## 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>5</td>
</tr>
<tr>
<td>Ongoing new &amp; re-emerging disease investigations</td>
<td>5</td>
</tr>
<tr>
<td>Unusual diagnoses or presentations</td>
<td>7</td>
</tr>
<tr>
<td>Changes in disease patterns and risk factors</td>
<td>8</td>
</tr>
<tr>
<td>Horizon Scanning</td>
<td>14</td>
</tr>
<tr>
<td>References</td>
<td>15</td>
</tr>
</tbody>
</table>

## Highlights

- Porcine epidemic diarrhoea general update                   | 5    |
- Coal tar toxicity due to access to a tarmac residue          | 7    |
- Increase in swine influenza diagnoses in England            | 10   |
- *Haemophilus parasuis* detected with betalactam resistance  | 12   |

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 (four sites), Wales Veterinary Science Centre, Aberystwyth) from the first quarter of 2016 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

Diagnostic pig submission trends

Total diagnostic submissions from pigs in January to March 2016 were reduced compared to the same period in the previous two and five years, the reduction particularly affecting carcase submissions as indicated in Table 1, although Table 2 shows that the overall submissions in this quarter are not very different from those in 2013. Carcase submissions represented 31% of total diagnostic pig submissions during this quarter which is slightly lower than the same quarter in 2015 (35%) and not dissimilar to the previous quarter (28% in Q4, 2015). Diagnostic submissions are usually higher in the first and last quarters of the year as the colder months are often associated with greater disease challenge, particularly respiratory disease. Following the relatively mild end of 2015, temperatures did fall in Q1, 2016 and submissions of both carcase and non-carcase submissions were higher this quarter than in the last. Several other 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 some of these being hard to quantify. The current low price for slaughter pigs is proving challenging for the pig sector and variable costs, of which diagnostic testing is one, are under scrutiny. However, promotion of initiatives within the pig industry involving pig producers working with their veterinary practitioners to improve pig health and reduce antimicrobial use may mean increased uptake of diagnostic testing. There have also been the recent launches of the electronic medicine book for pigs (eMB-Pigs), developed by AHDB Pork with the Veterinary Medicines Directorate for UK pig producers to accurately record on-farm antibiotic usage data, and the Pig Industry Antibiotic Stewardship Programme by the National Pig Association.

<table>
<thead>
<tr>
<th></th>
<th>Carcase</th>
<th>Foetus/Stillborn</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>79</td>
<td>74 %</td>
<td>74 %</td>
<td>7</td>
</tr>
<tr>
<td>Wales</td>
<td>1</td>
<td>200 %</td>
<td>42 %</td>
<td>3</td>
</tr>
<tr>
<td>Scotland</td>
<td>10</td>
<td>71 %</td>
<td>45 %</td>
<td>1</td>
</tr>
<tr>
<td>Unknown/Non-GB</td>
<td>1</td>
<td>40 %</td>
<td>83 %</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
<td>73 %</td>
<td>69 %</td>
<td>8</td>
</tr>
</tbody>
</table>

Other = non-carcase/non-foetus submissions. Unknown = region not given by submitter.
The data in the above table provides total submissions, then submissions by country and sample type for Q1, 2016 with a comparison with the same period in the previous two (Q1 2016 v prior 2) or previous five (Q1 2016 v prior 5) years’ submissions.

Table 2: Pig Diagnostic Submissions, January to March 2012-2016 and October to December 2015

<table>
<thead>
<tr>
<th></th>
<th>Non Carcase Submissions</th>
<th>Carcase Submissions</th>
<th>APHA total</th>
<th>SACCVS total</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>APHA</td>
<td>SACCVS</td>
<td>Total</td>
<td>APHA</td>
<td>SACCVS</td>
</tr>
<tr>
<td>Jan-Mar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>160</td>
<td>44</td>
<td>204</td>
<td>81</td>
<td>10</td>
</tr>
<tr>
<td>2015</td>
<td>144</td>
<td>85</td>
<td>229</td>
<td>106</td>
<td>15</td>
</tr>
<tr>
<td>2014</td>
<td>161</td>
<td>70</td>
<td>231</td>
<td>114</td>
<td>15</td>
</tr>
<tr>
<td>2013</td>
<td>140</td>
<td>70</td>
<td>210</td>
<td>92</td>
<td>13</td>
</tr>
<tr>
<td>2012</td>
<td>190</td>
<td>110</td>
<td>300</td>
<td>131</td>
<td>34</td>
</tr>
<tr>
<td>Oct-Dec</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>121</td>
<td>58</td>
<td>179</td>
<td>59</td>
<td>10</td>
</tr>
</tbody>
</table>

Diagnostic pig submissions by disease syndrome

Each diagnostic submission is allocated a disease syndrome based on clinical history and diagnostic findings. Figure 1 shows the syndromes represented in this quarter’s GB diagnostic submissions compared to the same quarter in prior years. There are no major changes compared to prior years with systemic and miscellaneous, respiratory and enteric syndromes being the three main disease syndromes as expected. The proportion of submissions recorded as unknown is lower which suggests better provision of surveillance data by submitting practitioners. A reminder of the importance of accurate surveillance data was sent with the VIC newsletters to submitting veterinary surgeons and also requested that clinical signs, where present, be provided with diagnostic submissions accurately identifying them as diagnostic and enabling the syndrome to be identified, thus ensuring capture of data from all suitable submissions to both APHA and SAC CVS. Respiratory syndrome makes up a greater proportion than in previous years and may have been influenced by the reportedly high incidence of respiratory disease in the field, with the swine influenza diagnostic trend being high this quarter as described later in this report. Maintaining throughput of enteric submissions is important with respect to continued surveillance testing for porcine epidemic diarrhoea and it is reassuring to see that the proportion of enteric syndrome submissions is similar to this quarter in previous years.

Figure 1: Throughput of GB pig diagnostic submissions as % by syndrome for Q1 2012-2016
The well-attended Pig Veterinary Society Spring meeting in April 2016 was themed “Back to Basics” and provided CPD on the investigation and control of common disease presentations in pigs. An APHA presentation on the diagnosis of enteric disease outbreaks provided the opportunity to emphasise the value of full diagnostic investigations and surveillance, highlight particular threats and signpost practitioners to the diagnostic support on the APHA vet gateway http://ahvla.defra.gov.uk/vet-gateway/surveillance/diagnostic-support.htm.

Contributors of diagnostic submission data include APHA Veterinary Investigation Centres, SAC CVS Disease Surveillance Centres and partner non-APHA post-mortem providers and a map of the surveillance network provided is shown in Figure 2. Thirteen of the 79 pig carcase submissions in England this quarter were dealt with by the external post-mortem providers.

Figure 2: GB surveillance network: map showing provision of services in England, Wales and Scotland
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 2011-2015 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.

Analysis of Diagnosis Not Reached (DNR) by syndrome and presenting sign

- A total of 14% of GB pig submissions in January to March 2016 did not reach a diagnosis following reasonable testing. This was not significantly changed compared to the overall DNR for prior years of 17.7%. The overall DNR rate of 21.9% for this quarter for SACCVS was increased but not significantly compared to 14.8% for prior years. The overall DNR rate for APHA (11.9%) was lower but not significantly compared to 18.6% for prior years.

- There was a significant increase in DNR for enteric syndrome SACCVS submissions in this quarter of 2016 compared to prior years. The DNR enteric submissions for both SACCVS (of which there were four) and APHA in this quarter were reviewed. They were from widely differing ages with different clinical and epidemiological presentations; six of the nine were submissions of faeces, on which diagnostic testing is more limited. They did not provide evidence of a new and emerging syndrome but DNR submissions in this syndrome will be kept under review in subsequent quarters.

- No individual presenting sign showed significant increases in DNR in this quarter for GB, APHA or SACCVS data compared to prior years and there was a significant reduction in DNR for APHA submissions with a presenting sign of found dead compared to prior years. No other individual syndrome (other than enteric syndrome as described above) had an elevated DNR in this quarter for GB, APHA or SACCVS compared to prior years.

Analysis of undiagnosed submissions in the first quarter of 2016 has not revealed evidence of a new and emerging syndrome in GB pigs.

ONGOING NEW AND RE-EMERGING DISEASE INVESTIGATIONS

Porcine epidemic diarrhoea update

Following porcine epidemic diarrhoea (PED) being made a notifiable disease in England, Scottish Government working with the Scottish pig industry also made PED notifiable in Scotland in March 2016 with a similar approach being taken; suspect or confirmed disease must be reported and control of disease will be industry-led. The new law makes it mandatory for any suspected case of PED in Scotland
to be notified to the relevant authority. In practice notification is to Quality Meat Scotland through the new Scottish Pig Disease Control Centre (SPDCC). As in England, the new legislation will not impose any mandatory restrictions, culling etc on suspicion or confirmation of disease. On receipt of notification, the SPDCC will provide advice to the affected keeper(s) on how to contain and manage the disease. Samples from suspect cases in Scotland may be collected and sent to SACCVS for testing to confirm whether PED is present. In England and Wales, testing is provided by APHA. More information is given on this link: https://www.gov.uk/guidance/porcine-epidemic-diarrhoea-how-to-spot-and-report-the-disease. There have been no suspect PED cases since it was made notifiable in either country. As testing of non-suspect cases is permitted as part of enhanced surveillance for PED, routine diagnostic submissions to APHA from pigs with diarrhoea in England and Wales are tested under AHDB Pork funding. Between June 2013 to March 2016, 383 APHA diagnostic submissions from outbreaks of diarrhoea have tested PED PCR-negative. A PED “lessons learnt” exercise was held by Defra involving all parties involved from the time that PED emergence in the US was noted in 2013 to making PED notifiable in England in December 2015. Making PED notifiable represented a novel partnership approach to disease prevention and control between Government and industry. The exercise allowed participants to contribute on which aspects of the process worked well and which could be improved, to provide a template for the process involved which could be used for future diseases of pigs or other livestock.

The EFSA PED update report was published (EFSA, 2016) and provided information on PED cases from seven countries and on PED monitoring activities in thirteen countries in the EU. The virulent (non-OH851) PEDV strain has only been reported in the Ukraine in Europe to date (Dastjerdi and others, 2015). The US and Canada both report a decline in PED compared to the same period over the winter of 2014-15 while several EU countries report ongoing outbreaks due to the less virulent OH851-like PEDV strains. Two publications report the detection of previously undescribed recombinant TGEV-PEDV virus strains circulating in samples from 2009 in Italy (Boniotti and others, 2016) and in 2012 in Germany with clinical disease reported to be similar to cases of PED in both countries (Akimkin and others, 2016). The recombinant probably originated in a country in which both PEDV and TGEV are endemic (of which Italy is one) and reflects the potential for natural recombination among coronaviruses. As the presence of this recombinant in other parts of Europe is not known and has not been previously described, it is difficult to determine its parental strains and geographic spread at this stage. It is worth noting that Italy is one of the few European countries which reported PED outbreaks in the years between the 1990s and the emergence of virulent PEDV in Asia from 2010 and North America from 2013. PEDV has not been detected in UK pigs since 2002 and TGE has not been detected in UK pigs since 1999. If a recombinant TGEV-PEDV strain was introduced and caused disease in UK pigs and was reported as suspect PEDV, the PEDV PCR test would detect this recombinant strain. The main reason that PEDV was made notifiable in England and Scotland was for prompt detection and control of virulent PEDV strains and this is not undermined by this finding. These findings reinforce the importance of the measures in place to prevent entry of PEDV, which will also reduce the risk of entry of other swine enteric coronaviruses.

**Klebsiella pneumoniae septicaemia in pigs: Seasonal alert**

Veterinarians were reminded in APHA VIC newsletters and through the Pig Veterinary Society and Veterinary Record (APHA, 2016) of the seasonal occurrence of outbreaks of septicaemia in pigs due to infection with *Klebsiella pneumoniae* subspecies *pneumoniae* (*Kpp*). Such *Kpp* outbreaks due to a particular sequence type 25 strain have been diagnosed between May and September each year from 2011 to 2015 and 16 commercial pig farms have been affected in England, some in more than one year. They have mostly been in East Anglia, with one outbreak during 2014 in the Starcross (South-West England) region, and one in 2015 in the Thirsk (Northeast England) region. The most consistent clinical features are acute losses (often with pigs just found dead) of pre-weaned pigs on outdoor units from ten-days-old to weaning in multiple litters. Grossly, lesions typical of septicaemia are seen, from which *Kpp* can be isolated in pure growths. The clinical signs of sudden death are non-specific and further investigation, including post-mortem examination and culture, is essential to confirm a diagnosis of *Kpp* septicaemia. Updated disease information is now available on this link: http://ahvla.defra.gov.uk/documents/surveillance/diseases/klebsiella-vets.pdf.
UNUSUAL DIAGNOSES OR PRESENTATIONS

There were a number of unusual diagnoses or presentations this quarter; details of these have been included in monthly APHA or SACCVS reports; [http://www.defra.gov.uk/APHA-en/publication/pig-survreports-monthly/](http://www.defra.gov.uk/APHA-en/publication/pig-survreports-monthly/). These will be kept under review to assess whether they justify initiation of emerging disease investigations.

**Coal tar toxicity due to access to a tarmac residue**

A severe incident of coal tar toxicity was diagnosed in a large batch of six-week-old nursery pigs when three were submitted to investigate lethargy, weakness, ataxia, wasting and deaths despite antimicrobial treatment. Deaths escalated to cause around 14 per cent mortality. Anaemia and ascites with severe diffuse hepatopathy were consistent post-mortem findings (Figures 3 and 4). The livers were friable and markedly mottled throughout. Histopathology revealed severe hepatic necrosis consistent with coal tar toxicity. This was reported and investigated as a potential food safety incident and the APHA Veterinary Investigation Officer visit to the farm revealed that the site had been used to rear pigs for several years, but the problem arose following recent removal of the old tarmac surface. This had left a residue which the next batch of pigs placed in strawed pens rooted down to and consumed.

The exposed pigs that were fit to travel were removed from the premises to prevent further access and those not fit to travel were humanely euthanased on site. A voluntary agreement to restrict all exposed pigs for a period of four weeks following cessation of exposure was agreed to protect the food chain. Future access to coal tar was prevented by complete removal of all tarmac residue verified by inspection of the surface before allowing pigs to occupy the site again. Coal tar is a well-recognised toxic agent in which phenols are the most toxic principle. Pigs seem particularly susceptible to coal tar poisoning, probably due to their inquisitive rooting behaviour and omnivorous nature. Other sources of coal tar include tar roofing material and some makes of clay pigeon in which pitch is used as a binder. The case highlights the need to raise awareness of the risk of coal tar toxicity among pig keepers and practitioners, and the importance of investigating promptly where there is poor response to treatment and increasing mortality. The case was included in the APHA Veterinary Record April Surveillance report and an information sheet for pig keepers and veterinarians is planned.
Haemorrhagic bowel syndrome on two unrelated units on home-mix diets
A haemorrhagic bowel disorder occurred on two indoor finisher units, both using home-mix diets. One was an indoor finisher unit on which seven pigs died over a four-day period from a group of 400 five-month-old pigs. On-farm post-mortem examination of two had revealed haemorrhagic enteropathy with no visible torsion. Three further deaths were submitted for investigation and all showed a common theme with slight variation; all had food in their stomachs and dark red bloody contents throughout the entire small intestine. One of the pigs had a mesenteric torsion accounting for this appearance, but the other two did not. The intestines were too autolysed for meaningful histopathology and, although Lawsonia intracellularis was detected by PCR in the intestine of one pig, haemorrhagic enteropathy due to this organism could not be histologically confirmed. Haemorrhagic bowel syndrome is described in the literature with lesions similar to those seen with torsion in the abdomen and intestine but without torsion being present and distinct from Lawsonia-associated haemorrhagic enteropathy. It is often, but not always, associated with whey feeding. On both farms there was no whey feeding but the feed was home-mixed. On the farm described here, the cereal ingredient had changed in the batch of feed provided just prior to the problem appearing. A paper by Thomson and others (2007) in the Pig Journal 59:152 describes the pathogenesis with fermentation in the intestines leading to raised intra-abdominal pressure and then multi-organ dysfunction. As a main identified risk factor is rapid fermentation in the intestines, the dietary constituents, feeding method and pattern, and any changes merit reviewing when incidents occur. These cases were described in a presentation “Diagnosis of enteric disease outbreaks” by APHA at the April Pig Veterinary Society Spring Conference 2016.

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.

Disease due to Streptococcus suis remains prevalent in postweaned pigs
Meningitis, septicaemia and polyarthritis due to Streptococcus suis is one of the most common systemic diagnoses in submissions from postweaned pigs. Since the start of 2016, S. suis type 2 has remained the most prevalent of the serotypes identified, with types 1, 7 and 14 also featuring as causes of primary disease and, with others, also concurrent with other infections. The number of S. suis serotypes identified by quarter are given in Table 3 and Figure 5 shows an image of a joint affected with fibrinosuppurative arthritis due to S. suis type 14 from an outbreak of nervous signs and lameness in pigs occurring two to four weeks after weaning.

Figure 5: Arthritis in a pig due to S. suis type 14

![Image of a joint affected with fibrinosuppurative arthritis due to S. suis type 14](https://example.com/image.png)
Table 3: number of *Streptococcus suis* serotypes by quarter in APHA diagnostic submissions

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>14</th>
<th>Non-typeable</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 2015</td>
<td>1</td>
<td>15</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2 2015</td>
<td>3</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3 2015</td>
<td>3</td>
<td>8</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4 2015</td>
<td>2</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1 2016</td>
<td>1</td>
<td>13</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In one case, pigs were submitted from an all-in, all-out nursery unit of over 2,500 pigs from a single source. Following implementation of an autogenous vaccine for Glässer’s disease, the in-feed antibiotic treatment usually given in the early post-weaning period was not given and 40 animals developed neurological and respiratory signs between five and six-weeks-old, about 12 of which died. The pigs were showing meningitis-like signs with recumbency and paddling. At post-mortem examination, arthritis, pneumonia and meningitis were present and *S. suis* type 7 was isolated from multiple tissues. A contingency plan had been made prior to removal of the in-feed antibiotic and in-water medication was promptly implemented to which the pigs responded well. The *S. suis* isolate is being included in the autogenous vaccine for future batches.

In the first quarter of 2016, disease involving *S. suis* was diagnosed in 25 submissions, yielding 27 *S. suis* isolates as in two submissions, two serotypes were detected. All the cases were in postweaned pigs, with 75% of submissions for which ages were given involving pigs between four and 12 weeks old. The two clinical signs most frequently reported in these were pigs found dead and nervous signs; with wasting, lameness, respiratory signs, diarrhoea and recumbency also noted in descending order of frequency. Seventeen submissions were of pigs and eight were postal samples. Carcase submissions allow full diagnostic investigation and in ten of these, concurrent diagnoses were made, of particular note were porcine reproductive and respiratory syndrome (PRRS) in three cases and swine influenza in three. Viral infections can predispose to disease due to *S. suis* and viral involvement should be considered in *S. suis* outbreaks, particularly where there is more severe or unresponsive disease. Advice on testing is provided on the APHA Vet Gateway: [http://ahvla.defra.gov.uk/documents/surveillance/sub-handbook.pdf](http://ahvla.defra.gov.uk/documents/surveillance/sub-handbook.pdf)

**Leptospirosis causing abortions with mummified fetuses**

An outbreak of abortions and increased returns to service on an indoor breeding unit was diagnosed as leptospirosis when foetal kidneys tested positive for pathogenic *Leptospira* DNA by PCR from a mummified litter (Figure 6). Mainly older sows were affected and those aborting did not show other clinical signs. Serology by microscopic agglutination test against the panel of pathogenic *Leptospira* serovars was strongly recommended to identify the specific serovar involved. The scale of disease on this unit did not suggest the involvement of an exotic *Leptospira* serovar such as Pomona. Leptospirosis due to various serovars in pigs can cause late abortion, stillbirth, birth of piglets with low viability and/or...
infertility. In recent years, *L. Icterohaemorrhagiae*, *L. Bratislava* and small mammal (vole, shrew)-adapted leptospires have been involved in cases diagnosed at APHA and these have tended to occur in autumn to winter months, possibly due to increased contact with rodents as they enter pig housing as food sources elsewhere become more scarce. Porcine parvovirus and porcine circovirus 2-associated reproductive disease are differentials to consider in cases of stillbirths and mummifications.

![Figure 6: Leptospirosis – mummified pig foetuses of varying sizes](image)

Leptospirosis is not a commonly confirmed diagnosis in pigs and determining the serovar helps to identify potential reservoirs of infection, target control measures and determine, if disease persists, whether vaccines would be appropriate for control. There are inactivated vaccines but none is currently licensed in the UK and so must be imported into Great Britain under a farm-specific special import certificate from the Veterinary Medicines Directorate. Control measures include improved hygiene, rodent control, strategic antimicrobial treatment, changes in management and, sometimes, depending on the serovar involved and the scale of disease, vaccination. Leptospires are zoonotic and advice to reduce the risk of human infection is similar to that for other zoonotic agents present on pig farms. This case and the zoonotic risk was highlighted in the APHA Veterinary Record March Surveillance report.

### Increase in swine influenza diagnoses in England

In the first quarter of 2016, the trend in the submission diagnostic rate for swine influenza increased significantly to the highest recorded in the last 12 years at 8.6% as illustrated in Figure 7. These diagnostic data are supported by anecdotal reports from pig practitioners of increased outbreaks in the field over the first quarter of 2016. This may well reflect the arrival of the cooler weather and better survival and transmission of the virus, as well as colder wetter weather making effective cleaning and disinfection harder to achieve.

![Figure 7: Seasonality of GB swine influenza diagnoses 2004-2016](image)
The Defra-funded swine influenza surveillance project which funds the diagnostic testing for swine influenza monitors the virus strains infecting pigs in Great Britain. This surveillance is based on virological detection in nasal swabs or respiratory tissues using influenza m gene and pandemic H1N1 2009 PCRs followed by virus isolation and strain typing. Further subtyping PCRs are undergoing field validation and are likely to be in use soon. More details about the swine influenza surveillance are available on this link: http://ahvla.defra.gov.uk/documents/surveillance/diseases/swine-influenza.pdf

The swine influenza diagnoses were all on pig farms in England; with most in North Yorkshire and Lincolnshire. Two diagnoses were made in preweaned pigs aged two and three weeks old with the remainder in postweaned pigs with ages ranging from four to 19 weeks, but most being between four and ten weeks old. Four diagnoses were made from submissions of nasal swabs, seven from pig carcases and one from viscera from on-farm post-mortem examination. There were concurrent diagnoses made in all of the submissions of carcases and viscera, which allow more comprehensive testing. These concurrent diagnoses involved Pasteurella multocida (three), Haemophilus parasuis (three), Streptococcus suis (two), enteric E. coli (two) and PRRS, salmonellosis, and gastric ulceration in one submission each; where mortality is associated with swine influenza it is usually as a consequence of these concurrent diseases.

The two main swine influenza strains currently identified in GB pigs through the Defra-funded surveillance are pandemic H1N1 2009 (pH1N109) and H1N2 in approximately equal numbers. The avian-like H1N1 strain is only occasionally detected having been largely displaced by pH1N109 and the H3N2 strain has not been detected since 1997. A recent publication on the global antigenic diversity of swine influenza A viruses (Lewis and others, 2016) reveals the wide diversity of influenza viruses in pigs across multiple continents and emphasises the importance of maintaining the current GB surveillance in pigs.

Typical seasonal rise in Porcine Reproductive and Respiratory Syndrome
The diagnostic rate of PRRS showed the usual seasonal rise in the first quarter of 2016 (Figure 8) which is likely to be for similar reasons to those described for swine influenza above.

Figure 8: Seasonality of GB PRRS diagnoses 2004-2016 (Q2 data not complete)

Sequences of ORF5 were obtained from 29 PRRS viruses detected in GB diagnostic submissions in 2015-16 and these are illustrated in the phylogenetic tree in Figure 9. All strains are genotype 1 with no genotype 2 ever having been detected in GB pigs. The change in diversity follows the expected trend with ever increasing branch lengths being seen as the existing viruses continue to evolve in pigs. No entirely new branches have appeared, suggesting no new incursions of “foreign” virus strains. Some branches seen previously are not represented in 2015-16; this could be because they have been missed as there were no submissions from farms with one of those viruses, or alternatively, it is possible that these viruses are not circulating any more. Further sequencing over time will clarify which is the case. There were Porcilis vaccine-like viruses detected in 2015-16, but no Unistrain or Boehringer-like viruses. This is likely to reflect the greater time that the Porcilis vaccine has been in use in pigs as all three are live vaccines and over time are likely to spread beyond the vaccinated population. Sequences of viruses from different regions of the country (where known) have been identified. Interestingly, the 2015-16 Bury
St Edmunds and Thirsk strains do not overlap except when they are vaccine-like. This would suggest that the regions tend to have discrete virus populations, although overlapping strains may be found as the regional origins of the strains currently in grey (origin not known) are provided. Given the interconnectivity of the pig industry, one would expect some overlap and in previous years that has been observed. Both areas have viruses that fall within several distinct clusters, indicating that there is a diversity of viruses circulating in each area. **The sequences will be reported to the submitting practitioners and farms and will contribute to epidemiological investigations and control initiatives.**

Figure 9: Phylogenetic tree illustrating the 2015-16 PRRS from GB diagnostic submissions

---

**Haemophilus parasuis with beta-lactam resistance isolated from clinical cases**

Beta-lactamase (ampicillin) resistance is unusual in *Haemophilus parasuis* (Hps) from GB pigs and two resistant isolates have been identified in the first quarter of 2016 from 14 archived at APHA. Sensitivity testing of Hps isolates from 25 submissions to APHA and SACCVS identified three resistant GB isolates in 2015 (one Scotland, two England). One resistant isolate from a Scottish unit was detected in 2014 and none were detected in 2013. Testing has confirmed resistance to both penicillin and ampicillin,
beta-lactamase production, and an MIC of >32mg/l penicillin in the first resistant isolate identified in 2016. The pigs on both farms from which the 2016 resistant isolates were obtained had been treated with amoxicillin, the isolates were from lesions consistent with disease due to Hps. This type of resistance is important as penicillins are commonly used for treatment of Hps infections and, as a member of the same family as Pasteurella and Actinobacillus species, resistance could be transferable. Beta-lactam resistance has been reported globally in Hps although the proportion of resistant isolates varies by country; for example, 9.1% of Chinese isolates were reported to be ampicillin resistant (Zhou and others, 2010) as were 43.3% of Spanish isolates (Martin de la Fuente and others, 2007). One of the beta-lactamase isolates was still susceptible to tetracycline and trimethoprim-sulphonamide which are common alternatives to penicillin treatment but one was also resistant to both of these. The identities of the isolates are also being checked, both are Haemophilus parasuis by conventional phenotypic identification methods but 16S sequencing did not give a good match for one. There were peaks in the diagnostic rate of disease due to Hps in 2013 and 2015 since when the diagnostic rate in the first quarter of 2016 has fallen lower than the same period in 2015. The diagnostic trend and that of the resistance will be monitored in future submissions and isolates and this finding will be included in a future APHA Veterinary Record Surveillance report and will be published.

Porcine circovirus 2 genotyping reveals more PCV2d strains
Porcine circovirus 2-associated disease (PCVAD) incidents are relatively infrequent as illustrated in Figure 10 with widespread vaccination in place in the commercial GB pig herd. Only one diagnosis of PCVAD was made in the first quarter of 2016, in this case involving reproductive disease. The global emergence of a novel PCV2 variant known as PCV2d (formerly known as PCV2b variant) has been reported in recent years and one such variant from a 2013 submission was detected in 36 cases genotyped between 2011 and August 2014, the others were all typical PCV2b. A further eight cases were genotyped between September 2014 and January 2016 to determine if there was any change and three were found to be PCV2d, two of which were from the same premises. The two premises with the PCV2d were in Suffolk and North Yorkshire. On the Suffolk farm, an enteric presentation of PCVAD was diagnosed with concurrent spirochaetal colitis due to Brachyspira pilosicoli. The schedule involved PCV2 vaccination of pigs two weeks after weaning. Whether it was this delay of vaccination into the post-weaning period, poor compliance with the vaccination schedule, or other factors which resulted in PCVAD occurring in vaccinated pigs, is not clear and the clinical problem did not subsequently continue. There is no unequivocal evidence available to suggest that the PCV2d genotype has greater virulence or escapes vaccinal immunity more than typical PCV2b but the literature indicates that its prevalence is increasing globally (Xiao et al. 2015) and these findings suggest the same is occurring in England and Wales.

Figure 10: GB incidents of PCVAD as a % of diagnosable submissions (2016 data incomplete)
HORIZON SCANNING

Vesicular disease associated with Senecavirus A infection in the Americas

As described in the last Quarterly Emerging threats report, vesicular disease associated with infection with Senecavirus A (SVA, also known as Seneca Valley virus) emerged in multiple pig herds in Brazil during 2014 to 2015 and in about 100 herds in the USA between July and November 2015, although outbreaks have since abated. Images of the vesicular lesions occurring in cases of SVA can be found in publications from Brazil (Leme and others, 2015: Vannucci and others, 2015). Deep nail bed haemorrhages visible on the hooves are also a common finding. A summary of information on disease associated with SVA infection compiled from information available from Brazil and the USA is provided on the APHA Vet Gateway at http://ahvla.defra.gov.uk/documents/surveillance/diseases/seneca-valley-virus.pdf and a preliminary outbreak assessment identifying potential risk pathways for entry of SVA into the UK has been published by the APHA International Disease Monitoring team at www.gov.uk/government/uploads/system/uploads/attachment_data/file/510872/poa-seneca-america.pdf.

The situation will be kept under review as further information becomes available from current studies in the USA into SVA infections in pigs and the epidemiology of the disease. While the properties of SVA have not yet been fully established, the fact that SVA is a member of the Picornaviridae family of non-enveloped, single-stranded RNA viruses (of which FMD viruses, polioviruses and rhinoviruses are also members) makes it likely to be relatively environmentally stable. Excretion of picornaviruses occurs in faeces and saliva, and the presence of a viraemic stage means that blood, meat and meat products and other products of animal origin may be a source of virus. The potential transmission pathways for SVA therefore relate to ingestion or inhalation of these secretions, excretions or products, or to fomites contaminated with them. Therefore, although transmission routes have not yet been proven for SVA, a range have been considered in the preliminary outbreak assessment. The pig industry is raising awareness about vesicular disease due to SVA with potential importers and the National Pig Association has recommended that imports of live pigs and semen from herds which have had outbreaks should be avoided. The vesicular manifestation of SVA infection is of concern because the lesions closely resemble those caused by notifiable vesicular diseases, most importantly FMD and swine vesicular disease. No suspect vesicular disease report cases in pigs have occurred in the UK in 2015 to suggest that SVA is present or emerging. However, pig keepers and veterinarians attending pigs are reminded that it is essential that any vesicular lesions seen in pigs should immediately be reported to the APHA as suspect notifiable disease for investigation via the Defra Rural Services Helpline (03000 200 301) in England, and in Scotland and Wales via the local APHA Field Services Office. Awareness of vesicular disease due to Senecavirus A and the imperative need to report any vesicular disease in pigs to APHA as suspect notifiable disease was highlighted in the APHA April Veterinary Record Surveillance report.

African Swine Fever in Eastern EU

Cases of African Swine Fever (ASF) in wild boar continued to be reported in 2016, in particularly high numbers in Estonia and Latvia in the Eastern EU Member States (MS) as shown in Figure 11.

There has fortunately been no recent spill-over into domestic commercial or backyard pigs in the Eastern EU Member States in 2016 (to end April 2016). Cases continue to be reported in the Ukraine and an outbreak of ASF was reported in early April 2016 on a backyard pig farm near the Moldovan border. Moldova has pig population of approximately 600,000 pigs, about two-thirds of which are in backyard farms averaging only one to two pigs each. The biosecurity on such units tends to be poorer than on commercial units which is raising concern that if ASF should enter the Moldovan wild boar population, spill-over could readily occur although the estimated density of the wild boar population in the country is one of the lowest in the Eastern EU. The occurrence of ASF in Moldova would increase the risk of spread to Romania which has more transport links and people movements to UK. Improving biosecurity and maintaining the swill feed ban remains important in these countries. Very little meat is imported and no live pigs are imported from Romania to UK and no live pigs or pig meat are imported from Moldova; the perceived risk of ASF to the UK has not changed from very low.
A recent survey of around 300 smallholder and pet pig keepers by the University of Liverpool (https://www.liverpool.ac.uk/farm/pigs/) reported that a quarter fed household scraps to their pigs in spite of this having been illegal since 2001 due to the risk of infecting pigs with notifiable diseases - in particular foot and mouth disease and the swine fevers. NPA and BPA continue to campaign to raise awareness of the risks and stop people feeding kitchen waste to their pigs.

REFERENCES


APHA (2016). APHA Disease surveillance report: Disease surveillance in England and Wales, April 2016 Veterinary Record 178:18 441-444

Bonìotti, M. Beatrice; Papetti, Alice; Lavazza, Antonio; Alborali, Giovanni; Sozzi, Enrica; Chiapponi, Chiara; Faccini, Silvia; Bonilauri, Paolo; Cordioli, Paolo; Marthaler, Douglas (2016). Porcine epidemic diarrhea virus and discovery of a recombinant swine enteric coronavirus, Italy. Emerging Infectious Diseases Vol. 22, No. 1 83-87


Martin de la Fuente and others (2007). Vet Microbiol. 120, 184–191


Zhou and others, (2010) Veterinary Microbiology 141 168–173