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Monitoring the field occurrence of appropriate animal diseases can highlight the potential for zoonotic transmission and provide a sentinel for human, environmental and foodborne health risks. These reports, which primarily relate to farmed animal species, summarise the surveillance activities of the Animal and Plant Health Agency (APHA) and the Scottish Agricultural College Consulting, Veterinary Services (SACCVS, operating within Scotland’s Rural College – SRUC) for zoonoses and infections shared between man and animals in Great Britain, using data gathered by the network of Veterinary Investigation Centres. Quantitative diagnostic data for all of GB is provided by the Veterinary Investigation Diagnostic Analysis (VIDA) surveillance system. Summaries of joint veterinary/medical investigations into incidents and outbreaks of zoonotic disease and associated activities are also included. This report covers the 12 month period between January and December 2018.

The Zoonoses and Veterinary Public Health project (FZ2100) is funded by Defra, the Scottish Government and the Welsh Government through the APHA’s Bacterial Diseases and Food Safety portfolio and also uses returns from scanning surveillance projects. Orphan zoonoses are defined as any zoonoses for which no specific animal-health derived legislation exists, and so excludes Salmonella and those diseases which are compulsorily notifiable, e.g. brucellosis or TB. Information concerning notifiable or reportable zoonoses is recorded elsewhere, some under specific projects such as FZ2000 (Salmonella).

1. General scanning surveillance

1.1 Orphan Zoonoses VIDA data for Great Britain: January – December 2018

This table (collated 30/01/2019) summarises clinical diagnoses of orphan zoonoses and infections shared between animals and humans from specimens submitted to APHA and SACCVS veterinary investigation centres between January and December 2018 and compares the findings with the data from 2016 and 2017. It includes rare zoonotic infections and those for which zoonotic potential is confined predominantly to immuno-compromised individuals. Diagnoses use strict criteria and are recorded (once only per incident) using the Veterinary Investigation Diagnostic Analysis (VIDA) system. The list is subject to selection, submission and testing bias. It is not definitive and excludes notifiable or reportable diseases (notably salmonellosis, which is recorded elsewhere). It is intended only as a general guide for veterinary and public health professionals to the diagnosed occurrence of animal-associated infections in predominantly farmed animal species in GB.
1. General scanning surveillance: non-statutory zoonotic VIDA data for Great Britain, January - December 2018

<table>
<thead>
<tr>
<th>VIDA codes</th>
<th>Diagnosis</th>
<th>Total (all species)</th>
<th>Diagnoses in January – December 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2016</td>
<td>2017</td>
</tr>
<tr>
<td>311</td>
<td>Babesiosis</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>258 &amp; 659</td>
<td>Intestinal spirochaetosis ((Brachyspira pilosicoli))</td>
<td>21</td>
<td>28</td>
</tr>
<tr>
<td>188 &amp; 253</td>
<td>\textit{Brucella} in marine mammals</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>013</td>
<td>\textit{Campylobacter} fetopathy</td>
<td>146</td>
<td>152</td>
</tr>
<tr>
<td>282</td>
<td>Chlamydirosis ((C. psittaci))</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>014</td>
<td>\textit{Chlamydophila abortus} fetopathy</td>
<td>366</td>
<td>222</td>
</tr>
<tr>
<td>732</td>
<td>Coryne. pseudotuberculosis (CLA)</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>318</td>
<td>Cryptosporidiosis</td>
<td>553</td>
<td>387</td>
</tr>
<tr>
<td>362</td>
<td>Cysticercosis</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>193</td>
<td>Dermatophilus infection</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>022, 133 &amp; 615</td>
<td>Erysipelas</td>
<td>41</td>
<td>29</td>
</tr>
<tr>
<td>371, 372 &amp; 373</td>
<td>Fasciolosis</td>
<td>586</td>
<td>732</td>
</tr>
<tr>
<td>363</td>
<td>Hydatidosis</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>015, 136 &amp; 139</td>
<td>Leptospirosis (all categories)</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>016, 140, 150, 189 &amp; 711</td>
<td>Listeriosis (all categories)</td>
<td>187</td>
<td>118</td>
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<tr>
<td>------</td>
<td>----------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>Louping ill</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Orf (parapox virus)</td>
<td>42</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td><em>Pasteurella multocida</em> pneumonia/pasteurellosis</td>
<td>195</td>
<td>231</td>
</tr>
<tr>
<td></td>
<td>Pseudocowpox (parapox virus)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Q Fever/Coxiella burnetii</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Red Mite (<em>Dermanyssus galinae</em>)</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Ringworm</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Sarcoptes scabei infection</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Streptococcal infection (excluding bovine mastitis)</td>
<td>146</td>
<td>132</td>
</tr>
<tr>
<td></td>
<td>Swine influenza</td>
<td>33</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Toxoplasmosis (incl. fetopathy)</td>
<td>234</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>Tuberculosis (excl. <em>M. bovis</em>)</td>
<td>29</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Yersiniasis (incl. fetopathy)</td>
<td>12</td>
<td>22</td>
</tr>
</tbody>
</table>

NR – Not recorded  Shaded boxes indicate a diagnosis is not available for that species

1 Includes both domestic and wild birds  2 Mammals only

Common minor diseases of zoonotic importance, such as orf and ringworm, are grossly underestimated by the VIDA recording and reporting system, as it is unusual for practicing veterinary surgeons to submit material for diagnosis.

More detailed specific information on scanning surveillance diagnoses is available from:

http://apha.defra.gov.uk/vet-gateway/surveillance/index.htm
1.2 Highlights from APHA and SACCVS disease surveillance centres

This section provides a summary of main items of zoonotic interest from material submitted to the APHA (England and Wales) and SACCVS (Scotland) between January and December 2018.

Further information is provided in the quarterly reports by the APHA species groups and the monthly surveillance reports in the Veterinary Record derived from scanning surveillance:

http://apha.defra.gov.uk/vet-gateway/surveillance/reports.htm

No further highlights to report other than those detailed later in the Report.

2. Specific scanning and targeted surveillance and other studies

2.1 Campylobacter

Human campylobacteriosis is usually caused by the thermophilic Campylobacter species C. jejuni and C. coli, which can be found in a wide range of livestock, poultry and wildlife species. Poultry and poultry products are the main sources for human infection, and campylobacteriosis is the most commonly reported bacterial cause of food poisoning in the UK, with over 63,000 cases reported in 2017. This report does not cover food-borne illness related to Campylobacter infection.

However, non-thermophilic Campylobacter strains (such as C. fetus) can also (rarely) cause severe systemic illness in people.

Please note that only Campylobacter fetopathy numbers are detailed in Table 1 above.

England & Wales

Seven isolations from bovine abortions and 94 isolates from ovine abortions were obtained in 2018. The majority of these abortions were due to C. fetus fetus.

Scotland

Ten isolations from bovine abortions and 26 isolations from ovine abortions were made in 2018. The majority of these abortions were due to C. fetus fetus.

Dogs: 250 isolations from canine faecal samples were obtained in 2018 (164 C. upsaliensis; 52 C. jejuni; 9 C. coli; 18 C. lari; 7 Campylobacter spp.).
Cats: 26 isolations from feline faecal samples were obtained in 2018 (20 \textit{C. upsaliensis}, 3 \textit{C. jejuni}, 3 \textit{Campylobacter spp}).

### 2.2 Leptospirosis

Targeted surveillance by APHA for leptospirosis is variously achieved by analysis of results from: (1) RT-PCR for pathogenic leptospires on appropriate diagnostic samples, sequencing and denaturing high pressure liquid chromatography (DHPLC); (2) Microscopic agglutination test (MAT) antibody testing on sera submitted for disease diagnosis, monitoring and export (mainly dogs). Diagnostic MAT titres are considered seropositive at 1/100 or above (1/50 for \textit{L. Hardjo bovis} in cattle) and; (3) Bulk milk tank antibody testing (by ELISA) of samples submitted from dairy herds for monitoring purposes. The latter two methods are influenced by vaccination (dogs and cattle); MAT results are also very dependent on the range of serology (pools or single serovars) undertaken.

1. Between January and December 2018, a total of 243 specimens (kidney samples, primarily from pigs, but including 45 cattle, two dogs and one fox) were examined by real-time PCR for pathogenic leptospires. Five samples from two separate submissions, all pig samples, tested positive for \textit{Leptospira} DNA. Thirty-four samples were unsuitable for testing and 204 samples tested negative.

   In addition to the above testing numbers, four separate bovine abortion submissions from Scotland were tested positive by PCR at SACCVS.

2. A total of 4,149 \textit{Leptospira} serology tests were carried out in 2018 and serum samples originated from a range of species. Some serum samples were tested for antibodies to more than one serovar, depending on the request of the submitter.

   1,784 tests were performed on dog serum samples, with 1,569 testing negative and 215 testing positive. The highest number of tests requested was for \textit{L. Canicola} (850 tests), of which 13.3\% had a positive result, followed by \textit{L. Icterohaemorrhagiae} (269 tests carried out; 3.7\% positive results) and \textit{L. Bratislava} (220 tests carried out; 9.5\% positive results). The highest percentage of positive results was found for \textit{L. Australis} (22 tests; 72.7\% positive). It has to be noted that a positive serological result for a dog can be due to either a positive vaccination status or recent seroconversion following acute disease.

   1,118 tests were performed on bovine serum samples, with 11.2\% positive results. The highest number of requested tests were for \textit{L. Hardjo bovis} (1,008 tests), of which 11.4\% tested positive.

   773 tests were performed on porcine serum samples, with 2.5\% positive results. \textit{L. Bratislava} was the serovar with the highest number of positive results (14 out of 239 requested tests; 5.6\% positive results).
3. Between January and December 2018, 18 (17.3%) of 104 bulk milk L. Hardjo antibody tests undertaken for monitoring purposes were negative, 16 (15.4%) were low-positive, 16 (15.4%) were mid-positive and 54 (51.9%) were high positive. In 2017, figures (185 tests) were 22.7% negative, 17.9% low positive, 11.9% mid positive and 47.6% high positive. The significance of these observations is heavily influenced by vaccination status and selection, although it is thought unlikely that fully vaccinated herds contributed many samples. The number of bulk milk submissions for leptospirosis testing was down 43.8% compared to 2017.

2.3 Mycobacteria (excluding M. bovis)

Since Mycobacterium bovis became notifiable in all species in 2006, the number of samples examined by APHA Weybridge has increased, particularly from pets and camelids. Samples from pigs are mainly submitted by meat inspectors.

*M. microti* was isolated from two alpacas. *M. avium* was isolated on six occasions from pigs.

2.4 Q fever

Diagnosis of Q fever is undertaken using PCR to confirm the presence of Coxiella burnetii, typically following the identification of suspicious acid-fast bodies in MZN stained smears of foetal tissues. Confirmation of Q fever as a cause of fetopathy requires histopathology and immunohistochemistry of placental tissue in addition to a positive PCR result. In each case where a clinical diagnosis is made, public health colleagues are informed of the incident and the zoonotic potential of this organism is highlighted to the farmer and private veterinary surgeon, with the provision of an advisory sheet provided: [Q fever: Information for farmers](#)

*C. burnetii* was confirmed by PCR testing and considered the cause of fetopathy on four occasions; three in cattle and one in sheep.

2.5 Streptococcus suis

*Streptococcus suis* isolates from diagnostic material submitted to APHA and SACCVS Veterinary Investigation Centres are typed further for disease surveillance purposes. The numbers and serotypes from porcine diagnostic material submitted during the period January – December 2018 are shown below, with data for previous years for comparison. UT = untypeable
Streptococcus suis type 2 again predominated as in previous years, but there is a notable spread across serotypes.

### 2.6 Toxoplasmosis

The European Food Safety Authority (EFSA Journal 2007, 583, 1-64) highlighted the significance of toxoplasmosis as a foodborne zoonosis and the need to improve surveillance in this field. Serological examinations for *Toxoplasma gondii* using the latex agglutination test (LAT) are undertaken by the APHA on sera submitted to VICs. The findings presented below provide a summary of the serological status of samples submitted for diagnosis, monitoring and screening purposes during the period January to December 2018, but do not constitute a structured survey. Positive samples, as defined here, have LAT titres of 1/64 or greater and indicate a history of exposure to this protozoan parasite. Toxoplasmosis as a cause of fetopathy in sheep may also be diagnosed through antigen testing of placental tissue, and in sheep and goats through IFAT testing of foetal blood or body fluid.

During 2018, a total of 154 sera were received from 32 separate sheep, 3 separate goat submissions and one camelid submission of which 73 (47.4%) tested positive for *T. gondii*, comprising of 67 sheep from 25 submissions, 5 goats from 2 submissions and one alpaca. This is compared to 387 serum submissions in 2017, a 60% fall, from 88 sheep and 15 goat premises. However, the overall positive ratio was incredibly close at 47.4% compared to 49.4% positive samples in 2017. The dramatic fall in submission numbers most likely reflects the fact that pharmaceutical companies are able to offer free serological screening of flocks.

NB. Positive serology is not confirmatory of *Toxoplasma* as the cause of abortion nor presence of toxoplasmosis, but indicates exposure to the parasite and/or vaccination.
3. Investigations into zoonotic and potentially zoonotic incidents

Protocols for the investigation of zoonotic disease incidents in England and Wales are set out in the following document: Guidelines for the Investigation of Zoonotic Disease (England and Wales)

There is similar guidance on the investigation and management of zoonotic disease in Scotland:


Advice for members of the public planning a trip to animal-associated visitor attractions and other information can be found on the PHE Zoonoses Webpages

3.1 Cryptosporidiosis

Investigations to assist in human outbreaks of cryptosporidiosis linked to direct contact with animals are undertaken at the request of Consultants in Communicable Disease Control (CsCDC) of PHE/PHW (CsPHM in Scotland) and in collaboration with the National Cryptosporidium Reference Unit, Swansea, and follow jointly agreed guidelines.

APHA were contacted by PHE/PHW on five occasions during 2018 to request assistance in the investigation of cases of human cryptosporidiosis, all epidemiologically linked to visits to open farm premises.

Quarter 2 (April-June) is traditionally the busiest Quarter for such investigations and is related to the number of open farm visits undertaken by families or school groups around the Easter holiday and Bank Holidays and the higher number of young ruminants on such premises at this time of year. Contact with young lambs, either through bottle-feeding or handling, is the major risk factor for the zoonotic spread of Cryptosporidium parvum in these settings. The availability of hand-washing facilities supplying hot water and soap, as opposed to antimicrobial gel is extremely important to help prevent visitors becoming infected. The role of APHA in these investigations is to provide expert veterinary advice on animal husbandry and welfare to the relevant Incident Control Team. Also if necessary, to visit the farm and collect faecal samples for testing and to provide input into the overall recommendations for the prevention of further cases during the current outbreak and in the future.

The importance of the early involvement of APHA in these investigations, as soon as there is a suspected epidemiological link to animal contact, has been emphasised to the relevant authorities. Any delays in animal testing may greatly influence the test results which can in-turn prevent the establishment of a firm scientific link between animal contact and human cases through genotyping of isolates.
The level of APHA input varied in each of the outbreak investigations. On four occasions, APHA were part of the Outbreak Control Team (OCT) meetings but a farm visit and sampling was either, not necessary, or the offer of a visit was refused by the owner.

APHA was fully involved in a case between 19 March and 24 April 2018 with 118 confirmed and 80 probable human cases of Cryptosporidium parvum. The cases all had a known link to a working farm in West Sussex, open annually to the public during the lambing season.

APHA conducted a farm visit and collected animal faecal samples which were initially tested at APHA Weybridge for the presence of Cryptosporidia oocysts. Cryptosporidium spp. were detected in faecal samples collected from eight lambs at the farm. However, unfortunately genotyping was not possible at the Cryptosporidium Reference Unit (CRU) in Swansea, as there were insufficient oocysts present in the samples to allow further testing. Interestingly, in 38 of the confirmed human cases a unique gp60 genotype (IlaA15G2R2) of C. parvum was identified at the CRU.

Following a farm inspection by a multi-agency team, consisting of representatives of Public Health England (PHE), Health and Safety Executive (HSE) and the local District Council Environmental Health Department (EHD) and the meeting of the OCT, the open farm was advised to close to members of the public.

### 3.2 VTEC (STEC) O157

Verocytotoxigenic-producing *E. coli* (VTEC, STEC) O157 outbreak investigations are undertaken, according to agreed guidelines, at the request of CsCDC of PHE/PHW (CsPHM in Scotland) where an animal-associated source is suspected. These investigations variously involve collaboration with other organisations, including the Environmental Health Departments of Local Authorities and the Health and Safety Executive. Determination of phage type (PT), verocytotoxin (VT) type, and comparison of human and animal isolates by variable number of tandem repeat (VNTR) analysis are performed by the Gastrointestinal Bacteria Reference Unit (GBRU), PHE Colindale. If isolates from animals circumstantially implicated in outbreaks have the same PT and indistinguishable VNTR profiles from human cases, this is taken as confirmatory evidence of a causal association. In practice, there can be minor VNTR profile variation at a single tandem repeat locus amongst some isolates associated with an outbreak investigation. Other VTEC (STEC) O157 PTs may be detected incidentally during the investigation of animal premises.

In 2018 APHA were involved in 2 VTEC *E. coli* O157 on-farm outbreak investigations.

(1). In June, following the diagnoses of three human cases with VTEC infection epidemiologically linked to an open petting farm, PHE requested support from APHA. The farm was visited in June and July when samples were collected from animals and the environment.
A number of samples collected had *E. coli* O157 isolated from them, which matched very closely to the *E. coli* O157 that was cultured from the three human cases. PHE concluded that it was highly likely that the human cases acquired *E. coli* O157 during their visits to the farm. During farm visits general hygiene and biosecurity advice was given to the farmer.

(2). In September, APHA was contacted by PHW to assist in the investigation of 2 human cases of *E. coli* O157 thought to be linked to a goat milk product. The producer’s main output is pasteurised but they had been providing a small and specific customer base with raw (un-pasteurised) product at the request of the customers.

A sampling visit was carried out by a Veterinary Investigation Officer (VIO). No *E. coli* O157 was detected from any of the faecal or environmental samples collected. It was reinforced that shedding may be intermittent and these samples did not negate the risk associated with raw product or the potential for cross contamination.

Dairy hygiene and assessment of the production process was out of the VIO remit but was covered by the Local Authority Environmental Health Officers, Dairy Hygiene Inspectorate and the Food Standards Agency.

Raw products are no longer being supplied.

### 3.3 *Corynebacterium ulcerans*

*Corynebacterium ulcerans* was first isolated from cases of throat disease in humans in 1926, with zoonotic outbreaks initially associated with direct contact with farm animals or consumption of unpasteurised milk. The organism can produce diphtheria toxin which is capable of producing human disease with the same clinical signs as cutaneous or respiratory diphtheria caused by *C. diptheriae*. More recently, *C. ulcerans* has been isolated from the oral cavity of domestic pets such as dogs and cats, and current zoonotic outbreaks are investigated by APHA and CsPHM in Scotland through throat swabbing of in-contact companion animals.

During 2018 there were four incidents involving *C. ulcerans* that APHA were involved in.

In January, toxigenic *C. ulcerans* was detected from a patient’s throat swab and APHA were approached due to the possible zoonotic risk from the case’s six cats. APHA arranged throat swabbing of the six cats by the case’s local veterinary surgeon. The swabs were returned to APHA Starcross for culture, with no evidence of *C. ulcerans* in any of the swabs.

There was a similar incident in May with toxigenic *C. ulcerans* being detected from a patient’s throat swab and APHA were approached by PHE because of the possible zoonotic risk from the patient’s cat. Again following swab culture there was no evidence of *C. ulcerans* in any of the swabs at APHA Starcross.
In late September, PHE contacted APHA following the isolation of toxigenic *C. ulcerans* from a burn wound on the hand of a 76-year-old lady with no other clinical signs. Two Miniature Schnauzers were present in the case’s home and following contact with the private veterinary surgeon by APHA, both dogs had throat swabs taken and the swabs were submitted to APHA Starcross for culture, which were negative.

In an unusual case in August, PHE reported that *C. ulcerans* had been isolated from two different dogs, one a Staffordshire Bull Terrier and one a Dachshund, with different owners, by a veterinary surgeon in practice. The isolates had been forwarded to PHE Colindale for toxigenic testing which was confirmed positive. Both dogs had presenting clinical signs of chronic nasal discharge which subsequently responded to appropriate antimicrobial therapy. APHA was contacted to give advice. No cases of human disease were confirmed and nasopharyngeal swabbing of in-contact humans showed no evidence of *C. ulcerans* colonisation.

### 3.4 Psittacosis

An advisory visit was carried out to a wildlife rescue centre following an outbreak of respiratory disease in staff. A tentative diagnosis made by Public Health England (PHE) colleagues was Psittacosis, based on risk analysis, serological results and response to treatment. Both PHE and Environmental Health visited the site and raised concerns regarding the zoonotic disease control measures in place. APHA input was requested and a visit was carried out. During the visit a number of issues were identified and highlighted. These ranged from the effective use and storage of PPE (Personal Protective Equipment); to the education of staff regarding zoonotic diseases and the need for robust and structured pathogen control programmes. It was evident that improvements could be made and the input of APHA in providing an objective viewpoint was appreciated.