominant for several years, with avian-like H1N1 occasionally identified as described in the last quarterly report (APHA, 2019).

**Figure 9: GB swine influenza diagnoses by quarter as a percentage of diagnosable submissions**

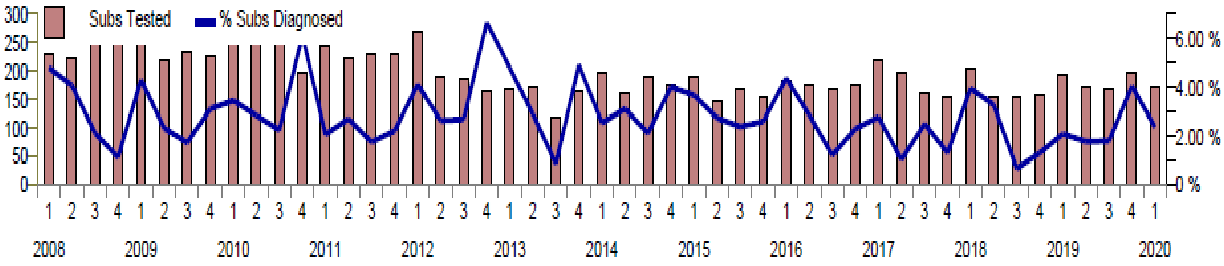



All outbreaks diagnosed in Q1-2020 were in post-weaned growing pigs, mainly affecting pigs aged four to eight weeks. Two outbreaks were diagnosed in finisher pigs, one by submission of nasal swabs, the other by submission of dead pigs in which PRRS was also diagnosed. The Defra-funded swine influenza surveillance at APHA provides PCR testing at no charge. Where acute respiratory disease suspicious of swine influenza occurs, plain nasal swabs or tissue pools (lung, trachea, tonsil) can be submitted. When samples test positive for influenza A virus by PCR, they are investigated further in order to identify the virus strain involved, using pandemic H1N1 2009 and other subtyping PCRs. Further details of this surveillance are given in the link below, or cases can be discussed with an APHA Veterinary Investigation Officer:
http://apha.defra.gov.uk/documents/surveillance/diseases/swine-influenza.pdf

## Pneumonia due to ampicillin-resistant *Actinobacillus pleuropneumoniae*

Pleuropneumonia involving *Actinobacillus pleuropneumoniae* (APP) was diagnosed in finisher pigs found dead on the morning of submission in a group of 800 finishers. Around 70 were showing acute respiratory signs and a further eight were found dead without prior clinical signs. The unit used an autogenous APP vaccine at weaning, however, it was reported that at the time of vaccination of this batch, there were issues with disease due to both porcine reproductive and respiratory syndrome virus (PRRSV) and swine influenza virus (SIV). The APP isolates were resistant to ampicillin on disc diffusion antimicrobial sensitivity testing, and the submission demonstrated the value of confirmatory diagnostic testing and of regular re-evaluation of antimicrobial sensitivity of endemic bacterial pathogens, especially when disease incidents arise. Ampicillin (beta-lactam) resistance in APP is occasionally detected by APHA in isolates from clinical cases (APHA, 2018; VMD, 2019); however none was detected in 2019, and this is the first identified in 2020. In addition to vaccine use for disease control, improving pig flow and ventilation and avoiding other predisposing factors such as viral disease and stresses are important in controlling disease due to APP in infected herds and reducing reliance on antimicrobial treatment. Increasing beta-lactam resistance in APP has been reported in other countries and, in Italy, ampicillin resistance increased from 11% of isolates in 1994 to 80% in 2009 (Vanni et al, 2012). A past study by Bosse and others (2017) reported ampicillin resistance in 20% of 96 UK isolates examined, in all cases associated with the presence of the blaROB-1 gene. This gene is commonly present on plasmids and could thus be transferred to other bacteria, significantly to other Gram-negative respiratory pathogens, such as *Pasteurella* *multocida* and *Haemophilus parasuis*. This resistance is of concern as penicillin/penicillin derivatives are the drugs of choice for the control of APP outbreaks.

**Figure 10: Seasonality of GB Actinobacillus pleuropneumoniae diagnoses as a percentage of diagnosable submissions**

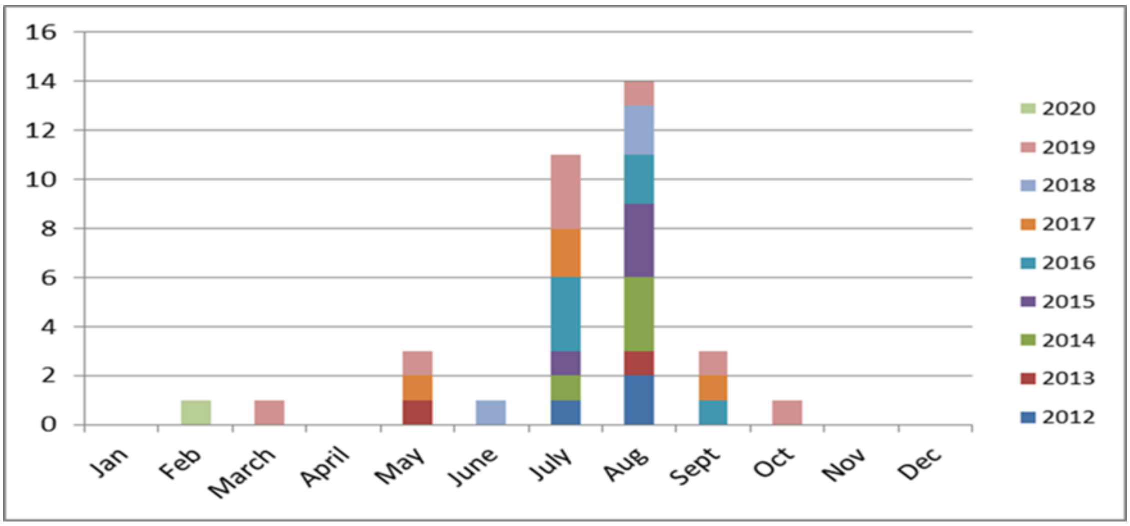



Surveillance for antimicrobial resistance in APP isolates is in place at APHA and kept under review to detect change in trend. There was no increase in the diagnostic rate of APP in GB in Q1-2020 as shown in Figure 10.

## Early spring outbreak of *Klebsiella pneumoniae* septicaemia in piglets

Outbreaks of piglet septicaemia due to *Klebsiella pneumoniae* subspecies *pneumoniae* (Kpp) in England showed a strict seasonal pattern from their emergence in 2011, with diagnoses made by the APHA between May and September each year until 2018. The season of occurrence extended in 2019 to include the months of March to October (APHA, 2019a). During Q1-2020, an early diagnosis of Kpp septicaemia in piglets was made in February for the first time, as illustrated in Figure 11.

**Figure 11: Outbreaks of Kpp septicaemia by month of diagnosis, 2011 to April 2020**




The outbreak was typical and affected two-week-old piglets on an East Anglian outdoor breeding unit which had not previously experienced outbreaks of Kpp. Several gilt litters were affected with 3% mortality overall, all of the deaths occurring over a two-day period. Kpp septicaemia was confirmed in multiple pigs found dead which fulfilled the case definition. It was noted that the weather was unusually mild for the time of year when the outbreak occurred. The case was described in the March 2020 Veterinary Record surveillance report (APHA, 2020a).

A focus surveillance article was published with an update on Kpp septicaemia outbreaks (Williamson and others, 2019). Characterisation of the Kpp isolates involved in 2019 and this early 2020 outbreak is in progress; Kpp sequence type 25 is the emergent strain involved in all but one outbreak between 2011 and 2018. An information note is available on this link: http://apha.defra.gov.uk/documents/surveillance/diseases/klebsiella-vets.pdf

## Coal tar toxicity incident

One of the most common toxicities diagnosed in pig submissions to APHA is that due to coal tar and asphalt, bituminous materials containing a complex mix of chemicals, some of which are toxic to pigs. An incident of coal tar toxicity was diagnosed when sudden deaths of outdoor growers were investigated; three adjacent pens were affected with 8.3% cumulative mortality compared to 0.5% across other pens accommodating the batch of pigs. Severe hepatic pathology (Figure 12) was present which histopathology confirmed to be due to widespread acute hepatic necrosis.

**Figure 12: Hepatic necrosis in a grower pig due to coal tar toxicity**

**Figure 13: Clay pigeon fragments**

Coal tar poisoning was suspected and a farm visit was undertaken. The source of coal tar was found to be fragments of old clay pigeons (Figure 13) within affected pig paddocks, which were exposed when pigs rooted. The field had not been used for approximately 12 years and it was revealed that shooting had taken place historically at one end, explaining the exposure to residual clay pigeon fragments in just the three affected pens (ECHA, 2017). The incident was reported to the Food Standards Agency as a potential food safety incident and included in the APHA chemical food safety quarterly report (APHA, 2020b) and Veterinary Record monthly surveillance report (APHA, 2020c). The pigs at risk were removed from the field and restricted from entering the food chain for 28 days, although there was no immediate threat to food safety as the pigs were several months away from slaughter. This case highlights the importance of checking that historical land use poses no potential risk to livestock placed on it, and the value of prompt post-mortem examination when unexpected deaths occur. Information on sources of coal tar can be found at: [http://apha.defra.gov.uk/documents/surveillance/diseases/coal-tar-toxicity.pdf](http://apha.defra.gov.uk/documents/surveillance/diseases/coal-tar-toxicity.pdf)

## Mycoplasma hyorhinis incidents with PRRS

Diagnoses of polyserositis due to *Mycoplasma hyorhinis* were made in four submissions during Q1-2020 in pigs ranging in age from seven to 11 weeks; PRRS was also diagnosed in three of these four cases and one involved swine influenza. Two cases were described in the April 2020 Veterinary Record surveillance report (APHA, 2020c), in both of which PRRS was confirmed by PCR and positive PRRS immunohistochemistry and histological changes were suggestive of PRRS involvement, although the pigs were vaccinated for PRRS. The findings included fibrinous polyserositis and arthritis and *M. hyorhinis* was detected in serosal swabs by DGGE-PCR, and in one case also in the lungs, and neither *Haemophilus parasuis* nor *Streptococcus suis* were isolated. In one of these cases, the clinical signs were of wasting and in the other, pigs were predominantly affected with respiratory disease together with lameness and wasting. *M. hyorhinis* should be considered a potential cause of polyserositis (Rovira, 2009), in addition to being a potential cause of enzootic pneumonia-like lung lesions, in post weaned pigs. While *H. parasuis* and *S. suis* remain the main causes of such presentations in nursery-age pigs, specific testing for *Mycoplasma* species is merited as part of diagnostic investigations, especially when routine bacteriology does not identify the cause. This requires the collection of plain swabs for *Mycoplasma* DDGE–PCR from lesioned joints and serosal surfaces in addition to charcoal swabs for routine bacteriology.

Most cases of polyserositis identified at APHA in which *M. hyorhinis* was detected have involved underlying primary pathogens, in particular PRRS virus. The prevention of concomitant infections is likely to help reduce the systemic spread of *M. hyorhinis*. There is a report in the literature of greater susceptibility to polyserositis in seven-week-old pigs experimentally infected with *M. hyorhinis* (Martinson and others, 2017). Clavijo and others (2017) described a study on the infection dynamics of *M. hyorhinis* which showed that the prevalence was very low in sows and pre-weaned piglets, but very high by the end of the nursery period, in the pig herds examined.

## Scanning surveillance detections of LA-MRSA in joint disease

Livestock-associated meticillin-resistant *Staphylococcus aureus* (LA-MRSA) was identified in two separate APHA scanning surveillance submissions from different farms in England following testing of *Staphylococcus aureus* isolates obtained from piglets with suppurative joint infections. Pigs colonised by LA-MRSA usually show no clinical signs but opportunistic staphylococcal infections such as these occasionally occur. In both of these cases, the LA-MRSA was considered incidental to the main cause of disease on the farm and was isolated from a single pig. One case was an 11-day-old piglet in a group in which coccidiosis was diagnosed and the other was a two-day-old piglet with hypo-gammaglobulinaemia. PRRS was not diagnosed in either case. Antimicrobial sensitivity testing of the isolates was carried out within APHA's "Monitoring of Antimicrobial Resistance in Bacteria from Animals and their Environment" project. Characterisation of the two isolates identified both as LA-MRSA, clonal complex (CC) 398. CC398 represents a group of related LA-MRSA strains which have been frequently detected in livestock in Europe in recent years. The isolates were of different but related *spa* types (t1456 and t1250), both of which have been detected previously in pigs in Europe.

These isolations represent the third and fourth occasions that LA-MRSA has been detected in lesions in APHA pig scanning surveillance submissions; the first was in late 2014 (Hall, Kearns and Eckford, 2015), and the second in 2017 (APHA, 2017), both from cases of skin disease. Guidance available for those working with livestock to reduce the risk of LA-MRSA infection was provided (https://www.gov.uk/government/publications/la-mrsa-information-for-people-who-work-with-livestock). The Veterinary Medicines Directorate, which is the policy lead for antimicrobial resistance, provides regular updates on LA-MRSA isolations from animals in the UK and a review of LA-MRSA isolates from animals and animal products in the UK was recently published (Anjum and others, 2019).

### Diagnoses made in negated porcine notifiable disease report cases

It is a legal requirement to report suspicion of notifiable disease in animals. In Great Britain, reports must be made to APHA, which will then undertake an official investigation (Defra, 2019). The investigation findings may allow the APHA veterinarian to rule out the suspicion of notifiable disease on clinical grounds without the need for testing. Where this is not possible, official samples are collected for laboratory testing at the national reference laboratory and the premises remain under formal restriction until negative test results are received enabling the suspicion of notifiable disease to be ruled out. Investigation into the disease condition that led to suspicion of notifiable disease can then be progressed. Descriptions of these investigations and their outcomes during 2017-2019 were the subject of a Veterinary Record focus article (Williamson and others, 2020b) to raise awareness of the need to consider, and report, suspicion of notifiable disease as well as providing information on their differential diagnoses. Diagnostic investigations were undertaken in eight of 13 disease incidents in which notifiable disease had been ruled out and diagnoses were established in six cases. PRRS was involved in three of the disease outbreaks all in commercial pig herds, with likely porcine dermatitis and nephropathy syndrome also involved in one of these. The PRRS diagnoses were made in commercial pig herds. Bacterial septicaemia due to erysipelas was confirmed in one case, and thrombocytopenia purpura was diagnosed in young piglets with haemorrhages. More information is provided in the focus article and in the individual cases are described in monthly or quarterly surveillance reports at:
https://www.gov.uk/government/collections/animal-disease-surveillance-reports.

# Horizon scanning

### Haemorrhagic tracheitis syndrome investigations in North America

Outbreaks of distinctive “honking” coughing associated with tracheal lesions have been reported by veterinary practitioners in North America (NA). The clinical presentation has been termed “Haemorrhagic tracheitis syndrome” because of the consistent finding of tracheitis as the principal pathology in affected pigs. This syndrome has been described from Canada for a period of years and more recently in the US. The Swine Health Information Centre and American Association of Swine Veterinarians sponsored a webinar giving an informative overview of this syndrome (accessible from: https://www.swinehealth.org/shic-aasv-hemorrhagic-tracheitis-syndrome-management-webinar/) involving several speakers from the US and Canada. The case definition is of acute onset of a characteristic "honking" cough, usually in a low percentage of pigs aged 14 to 30 weeks old leading to dyspnoea and, in some, to death or euthanasia. A consistent finding in affected pigs is marked oedema and haemorrhage in the tracheal submucosa causing luminal obstruction.

Tracheas are routinely opened in pigs submitted for post-mortem examination to the GB surveillance network. Outbreaks of disease fitting the case definition have not been recognised, however occasional pigs with tracheitis have been seen in diagnostic submissions. Six such cases since 2011 were reviewed; four were in finisher pigs (16, 19, 20 and 20-week-olds), one in a 10-week-old grower, and one in a five-week-old weaner, all from indoor pig units in different regions of England. All cases were reported to have been showing with respiratory clinical signs which, when described further, included dyspnoea (two) and coughing (three). The lesions were described histologically as elevated fibrinonecrotic protrusions into the tracheal lumen with necrosis and suppuration varying from acute to subacute and/or chronic. In addition to tracheitis, the post-mortem findings included moderate to severe pneumonias in five cases and the pneumonias were considered the principal pathology. In the sixth case, the only one where tracheitis was the main pathology, no diagnosis was established; however, based on histopathology, earlier swine influenza virus infection was suspected although it was not detected by PCR. Diagnostic investigation of the five pneumonic cases with tracheitis detected involvement of a range of pathogens with no consistent findings. These included *Pasteurella multocida*, *Mycoplasma hyorhinis, Streptococcus dysgalactiae* subsp *equisimilis*; *Trueperella pyogenes* and, in one case, fungal hyphae were detected by histopathology in association with the tracheal lesions as described in the Q4-2019 report (APHA, 2019b).

In North America, a standardised diagnostic protocol to investigate outbreaks of haemorrhagic tracheitis syndrome is being applied. Swine influenza is considered a potential initiating cause in some North American outbreaks, emphasising the need for early sampling of respiratory disease outbreaks to detect swine influenza virus. Where lesions of tracheitis are encountered in GB pigs, images of the lesions are helpful together with full diagnostic investigation to include collection of fresh and fixed trachea and plain and charcoal swabs from tracheal lesions alongside samples for investigation of respiratory disease.

## Highly divergent porcine sapovirus characterised in the US

Porcine sapoviruses (SaVs) are genetically diverse and widely distributed in pigs in pig-producing countries. Eight genogroups have been identified, genogroup (G) III being the predominant type. Most of the eight genogroups of porcine SaV have been detected circulating in pigs in the United States. A recent publication reported the detection of porcine SaVs in pigs of varying ages with clinical diarrhoea, in different US States, using next-generation sequencing and genetic characterization (Wang and others, 2020). Porcine SaV GIII was detected in all of the seven cases described and SaV GVI was also detected in one case, in a pooled sample. Other enteric viruses were also detected in all but one of the cases investigated. Piglets experimentally infected with porcine SaVs may develop vomiting and/or diarrhoea. In the field, subclinical infection appears to occur and coinfection of porcine SaV with other enteric viruses is common, thus its contribution to clinical disease is uncertain. The literature on porcine SaVs will be kept under review and there is an Swine Health Information Centre factsheet on this link: http://www.cfsph.iastate.edu/pdf/shic-factsheet-porcine-sapovirus

### Pigs not susceptible to experimental infection with novel human coronavirus (SARS CoV-2)

Since the global emergence of the novel human coronavirus, named Severe Acute Respiratory Syndrome Coronavirus-2 (SARS CoV-2) and associated Covid-19 disease, several scientific groups have been investigating the potential for infection of, and transmission by, several animal species based, in part, on the presence of receptors for SARS CoV-2 virus in certain species. The novel human coronavirus SARS-CoV-2 is a member of the B lineage of the genus betacoronavirus (Order Nidovirales, Family Coronavirales). An important mechanism of cross-species transmission is the ability of a virus to bind to a receptor in the novel host which, for coronaviruses, is determined by the receptor specificity of the viral spike (S) entry protein. In a study published from China by Shi and others (2020), ferrets and cats were found to be highly susceptible to SARS CoV-2 infection, dogs had low susceptibility, and pigs, chickens, and ducks were not susceptible to infection with SARS CoV-2. Results released from another experimental study in Germany (FLI, 2020) also showed ferrets to be susceptible to SARS CoV-2 infection, while pigs and chickens were not, and established that fruit bats could be infected. These studies are based on inoculation of small numbers of animals, however they align with field observations of infections reported in various felids, mink and dogs in various countries, arising from reverse zoonosis events. These reports and the results of experimental infections provide important information about potential animal reservoirs of SARS-CoV-2 and evidence for risk assessments. Generic Covid-related advice for people with animals has been provided (Defra, 2020) and guidance for pig keepers and the pig industry is available from the National Pig Association and Agriculture and Horticulture Development Board (AHDB, 2020).

# References

AHDB (2020). Coronavirus: advice for farmers and growers. Accessed 18-05-20 https://ahdb.org.uk/coronavirus?_cldee=c3VzYW5uYS53aWxsaWFtc29uQGFwaGEuZ3NpLmdvdi51aw%3d%3d&recipientid=contact-df66f9e76c96e81180ce005056b864bf-4415eaba55ae40a98e3d37fab21cf672&esid=55d6d83c-4690-ea11-a811-000d3a86d545

Anjum MF; Marco-Jimenez F; Duncan D; Marin C; Smith RP; Evans S (2019). Livestock-associated Methicillin-resistant Staphylococcus aureus from animals and animal products

in the UK. Frontiers in Microbiology 10 Article 2136
https://doi.org/10.3389/fmicb.2019.02136

APHA (2017). Staphylococcal skin infection and antimicrobial resistance. In GB pig quarterly report: Disease surveillance and emerging threats Volume 21: Q2 – April to June 2017 p10
https://www.gov.uk/government/publications/pig-disease-surveillance-reports-2017

APHA (2018). Ampicillin resistance in *Actinobacillus pleuropneumoniae.* In GB pig quarterly report: Disease surveillance and emerging threats. Volume 22: Q4 – October to December 2018 pp12-13
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/783297/pub-servrep-p1018.pdf

APHA (2019a). Extended season of *Klebsiella pneumoniae* septicaemia outbreaks. In GB pig quarterly report: Disease surveillance and emerging threats. Volume 23: Q3 – July to September 2019 pp9-10
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873051/pub-survrep-p-Q4-19.pdf

APHA (2019b). Unusual pluck lesions associated with fungal disease in nursery pig. Disease surveillance and emerging threats. Volume 23: Q4 – October to December 2019 pp 10-11
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873051/pub-survrep-p-Q4-19.pdf

APHA (2020c). *Klebsiella pneumoniae* subspecies *pneumoniae* septicaemia in piglets. Disease surveillance in England and Wales, March 2020. Veterinary Record 186, 403-407
https://veterinaryrecord.bmj.com/content/186/13/403

APHA (2020b). FSI 2020-002. In: Chemical Food Safety quarterly report, January to March 2020 pp5-6
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/883481/pub-chemfood0120.pdf

APHA (2020c). Coal tar toxicity in grower pigs. In: Disease surveillance in England and Wales, February 2020. Veterinary Record 186, 270-274
https://veterinaryrecord.bmj.com/content/186/9/270

Clavijo, MJ., Murray, D., Oliveira, S., Rovira, A. (2017) Infection dynamics of *Mycoplasma hyorhinis* in three commercial pig populations. Veterinary Record 181, 68.https://veterinaryrecord.bmj.com/content/vetrec/181/3/68.full.pdf

Dee, S.A., Niederwerder, M.C., Patterson, G., Cochrane, R., Jones, C., Diel, D., Brockhoff, E., Nelson, E., Spronk, G. and Sundberg, P. (2020), The risk of viral transmission in feed: What do we know, what do we do?. Transbound Emerg Dis. Accepted Author Manuscript. https://doi.org/10.1111/tbed.13606

Defra (2015). Porcine epidemic diarrhoea: how to spot and report the disease. www.gov.uk/guidance/porcine-epidemic-diarrhoea-how-to-spot-and-report-the-disease

Defra (2018). Qualitative risk assessment for the risk of introducing African swine fever (ASF) to the UK pig population from European Member States via human-mediated routes. Accessed 22-05-20 https://www.gov.uk/government/publications/qualitative-risk-assessment-risk-of-introducing-african-swine-fever-to-the-uk-pig-population

Defra (2019) Notifiable diseases in animals. Accessed 22-05-20 https://www.gov.uk/government/collections/notifiable-diseases-in-animals

Defra (2020). Coronavirus (COVID-19): advice for people in England with animals. Accessed 18-05-20 https://www.gov.uk/guidance/coronavirus-covid-19-advice-for-people-with-animals

ENETWILD consortium, Javier Fernandez-Lopez, Pelayo Acevedo, José Antonio Blanco-Aguiar, Joaquín Vicente, 2020. Analysis of wild boar-domestic pig interface in Europe: preliminary analysis. EFSA supporting publication 2020:EN-1834. 45 pp. https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/sp.efsa.2020.EN-1834

European Chemicals Agency (2017). Figure A.2 Principle of clay target shooting (from ILA-E, 2010). In: “Annex Xv Restriction Report – Lead In Gunshot In Wetlands” p16 accessed 19/05/20 https://echa.europa.eu/documents/10162/69550ac2-4e97-6e68-9a1c-25ea1d264863

Friedrich-Loeffler-Institut (2020). Novel Coronavirus SARS-CoV-2: Fruit bats and ferrets are susceptible, pigs and chickens are not. Press release 04/02/2020 https://www.fli.de/en/press/press-releases/press-singleview/novel-coronavirus-sars-cov-2-fruit-bats-and-ferrets-are-susceptible-pigs-and-chickens-are-not/

Hall S., Kearns A. and Eckford S. (2015). Livestock-associated MRSA detected in pigs in Great Britain. Veterinary Record 2015 176: 151-152

Ito, S.; Bosch, J.; Jurado, C.; Sánchez-Vizcaíno, J.M.; Isoda, N. (2020). Risk Assessment of African Swine Fever Virus Exposure to *Sus scrofa* in Japan Via Pork Products Brought in Air Passengers’ Luggage. Pathogens 9: 302. https://www.mdpi.com/2076-0817/9/4/302

Jianzhong Shi, Zhiyuan Wen, Gongxun Zhong, Huanliang Yang, Chong Wang, Baoying Huang, Renqiang Liu, Xijun He, Lei Shuai, Ziruo Sun, Yubo Zhao, Peipei Liu, Libin Liang,

Jurado, C., Mur, L., Pérez Aguirreburualde, M.S. et al. (2019). Risk of African swine fever virus introduction into the United States through smuggling of pork in air passenger luggage. Sci Rep 9: 14423 https://doi.org/10.1038/s41598-019-50403-w

Martínez-Avilés M., Iglesias I. and De La Torre A. (2020). Evolution of the ASF Infection Stage in Wild Boar Within the EU (2014–2018). Front. Vet. Sci., 01 April 2020 | https://doi.org/10.3389/fvets.2020.00155

Martinson, B, Minion, FC, Kroll, J, Hermann, J. (2017). Age susceptibility of caesarian derived colostrum deprived pigs to *Mycoplasma hyorhinis* challenge. Vet Microbiol 210:147–52, doi: 10.1016/j.vetmic.2017.09.005

Pengfei Cui, Jinliang Wang, Xianfeng Zhang, Yuntao Guan, Wenjie Tan, Guizhen Wu, Hualan Chen, Zhigao Bu. (2020). Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS–coronavirus 2. Science 08 Apr 2020: eabb7015 https://science.sciencemag.org/content/early/2020/04/07/science.abb7015.full

Rovira, A. (2009) Review of *Mycoplasma hyorhinis*. Proceedings of 2009 Allen D. Lemon Swine Conference, USA. Accessed 22 May 2020 https://conservancy.umn.edu/bitstream/handle/11299/139745/1/Rovira.pdf

Scottish Government (2016). The Specified Diseases (Notification) Amendment (Scotland) Order 2016. http://www.legislation.gov.uk/ssi/2016/41/contents/made

Veterinary Medicines Directorate (2019). UK Veterinary Antibiotic Resistance and Sales Surveillance Report (UK-VARSS 2018) Supplementary material. Table S4.4: Clinical Surveillance Data for Isolates from Respiratory Infections of Pigs p30 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/842680/PCDOCS-_1705030-v1-UK-VARSS_Supplementary_Material_2018__2019__FINAL.pdf

Wang L., Marthaler D., Fredrickson R., Gauger P C., Zhang J., Burrough E.R., Petznick T., Li G. (2020). Genetically divergent porcine sapovirus identified in pigs, United States Transboundary and Emerging Diseases 67: Issue1, January 2020 Pages 18-28 https://doi.org/10.1111/tbed.13337

Williamson S., Bidewell C. and AbuOun M. (2019). Update on *Klebsiella pneumoniae* septicaemia outbreaks in preweaned pigs. Veterinary Record 184: 580-583 https://veterinaryrecord.bmj.com/content/184/22/580

Williamson, S., Bidewell, C., Pittalis, L., Brena, C., Richey, M., Florea, L., Wight, A., Wilson, L., Amato, B. (2020) Small-scale pig producers and disease surveillance: key threats. Veterinary Record 186, 19-21 https://veterinaryrecord.bmj.com/content/186/1/19

Williamson,S., Camilla Brena, Cornelia Bidewell, Ed Fullick, Alastair George, Livio Pittalis and Lévon Stephan (2020b) Investigation of negated notifiable disease report cases in pigs, 2017–2019. Veterinary Record 186, 482-48. https://veterinaryrecord.bmj.com/content/186/15/482.full

## Statement regarding use of this material

The material in this report has been compiled by the Animal and Plant Health Agency (APHA) Surveillance Intelligence Unit in collaboration with the APHA Surveillance and Laboratory Services Department.

The report is available on GOV.UK at: https://www.gov.uk/government/collections/animal-disease-surveillance-reports.



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

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

APHA is an executive agency of the Department for Environment, Food & Rural Affairs, and also works on behalf of the Scottish Government and Welsh Government.