GB Emerging Threats
Quarterly Report
Pig Diseases

Quarterly Report: Vol 22 : Q1 January to March 2018

Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction &amp; overview</td>
<td>2</td>
</tr>
<tr>
<td>New &amp; re-emerging diseases and threats</td>
<td>4</td>
</tr>
<tr>
<td>Ongoing new &amp; re-emerging disease investigations</td>
<td>6</td>
</tr>
<tr>
<td>Unusual diagnoses</td>
<td>6</td>
</tr>
<tr>
<td>Changes in disease patterns and risk factors</td>
<td>8</td>
</tr>
<tr>
<td>Horizon Scanning</td>
<td>11</td>
</tr>
<tr>
<td>References</td>
<td>13</td>
</tr>
</tbody>
</table>

Highlights

- Spread of African Swine Fever into Hungary
- Ivermectin resistance confirmed in Oesophagostomum dendatum
- Typical winter rise in PRRS diagnoses
- Novel bat-derived enteric virus in pigs in China
- Brachyspira suanatina detection in pigs in Germany

VIDA diagnoses are recorded on the APHA FarmFile database and SAC Consultancy: Veterinary Services LIMS database and comply with agreed diagnostic criteria against which regular validations and audits are undertaken.

The investigational expertise and comprehensive diagnostic laboratory facilities of both APHA and SAC C VS are widely acknowledged, and unusual disease problems tend to be referred to either. However recognised conditions where there is either no diagnostic test, or for which a clinical diagnosis offers sufficient specificity to negate the need for laboratory investigation, are unlikely to be represented. The report may therefore be biased in favour of unusual incidents or those diseases that require laboratory investigation for confirmation.

APHA VICs have UKAS Accreditation and comply with ISO 17025 standard. SAC C VS have UKAS accreditation at their central diagnostic laboratory and at the Aberdeen, Edinburgh, Perth, Ayr, Dumfries, Inverness, St Boswells and Thurso Disease Surveillance Centres which comply with ISO 17025 standard.

From September 2014 APHA contracted the services of partner Post Mortem providers. From April 2015, these services were provided by the Royal Veterinary College, the University of Bristol, University of Surrey, Wales Veterinary Science Centre and SACCVS. These providers contribute to the VIDA diagnoses recorded on the APHA FarmFile database and comply with agreed diagnostic criteria. To achieve a VIDA diagnosis, all testing must be carried out by a laboratory with ISO 17025 accreditation.
INTRODUCTION

This report contains analysis of animal health and scanning surveillance data and information from APHA, SAC Consulting Veterinary Services (SAC CVS) and non-APHA partner post mortem providers (SAC CVS, University of Bristol, Royal Veterinary College, University of Surrey, Wales Veterinary Science Centre, Aberystwyth) from the first quarter of 2018 compared to data in previous quarters and years. The network of partner post mortem providers is developing, and the current providers and sites have commenced activity at various times between September 2014 and July 2015. The report is compiled by the APHA Pig Expert Group, and is based on diagnostic submissions as well as on surveillance data and information from other sources. It is planned for the latter two to be expanded with time as other sources of complementary information are included. These scanning surveillance activities aim to provide timely detection of animal-related new and re-emerging diseases and threats. The information contained in this report, and other linked outputs, is used by government, the livestock industry, farmers and vets to maintain awareness and take action to manage risks that may be associated with the identified threats. Further information can be found at: http://ahvla.defra.gov.uk/vet-gateway/surveillance/index.htm.

OVERVIEW

Pig disease surveillance dashboard January to March output

Diagnoses made in the first three months of 2017 and 2018 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: Pig disease surveillance dashboard output for Q1, 2017 (1a) and Q1, 2018 (1b)

**Diagnostic submission trends**

Total GB diagnostic submissions to APHA and SAC CVS from pigs in January to March 2018 were reduced by 7% compared to the average of the four previous years although higher than in Q1, 2016. There were regional differences in submission levels with those from England mainly affected by these reductions. As noted in the previous two quarters months, there were fewer non-carcase (postal) submissions to APHA in Q1, 2018 although this was partially compensated for by increased submissions of this type to SAC CVS. Several variable factors influence submission rates including the economic prosperity of pig production, which is itself affected by feed and pig prices in particular, the effect of these being hard to quantify. However, discussions suggest that other contributory factors could include initiatives from pharmaceutical companies providing assistance with diagnostic testing, the increasing use of oral fluids for detection of respiratory viruses and the changing structure of some large pig veterinary practices which may decide which laboratories to use at management level. Development of syndromic surveillance to capture disease incidents from which no submissions are made to the network is being progressed. Efforts also continue to publicise the expansion of areas offering free carcase collection to post-mortem examination sites within the APHA network (APHA, 2017a) as this service has not often been used by pig farms.

Figure 2: GB Pig Diagnostic Submissions in January to March for each year 2014-2018
NEW AND RE-EMERGING DISEASES AND THREATS

Monitoring the trends in diagnoses of known diseases cannot, by definition, detect either new diseases or changes in endemic diseases that would prevent a diagnosis from being reached (for example a change in the pathogen that compromised the usual diagnostic test). Such new or emerging diseases would probably first be detected by observation of increased numbers of submissions for clinical and/or pathological syndromes for which a diagnosis could not be reached in the normal way. Submissions for which no diagnosis is reached (DNR) despite testing deemed to allow reasonable potential for a diagnosis to be reached are regularly analysed to look for increases in undiagnosed disease which could indicate the presence of a new or emerging disease. Undiagnosed disease submissions are summarised broadly by the clinical presentation of disease and, once this has been determined by further investigation, the body system affected. Both groups are investigated and trends in the levels are compared over time.

Data recording by APHA and SAC CVS was harmonised from 2007. The Species Expert Group reviews trends in VIDA DNR data each quarter with the aim of providing information on potential new or emerging diseases or syndromes. ‘Prior years’ refers to pooled data for 2012 to 2016 for GB VIDA data.

Supplementary analysis of APHA DNR data is also undertaken using an early detection system (EDS). This uses a statistical algorithm to estimate an expected number of DNR reports and a threshold value. If the current number of DNR reports exceeds the threshold (i.e. exceedance score>1), this indicates that the number of reports is statistically higher than expected. When this EDS identifies categories of submissions where the threshold DNR has been exceeded, the Species Expert Group reviews the data to investigate further. This review may involve assessment of individual DNR submissions. Where this DNR analysis finds no evidence of a new and emerging threat or other issue, the detail of these reviews in response to thresholds being exceeded may not be reported here.

Porcine Epidemic Diarrhoea update

No suspect incidents of porcine epidemic diarrhoea (PED) were reported since the one which tested PED PCR negative in January 2018. Diagnostic submissions from non-suspect cases of diarrhoea in pigs submitted to APHA continue to be routinely tested for PEDV on a weekly basis. None have been positive for PEDV in over 700 diagnostic submissions tested under AHDB Pork funding since June 2013. The last diagnosis of PED recorded in the GB diagnostic database (VIDA) was in 2002 on a farm in England. Further information on PEDV is available on this link: https://pork.ahdb.org.uk/health-welfare/health/emerging-diseases/pedv. No virulent PED outbreaks have been reported in Europe since 2014; other strains are still reported to be actively circulating with some genetic variation from 2014 outbreaks. Outbreaks of virulent PED continue to be described in the USA outbreaks continue to be diagnosed albeit at a lower level than during the emergence of the disease. In March 2018, USDA rescinded the Swine Enteric Coronavirus Diseases (SECD) Federal Order and reporting of PED cases to Federal animal health officials is no longer required. A publication on the stability of PED virus from Kim and others (2018) revealed the influence of different types of fomite (for example, metal, plastic, rubber and cloth) and of temperature on PEDV survival, with lower (4°C) temperatures favouring PEDV survival which in part explains the increased incidents recorded in the US over cooler winter months since PED emergence (AASV, 2018).

First report of African Swine Fever in Hungary

The first report of African Swine Fever (ASF) in Hungary was made in April 2018 in wild boar. This is another significant development in the continued westward spread of ASF in eastern and central European Union Member States since first detected in the eastern EU in January 2014. This resulted in a further update on ASF in central and eastern Europe from the International Disease Monitoring team which is available on this link: https://www.gov.uk/government/publications/african-swine-fever-in-pigs-in-poland-lithuania-and-latvia with ASF cases illustrated in Figure 3.

Hungary has been monitoring dead wild boar for ASF in eastern counties near borders with the Ukraine and Poland since 2016 with border checks for pork/pork products and increased passive surveillance in the rest of country from 2017. This detection of ASF was, however, outside this surveillance zone which is concerning. It means that either infection in wild boar nearer the border has been missed, or that the case results from other means of transmission such as illegal movement of infected pigs or feeding of infected pork/pork products. According to information from the competent authority, the most likely source is considered to be contaminated meat or food waste brought in by non-EU workers, as was suspected to
be the case for the geographical jump to the Czech Republic in 2017. Since the first case in wild boar was reported in Hungary, further wild boar have tested positive in the same vicinity, as well as near the border with Ukraine. In addition to this, Poland continues to report wild boar ASF cases, resulting in expansion of the new infected areas highlighted in the last quarterly report (APHA 2017b). Outbreaks in small herds of domestic pigs have also been reported recently in Poland.

Figure 3: ASF in Central and Eastern Europe since October 2017 (prepared April 30th 2018)

The continued westward spread of ASF emphasises the need to raise awareness amongst all pig keepers across Europe of the need to take stringent external biosecurity precautions to reduce the risk of introduction. These messages, and the importance of not feeding kitchen and catering waste have been highlighted in recent public communications; passing these on to UK pig farmers and keepers is vital: https://www.gov.uk/government/news/pig-keepers-warned-not-to-feed-kitchen-scrapsto-pigs-due-to-african-swine-fever-risk. The main message to prevent introduction of ASF to UK pigs is to prevent feeding of pigs with pork or wild boar meat or products. Providing dedicated clothing and boots for workers and visitors, limiting visitors to a minimum, and preventing outside vehicles which may be contaminated from coming on to the farm, are all valuable additional procedures to reinforce. An ASF poster for pig keepers has been produced as part of this campaign. This can be downloaded from this link: http://apha.defra.gov.uk/documents/surveillance/diseases/african-swine-fever-poster.pdf. There are also posters in different languages available from AHDB Pork warning farm staff and the public about the risk of feeding meat and meat products to pigs available: https://pork.ahdb.org.uk/health-welfare/health/emerging-diseases/african-swine-fever/.

Information from a publication modelling ASF transmission (Guinat and others, 2018) and from a recent talk by Klaus Depner of the Friedrich-Loeffler-Institut at the recent European Symposium for Porcine Health Management both emphasise that, contrary to some traditional textbook descriptions, the spread of ASF by pig to pig contact can be slower than for some other diseases (e.g. classical swine fever). If
infection is first introduced into a small number of pigs in a group, disease initially only involves those few pigs and spread of infection to larger numbers of pigs, leading to higher than expected mortality, can take several weeks. This slower spread is due to minimal transmission by aerosol, the fact that virus shedding does not start before clinical signs appear, and the relatively low amounts of virus being shed in excretions and secretions from infected pigs. However, there are very high amounts of virus present in the blood and tissues of affected and dead pigs and thus contact with, and consumption of, carcasses of dead pigs or wild boar or products from them is an efficient method of transmission. This slower spread on pig farms supports enhanced passive surveillance for ASF in restricted and at risk areas to enable early detection of ASF cases even where the mortality has not yet significantly increased.

ONGOING NEW AND RE-EMERGING DISEASE INVESTIGATIONS

Ivermectin resistance confirmed in adult Oesophagostomum dentatum worms
Resistance to ivermectin was confirmed in the roundworm Oesophagostomum dentatum obtained from a pig farm in England. The initial investigation into suspected reduced ivermectin efficacy was undertaken by the veterinary practitioner in conjunction with APHA and was described in the Q1-2017 report (APHA 2017c). The results from the on-farm study led to a controlled efficacy trial being undertaken at the Moredun Research Institute in collaboration with APHA and AHDB Pork using worms from the farm on which the initial investigation took place. This trial confirmed the finding of the first reported case of resistance to ivermectin in adult O. dentatum worms in the UK. Factors that might have played a role in ivermectin resistance development include long-term use of ivermectin for parasite control in pigs on the farm and continued use of outdoor paddocks without land rotation for decades. Fortunately, FECR testing suggest that benzimidazole treatment remains effective. Wider testing is recommended to determine whether this detection is an isolated incident or is of wider significance.

Faecal egg count reduction (FECR) testing is a well-recognised preliminary test to assess suspected reduced anthelmintic efficacy. It has been used widely in sheep flocks in which anthelmintic resistance in parasitic intestinal worms is an increasing issue. FECR involves collecting faeces for worm egg counts just prior to treatment and again at a specified time interval after treatment (according to which anthelmintic is involved; 14 days for ivermectin), sampling the same sows on each occasion. The mean % reduction in egg counts after treatment is then calculated as a proxy measure of efficacy. There is no laboratory marker for ivermectin (a macrocyclic lactone) resistance and therefore confirmation of this finding depended on performing in vivo infections with worms from the farm in a controlled efficacy trial. A presentation was made to the Pig Veterinary Society at the May 2018 meeting by Michele Macrelli from APHA to raise awareness of the finding and the use of FECRT. The investigation is described in a summary report at this link: https://pork.ahdb.org.uk/health-welfare/health/emerging-diseases/

UNUSUAL DIAGNOSES

There were a number of unusual diagnoses or presentations this quarter; details of these have been included in monthly APHA or SAC CVS reports; http://ahvla.defra.gov.uk/vet-gateway/surveillance/reports.htm. These are kept under review to assess whether they justify initiation of emerging disease investigations.

Aerococcus viridans infection associated with pericarditis in PRRS outbreaks
Aerococcus viridans was isolated from pericarditis and lung lesions in two pigs in which Porcine Reproductive and Respiratory Syndrome (PRRS) was diagnosed and there was gastric ulceration. A week later, further pale, wasted pigs were submitted to APHA from the same farm, as the group was showing some improvement but mortality was continuing. These pigs also had deep gastric ulcers, and influenza virus was also detected, indicating that sequential viral infections were playing a part in the clinical problem; interestingly A. viridans was again isolated from pericarditis lesions. In a separate submission in which PRRS was diagnosed in association with anaemia due to deep haemorrhaging gastric ulcers, A. viridans was isolated from the pericardium of one pig.
The isolation of *A. viridans* in pure growth from several sites in multiple pigs and in different submissions suggests that it was playing a role in the disease. This pathogen has been reported in the literature in association with arthritis, pneumonia, endocarditis and meningitis in pigs, particularly as an opportunistic pathogen and with PRRS virus (Martin and others, 2007). In this case its clinical significance was likely to be secondary to the viral infections identified. A previous incident involving polyserositis and endocarditis and *A. viridans* in pigs submitted to SAC CVS were highlighted in a past surveillance report (APHA 2011).

**Bone abscesses and joint infections in growing pigs**

Further to two investigations into osteomyelitis in post-weaned pigs which were described in the Q3-2017 pig disease surveillance report (APHA 2017d), a third similar incident was diagnosed, although the incidence of cases was lower on this farm and *Trueperella pyogenes* infection was not identified. Sporadic cases of lameness with leg swelling and loss of condition in post-weaned pigs on an indoor breeder-finisher farm were found to be due to osteomyelitis and fibrinopurulent arthritis in two seven-week-old pigs submitted. Osteomyelitis was confirmed by histopathology and *Fusobacterium necrophorum* and *Staphylococcus aureus* were isolated in pure growths from the lesions in the humerus and tibia (Figures 4a and 4b) respectively. The isolation of different bacteria from suppurative lesioned sites suggested entry from a breach of the skin or mucous membranes (including the respiratory tract) and (for the bone lesions) subsequent haematogenous spread. The possibility of spread from joints also has to be considered as in both these pigs there was gross evidence of arthritis in adjacent joints. Osteomyelitis lesions like these will go undetected if bones are not sectioned. A review of pen and inter-batch hygiene, routine procedures on farm (e.g. teeth clipping, iron supplementations, vaccinations, other injections) and potential causes of trauma was advised. It was also recommended that the frequency of needle changes be checked.

Figure 4: Osteomyelitis lesions (arrowed) in distal humerus (4a) and proximal tibia (4b)
CHANGES IN DISEASE PATTERNS AND RISK FACTORS

This section of the report gives information on occurrence of selected diseases. The data originate from submissions and are summarised and presented according to the diagnosis reached and assigned as a VIDA code. Our charts show the number of diagnoses (numerator) as a proportion of the number of submissions in which that diagnosis was possible (denominator), for all of GB, England & Wales and for Scotland. The bars indicate the 95% confidence limits. Note that the y-axis of the charts varies and therefore care must be taken when comparing individual charts.

Typical winter rise in PRRS diagnoses

The diagnostic rate for PRRS in GB in the first quarter of 2018 was the highest recorded quarterly diagnostic rate (16.6%) with the previous highest being in Q4 2016 (12.7%) as shown in Figure 5. The seasonality pattern with a peak in diagnoses in winter months and dip in summer months is familiar. This data supports anecdotal reports from pig practitioners of continued clinical problems associated with PRRS. The rise may well reflect better survival and transmission of the virus in cooler, darker and less dry weather conditions, as well as colder wetter weather making effective cleaning and disinfection harder to achieve. Temperature fluctuations and ventilation issues that can occur over the winter months may also contribute to PRRS as for other respiratory diseases. The majority of diagnoses were made in submissions from pigs in England.

Figure 5: Seasonality of GB PRRS incidents as a % of diagnosable submissions

The increasing diversity over time of PRRS virus (PRRSV) strains detected in samples in which PRRS is diagnosed continues as reported previously (APHA, 2016). No PRRSV-2 has been detected to date in GB pigs and the PRRSV-1 strains sequenced to date from 2018 remain within GB clusters, suggesting no new incursions of “foreign” virus strains. When funding allows, APHA sequences PRRSV from diagnostic submissions on a batch basis for surveillance purposes to monitor PRRS strains associated with disease. Veterinarians may also request sequencing on a chargeable basis to assist with epidemiological investigations.

Surveillance findings related to PRRS have recently been provided in an interactive dashboard format. This displays data associated with diagnoses of PRRS from the GB Veterinary Investigation Diagnosis Analysis (VIDA) database from 2012 to 2017. The data include clinical details from diagnostic submissions to the GB surveillance network. The dashboard is available by copying this link into a browser and was widely communicated when the dashboard was launched: https://public.tableau.com/profile/siu.apha#!/vizhome/Porcinereproductiveandrespiratorysyndrome/PRRS

This provides anonymised surveillance information about PRRS diagnoses to practitioners, the pig industry, those working in disease surveillance and any others who are interested.

Respiratory signs, wasting or found dead remain the main clinical signs reported for GB PRRS diagnoses. The three most common concurrent diagnoses with PRRS are streptococcal disease (mainly Streptococcus suis), pasteurellosis and salmonellosis, as illustrated in Figure 6 below, which is extracted from the PRRS dashboard. Although not one of the commonest concurrent diagnoses, gastric ulceration has been a significant feature of several 2018 PRRS outbreaks as described in the February and March 2018 APHA surveillance reports in the Veterinary Record (APHA, 2018a and 2018b).
Slight increase in diagnostic rate of swine influenza

In the first quarter of 2018, the trend in the diagnostic rate for swine influenza increased as illustrated in Figure 7. There is a less consistent seasonality pattern for swine influenza diagnoses through the GB surveillance network than for PRRS and swine influenza detected by testing outside the network, including through saliva (oral fluid) testing, is not captured in the GB surveillance data.

The Defra-funded swine influenza surveillance project (SV3041) monitors the virus strains infecting pigs in Great Britain and the testing for swine influenza virus remains on offer at no charge to veterinary practitioners. This surveillance is based on virological detection in nasal swabs or respiratory tissues using influenza A virus M gene and pandemic H1N1 2009 (pH1N1/09) PCRs followed by virus isolation and strain typing. More details about this free of charge swine influenza surveillance are available on this link: http://ahvla.defra.gov.uk/documents/surveillance/diseases/swine-influenza.pdf. The surveillance allows a diagnosis of swine influenza to be confirmed in outbreaks of respiratory disease and identification of the influenza A virus strain involved. This is particularly valuable for pig units where vaccination is being considered and can also help in epidemiological investigations and ascertaining possible sources of virus infection. It is also important for informing appropriate strain selection for use in subtype-specific serological assays relevant to the UK.

There were nine diagnoses of swine influenza in Q1-2018 and, for the first time since the November 2009 when pH1N1/09 was first detected in pigs in GB, no pH1N109 was detected in this quarter: this will be monitored in the coming months. Of the swine influenza A virus strains which were typed, H1N2 was predominant and it is worth noting that almost all H1N2 strains now identified in GB pigs are the reassortant H1N2 swine influenza A virus strain which has a core (internal) gene cassette from pH1N1/09 virus and outer components from swine H1N2 virus. This reassortant strain was first detected in 2010 through the Defra-funded surveillance (Howard and others, 2011) and the fact that it now dominates the H1N2 strains detected suggests that the reassortant virus has features which confer viral “fitness” in pigs. Development
of subtyping PCRs (for H1N1, H1N2 and H3N2) continues alongside further investigation of recent partially typed strains (whole genome sequencing).

**Swine dysentery outbreaks continue into 2018**
There have been four further diagnoses of swine dysentery in Q1 of 2018, all in South or North Yorkshire. With the submitting veterinary practitioner’s permission, SAC CVS provided the *Brachyspira hyodysenteriae* isolates to APHA for tiamulin minimum inhibitory concentration (MIC) testing at no charge. None of the isolates tested to date from 2017 and 2018 have had an MIC above the clinical break point, and the tested isolates were thus considered sensitive to tiamulin. Whole genome sequencing is also in progress to help look for, and rule out, possible epidemiological links and assess genes which may be linked with antimicrobial susceptibility. The sensitivity of two 2018 *B. pilosicoli* isolates were also tested and both were sensitive to tiamulin. The development of resistance of *B. hyodysenteriae* to antimicrobials commonly used in the control of swine dysentery is a recognized risk, particularly in situations where medication is used long-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.

AHDB Pork have been promoting awareness of the [Significant Diseases Charter](https://pork.ahdb.org.uk/health-welfare/health/swine-dysentery/) amongst producers and encouraging them to sign up and declare diseases such as swine dysentery, should they be diagnosed. The Charter is an extension of the earlier Swine Dysentery Producers Charter which came into being in 2009 in response to the significant spread of swine dysentery and increased diagnostic rate at that time. The initiative provided on-line advice about swine dysentery which is available on this link: [https://pork.ahdb.org.uk/health-welfare/health/swine-dysentery/](https://pork.ahdb.org.uk/health-welfare/health/swine-dysentery/)

**Respiratory disease and mortality incidents due to *Actinobacillus pleuropneumoniae***
Eight outbreaks of pneumonia and pleurisy caused by *Actinobacillus pleuropneumoniae* were diagnosed in different regions of England in the first quarter of 2018 compared to 14 during the whole of 2017, resulting in a small rise in the diagnostic rate for disease due to *A. pleuropneumoniae* in pig submissions to the GB surveillance network (Figure 8). All incidents, as expected, were in post-weaned pigs and, in most, *A. pleuropneumoniae* was the primary pathogen causing typical lung lesions without evidence of concurrent viral involvement. The most common main clinical sign reported was pigs being found dead. Disease due to *A. pleuropneumoniae* can occur at any age but is more usually diagnosed in finishers from 10- to 12-weeks-old. Although the number of incidents was not large (eight) there were more cases in younger pigs in Q1 2018 compared to incidents in the same quarter in 2013 and 2016 (Figure 9) when the rate of diagnosis was similar to Q1-2018. One incident was confirmed in five-week-old pigs.

Figure 8: Seasonality of GB *A. pleuropneumoniae* incidents as a % of diagnosable submissions

![Seasonality of GB A. pleuropneumoniae incidents as a % of diagnosable submissions](image)

Mixing pigs from sources of different *A. pleuropneumoniae* status is a known risk factor for disease as well as temperature fluctuations, high humidity, ventilation issues, moving and mixing groups, and other environmental or managemental stresses. As part of disease surveillance, prompted by the *A. pleuropneumoniae* diagnoses in the first quarter of 2018, the isolates archived at APHA from 2016 to date are being serotyped and tested in the toxin gene profile PCR. No unusual antimicrobial sensitivity patterns were noted in recent isolates.
Figure 10: Age of pigs affected in GB incidents of disease due to *A. pleuropneumoniae*

---

**HORIZON SCANNING**

**Novel bat-derived enteric virus in pigs in China**

A letter in *Nature* describes a novel enteric coronavirus, distinct from PED and TGE, causing diarrhoea and high mortality in neonatal piglets in China in 2017 (Zhou and others, 2018). Evidence indicates the virus recently moved from horseshoe bats into pigs and the index case herd is in a region fairly close to where severe acute respiratory syndrome (SARS) emerged in humans from bats via an intermediate host. This novel coronavirus is being called swine acute diarrhoea syndrome coronavirus “SADS CoV” and experimental infections of three-day-old piglets with either infected intestinal homogenate or cultured virus caused diarrhoea and 50% mortality. The letter reports its occurrence in four herds in one province (Guangdong). No human infection was described. This exemplifies the greater opportunity in certain parts of the world for wildlife-derived viruses to be transmitted to livestock, and with certain viruses, to humans with bats being recognised as a significant reservoir of diverse and evolving viruses. Although there is minimal specific information available about this virus, risk pathways for introduction from China would be likely to be similar to those identified for PED; there is no trade of live pigs or germplasm from China. The clinical signs described for SADS-CoV resemble virulent PED and should therefore prompt a report of suspect PED in England or Scotland where PED is notifiable. Follow-up virological investigation has been agreed for reported suspect PED cases which test negative and where clinical and epidemiological features remain of concern regarding infectious disease. APHA Virology staff are attending the International Pig Veterinary Society meeting in China in June 2018 where more information may be obtained. Awareness of this virus and associated disease is being raised by communications to veterinarians and the pig industry, alongside those on the item below and a reminder to report suspect PED.

**Feed ingredients and/or packaging as risk pathways for introduction of novel exotic and notifiable disease viruses to the UK**

A publication from the US on survival of pathogens in shipped animal feed ingredients contains findings relevant to risk pathways for introduction to UK from Asia and elsewhere of a variety of viral pathogens affecting livestock (Dee and others, 2018). The work was undertaken in part in response to the report on the possible origin of PED in the US (USDA, 2015). That report comprehensively reviewed the potential risk pathways for PED introduction into the US which are relevant to other enteric coronaviruses and to the UK and included introduction through contamination of animal feed ingredients, feed supplements, their packaging, pet treats, or people. Contamination of reused feed ingredient bags (tote bags), transported out of China was identified as the most likely route by which PED could have been introduced to the US. Research described in the new publication demonstrated survival of several notifiable disease
viruses or their proxys (e.g. PEDV, ASFV, Senecavirus A as proxy for FMDV) and non-notifiable viruses (e.g. PRRSV, PCV2) in conditions simulating their transport from China to USA. The emergence of SADS-CoV in China described above also underlines the risk of novel, and as yet undiscovered, viruses being introduced by this means. Paul Sundberg, the head of the US swine health information centre (SHIC) spoke at the Pig Vet Society spring conference in April 2018 and detailed the work on viral pathogen survival which was funded by SHIC. The preliminary outbreak assessment for PED which dates from 2013 and the emergence of virulent PED in the US will be reviewed in the light of new information.

Collation of the types, origins and quantities of imported animal feed-stuffs/feed ingredients will help inform the risks and the sources of available information to assist this are being reviewed, including imported ingredients which do not contain animal by products e.g. soybeans, minerals, vitamins. Awareness of this research is being raised by communications to veterinarians, the pig industry and feed companies including highlighting again the need to avoid reusing tote bags for transport of feed. Recent communications in relation to ASF reminded pig keepers to take strict biosecurity measures especially when returning from travelling overseas and for visitors from overseas, and to source pig feed and feed ingredients responsibly.

**Brachyspira suanatina detection in pigs in Germany**

*Brachyspira suanatina* has previously only been described in pigs in Scandinavia in 2007. A publication from Germany (Rohde and others, 2018) with an accompanying editorial (Hampson, 2018) reports the first description of *B. suanatina* infection in pigs outside Scandinavia and confirms the ability of this *Brachyspira* species to cause severe swine dysentery. The paper also describes several other detections of *B. suanatina* in Germany in healthy breeding sows and in fattening pigs with diarrhoea. Pathogenic *Brachyspira* species are spread by the faeco-oral route. It is likely that the same risk pathways exist for introduction of *B. suanatina* into the UK, and into pig herds, possibly by importation of clinically mildly or asymptomatically infected pigs. *B. suanatina* may also be introduced into new areas and pig herds by migratory waterfowl. Direct or indirect contact between waterfowl and pigs, particularly in outdoor production systems, would be a risk factor for introduction although it is not known how commonly *B. suanatina* is found in waterfowl. Routine *Brachyspira* culture methods in use at APHA and SAC CVS would detect *B. suanatina* from samples, if it was viable, however it may be mistaken for *B. hyodysenteriae* using routine biochemical tests. Therefore, cultures identified as *B. hyodysenteriae* from pigs will be analysed by whole genome sequencing on a regular basis; those available from 2017 swine dysentery cases have been shown to be *B. hyodysenteriae*. SAC CVS have indicated that *B. suanatina* would also be detected and differentiated in the *Brachyspira* diagnostic PCR. Breeding companies and any others importing pigs need to be aware that there are several *Brachyspira* species identified which can cause dysentery in pigs and that there needs to be a clear understanding of the health status of the supplying herds and the evidence supporting the status, which may include testing, as for other pathogens. The National Pig Association voluntary import protocol has practical advice on biosecurity including quarantine when importing pigs to the UK, and is relevant here. This protocol is available on this link: [http://www.npa-uk.org.uk/hres/NPA%20Imports%20Protocol%20(Revised%20October%202016).pdf](http://www.npa-uk.org.uk/hres/NPA%20Imports%20Protocol%20(Revised%20October%202016).pdf)

**Porcine circovirus 3 infection**

The last two quarterly GB pig disease surveillance reports described publications about a novel porcine circovirus, porcine circovirus type 3 (PCV3) in samples from both healthy pigs and pigs with a variety of disease presentations from several countries including the US, China, Italy, Poland and the UK. Evidence suggests that PCV3 is widespread in pigs globally but until there has been more systematic evaluation of the virus in diseased and healthy pigs, and experimental infections, there is still uncertainty regarding how significant a role PCV3 plays in porcine disease. Two recent publications on PCV3 indicate that this virus, although newly discovered in pigs, has been in the pig population for a number of years. A retrospective study of sera submitted for diagnostic reasons confirm PCV-3 circulation at least since 1996 in the Spanish pig population with a low/moderate frequency and PCV-3 did not appear to be linked to any specific pathological condition or age group (Klaumann and others, 2018). Work by Saraiva and others (2018) suggests that its evolution is not a recent event and that PCV3 has likely been circulating in pig-producing countries for some time before its first detection. No experimental infections with PCV3 have yet been
reported and no zoonotic concern is reported. Archived sample sets in GB pigs which are available for possible PCV3 testing, funding allowing, are being identified.

REFERENCES

AASV (2018) New PEDV case reports by week


http://veterinaryrecord.bmj.com/content/vetrec/182/9/247.full.pdf

http://veterinaryrecord.bmj.com/content/vetrec/182/14/396.full.pdf


Kim, Yonghyan, Venkatramana D. Krishna, Montserrat Torremorell, Sagar M. Goyal and


