Animal &
Plant Health
Agency

Zoonoses and Veterinary Public Health

Quarterly report Q3 – July to September 2022

Project FZ2100

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APHA is an Executive Agency of the Department for Environment, Food and Rural Affairs and also works on behalf of the Scottish Government, Welsh Government and Food Standards Agency to safeguard animal and plant health for the benefit of people, the environment and the economy.

Contents

Monitoring the occurrence of certain animal diseases can highlight the potential for zoonotic transmission and provide an indication of human, environmental and foodborne health risks. These FZ2100 project reports, which primarily relate to farmed animal species, summarise the surveillance activities of the Animal and Plant Health Agency (APHA) and the SRUC Veterinary Services in Scotland, 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 three month period between July and September 2022.

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. Non-statutory 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 in certain animal species, e.g. brucellosis or TB. Information concerning notifiable or reportable zoonoses is recorded elsewhere, some under specific projects such as FZ2000 (*Salmonella*). *Coxiella burnetii* (Q fever) was made reportable under the Zoonoses Order in 2021 and is included in this report.

1. General scanning surveillance

1.1 Non-statutory Zoonoses VIDA data for Great Britain: July - September 2022

This table (collated 10th November 2022) summarises clinical diagnoses of non-statutory zoonoses and infections shared between animals and humans from specimens submitted to APHA and SRUC Veterinary Investigation Centres between July and September 2022 and compares the findings with the same quarter (Q3) in 2020 and 2021. It includes rare zoonotic infections and those for which zoonotic potential is confined predominantly to immunocompromised 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 and most reportable diseases (notably salmonellosis, which is recorded elsewhere). The table 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 July - September 2022 – all species

VIDA codes	Diagnosis	2020	2021	2022	Cattle	Sheep	Goats	Pigs	Birds [1]	Misc	Wildlife [2]
311	Babesiasis	4	27	12	12						
258 & 659	*Brachyspira pilosicoli* /intestinal spirochaetosis	8	20	13				13	0		
013	*Campylobacter* fetopathy	0	3	2	2	0	0			0	0
282	Chlamydiosis (*C. psittaci*)	0	1	0					0		
014	*Chlamydia abortus* fetopathy	0	1	0	0	0	0			0	0
732	*Corynebacterium pseudotuberculosis (CLA)*	8	13	8		7	1				
318	Cryptosporidiosis	51	48	35	33	0	0	1	0	1	0
362	Cysticercosis	0	0	0		0					
193	Dermatophilus infection	0	0	0	0	0	0		0	0	
022, 133 & 615	Erysipelas	7	8	3		2	0	1	0	0	
371, 372 & 373	Fasciolosis	37	37	31	21	9	0			1	0
363	Hydatidosis	0	0	0		0					
015, 136 & 139	Leptospirosis (all categories)	2	1	1	1	0	0	0		0	0
016, 140, 150, 189 & 711	Listeriosis (all categories)	13	19	7	2	4	1	0	0	0	0

VIDA codes	Diagnosis	2020	2021	2022	Cattle	Sheep	Goats	Pigs	Birds [1]	Misc	Wildlife [2]
217	Louping ill	8	12	16	1	10			5		
225	Orf (parapox virus)	12	4	12		10	1			1	
152,153, 157, 158	*Pasteurella multocida* pneumonia /pasteurellosis	32	32	34	16	10	1	7	0	0	0
223	Pseudocowpox (parapox virus)	0	0	0	0						
027 & 262	Q Fever/*Coxiella burnetii*	1	1	0	0	0	0			0	0
374	Red Mite *(Dermanyssus gallinae)*	5	8	3					3		
195	Ringworm	1	1	2	1	0	1	0	0	0	0
379, & 392	*Sarcoptes scabei infection*	0	0	0	0		0	0		0	
024, 171, 172 & 644	Streptococcal infection (excluding bovine mastitis)	32	26	15		0	0	14	0	1	0
745	Swine influenza	5	6	1				1			
026 & 315	Toxoplasmosis (incl. fetopathy)	0	2	1		0	0			1	0
142	Tuberculosis (excl. *M. bovis*)	4	1	3			0	0	0	3	0
034 & 154	Yersiniasis (incl. fetopathy)	1	3	2		0	0	2	0	0	0

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 practising veterinary surgeons to submit material for diagnosis.

More detailed specific information on scanning surveillance diagnoses and trends for endemic diseases is available from:

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

1.2 Highlights from APHA and SRUC disease surveillance centres

This section provides a summary of the main items of zoonotic interest from material submitted to the APHA (England and Wales) and SRUC Veterinary Services (Scotland) between July and September 2022.

Further information is provided in the quarterly reports by the APHA species groups and the monthly surveillance reports in the Vet Record derived from scanning surveillance, which can be found at:

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

Quarter 3 in 2022 had lower numbers of total diagnostic submissions made to APHA and SRUC surveillance centres when compared with total diagnostic submissions for the same species for Q3 of 2021 and 2020. Further information is as follows:

- The cattle diagnostic submission numbers for Q3 2022 were higher than the other species; but were 20% lower than Q3 2021 and 27% lower than Q3 2020.
- The sheep diagnostic submission numbers for Q3 2022 were comparable to Q3 2021, and 10% lower than Q3 2020.
- The goat diagnostic submission numbers are always lower than sheep and cattle, reflective of ruminant livestock population numbers in Great Britain. Q3 2022 submission numbers were 20% lower than Q3 2021 and 13% higher than Q3 2020.
- The pig diagnostic submission numbers for Q3 2022 were 36% lower than Q3 2021 and 33% lower than Q3 2020.
- The avian diagnostic submission numbers for Q3 2022 were 5% lower than Q3 2021 and 11% higher than Q3 2020.

There are various factors which can influence submission numbers, and comparison with previous years is not straight forward. For example, economic factors and climatic factors can result in differences in submission numbers for the same quarter in different years. Scanning surveillance requests may also drive an increase in submissions for a specified time period when certain disease presentations are of interest, for example chronic condition loss in sheep.

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 meat 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 65,000 cases reported in 2018. This report does not cover foodborne 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

Only three *Campylobacter* isolates were identified by the APHA Starcross laboratory during the period July to September 2022. Two of these were from bovine abortion cases, which were separate submissions, and both were positive for *C. fetus venerealis intermedius*. The third case involved a four-month-old Holstein-Friesian dairy calf which presented with very watery, intermittently bloody, diarrhoea. This calf was found to be anaemic and dehydrated. Although *C. lari* was detected in this calf's faeces, there was limited laboratory testing, and the significance of the *C. lari* was not determined. This may have been an incidental finding as *C. lari* may be detected in the faeces of healthy cattle. In this case Salmonellae were not detected.

Scotland

SRUC Veterinary Services had a total of 41 *Campylobacter* isolates during the period July to September 2022, which were:

Bovine – There was one bovine *Campylobacter* isolate which was *C. jejuni.*

Canine – There were 34 canine *Campylobacter* isolates which comprised 27 *C. upsaliensis,* five *C. jejuni,* one *C. lari*, and one non-typed *Campylobacter* sp.

Feline – There were three feline *Campylobacter* isolates which were all *C. upsaliensis.*

Zoo animals – there were three *C. jejuni* isolates (two of these were detected in red-bellied tamarins, and one was detected in a cotton-top tamarin).

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 *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 July and September 2022, a total of 58 kidney specimens (kidneys from 10 cattle, 46 pigs, 1 zoo deer and 1 fox) were examined by real-time PCR for pathogenic leptospires with only one positive kidney test result from one of the cattle samples. This comprised foetal kidney testing positive from one of two aborted heifers from a beef suckler herd. Following this diagnosis of *Leptospira* abortion vaccination of the herd was recommended.
   7 of the submitted samples were unsuitable for testing.

2. Between July and September 2022 414 serum samples from a range of species were tested for *Leptospira* antibodies. A summary of the serology findings for dogs, cattle and pigs is as follows:
   Please note that more than one serotype may be detected in a serum sample.
   - **Dogs** (Export tests): For export purposes 137 canine sera were tested for *L.* Canicola and 8 were tested for *L.* Icterohaemorrhagiae. 6.6% and 12.5% were positive respectively, compared to 5.5% and 7.7% for the same quarter last year.
   - **Dogs** (Diagnostic tests): 34 canine sera were tested for diagnostic purposes - 8.8% were positive for *L.* Canicola (10% in Q3 2021), 40% for *L.* Copenhagenii (20% in Q3 2021), 9.7% for *L.* Icterohaemorrhagiae (4.9% in Q3 2021), 8.8% for *L.* Bratislava (9.3% in Q3 2021), 0% for *L.* Pomona (0% Q3 2021), 9.1% for *L.* Grippotyphosa (23.7% Q3 2021), 78.9% for *L.* Australis (38.6% Q3 2021) , 0% for *L.* Autumnalis (2.3% Q3 2021) and 25% for *L.* Sejroe (2.8% Q3 2021).
   - **Cattle**: 137 bovine samples were tested for *L.* Hardjo bovis, of these 8.8% were positive (15.8% in Q3 2021).
   - **Pigs**: 33 porcine samples were tested, of these 3% were positive for *L.* Bratislava (31.9% in Q3 2021).

3. Between July and September 2022 (Q3 2022) three (33.3%) of 9 bulk milk *L.* Hardjo antibody tests undertaken for monitoring purposes were negative, one (11.1%) was low positive, two (22.2%) were mid positive and three (33.3%) were high positive.
   For comparison, between July and September 2021, five (22%) of 23 bulk milk *L.* Hardjo antibody tests undertaken for monitoring purposes were negative, two (9%) were low positive, one (4%) was mid positive and fifteen (65%) were 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. Low submission numbers also make comparisons across the two quarters difficult.

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. A summary of potentially zoonotic non-statutory mycobacteria identified during the calendar year will be provided in the annual (Q4) report.

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 when *C. burnetii* is detected by PCR, 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:

Q fever: Information for farmers

During the period July to September 2022 there were six submissions, comprising two placental samples and four foetal fluid samples, for *Coxiella burnetii* PCR testing at the APHA Q fever National Reference Laboratory, Penrith Veterinary Investigation Centre. These were all from cattle (from five farms). Only one sample tested positive for *C. burnetii.* In addition, the detection of *C. burnetii* in a bovine bulk milk sample (from an English dairy farm) by PCR at an overseas laboratory was reported to APHA.

Further information about these two positive bovine submissions is provided in section 3.4.

2.5 *Streptococcus suis*

Streptococcus suis isolates from diagnostic material submitted to APHA and SRUC Veterinary Investigation Centres are typed further for disease surveillance purposes. The numbers and serotypes from porcine diagnostic material submitted during the period July to September 2022 are shown below, with data for the same quarter in previous years for comparison. UT = untypeable

Year (Q3)	1	2	3	4	5	7	8	9	11	13	14	15	21	25	28	29	34	UT	Total
2020	5	16	1	-	-	5	-	1	1	1	3	-	1	1	2	1	-	1	**39**
2021	6	6	1	1	-	4	1	2	-	-	-	-	-	-	-	-	-	-	**21**
2022	3	9	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	**15**

The above table shows that compared to the previous two years Q3 2022 had lower numbers of submissions where *Streptococcus suis* was detected in pigs and in Q3 2022 there was also less spread across serotypes. For Q3 for 2020 and 2022 serotype 2 predominated, whereas for Q3 2021 serotype 2 and serotype 1 were equally prevalent.

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 July to September 2022, 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 and goats may also be diagnosed through antigen (PCR) testing of placental tissue, and in sheep through IFAT testing of foetal blood or body fluid.

During the period July to September 2022 eight ovine samples were submitted for Toxoplasma serology. All were from the same farm, and there were positive titres in two of the samples. A diagnosis of Toxoplasmosis was made following post mortem examination of a red-necked wallaby which was found dead. On histopathological examination there was non-suppurative inflammation of the heart and brain, including parasitic bradycysts resembling *Toxoplasma gondii.* Immunohistochemistry confirmed the presence of *T. gondii* parasites in the heart and brain which were considered to be significant in the death of the wallaby.

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:

http://www.hps.scot.nhs.uk/resourcedocument.aspx?id=1190

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 UKHSA/PHW (CsPHM in Scotland) and in collaboration with the National Cryptosporidium Reference Unit, Swansea, and follow jointly agreed guidelines.

During Q3 2022 APHA continued to contribute, and advised on control measures during an ongoing investigation of an open farm attraction where there was a dual outbreak of human cryptosporidiosis and STEC O26. The investigation had initially commenced in quarter 2. The cryptosporidium cases had visited the implicated premises during the incubation period of their illness and the STEC cases had epidemiological links to the same premises. A multidisciplinary team visited, monitored, and advised on actions that would improve hygiene for visitors and which would reduce potential exposure to these zoonotic pathogens. The recommended actions were successfully implemented.

3.2 STEC

Shiga toxin-producing *E. coli* (STEC, formerly known as VTEC) outbreak investigations are undertaken, according to agreed guidelines, at the request of CsCDC of UKHSA/PHW (CsPHM in Scotland) where an animal-associated source is suspected. These investigations often also involve collaboration with other organisations, including the Environmental Health Departments of Local Authorities and the Health and Safety Executive. Determination of phage type (PT), shiga toxin (ST) type, and comparison of human and animal isolates by whole genome sequencing (WGS) analysis are performed by the Gastrointestinal Bacteria Reference Unit (GBRU), UKHSA Colindale. If isolates from animals circumstantially implicated in outbreaks have an indistinguishable WGS profile to those from human cases, this is taken as confirmatory evidence of a causal association. Other STEC (VTEC) PTs or WGS types may be detected incidentally during the investigation of animal premises.

During Q3 2022 APHA assisted the UKHSA with three non-O157 STEC cases, including the dual cryptosporidiosis and STEC O26 case above. The other two STEC cases involved human outbreaks of STEC O103 and STEC O145 which were both linked to dairy farms. In both of these cases APHA Veterinary Investigation Officers collected fresh faeces samples, from the collecting yard where the cows had stood prior to milking. As APHA do not perform non-O157 STEC bacteriology the samples were sent to UKHSA Colindale for non-O157 STEC culture and whole genome sequencing, WGS. In both cases the UKHSA Colindale laboratory did not detect the outbreak strain within the cattle faeces

samples. APHA attended several Outbreak Control Team (OCT) meetings during July, August and September for both of these cases:

STEC O103 outbreak: A cluster of human STEC O103 cases was associated with the consumption of soft cheese from a dairy farm in the East of England. The multidisciplinary team investigation established this 'brie-like' unpasteurised soft cheese was thought to have been contaminated sometime during the spring. The farm also sold unpasteurised milk through an on-farm vending machine, however there were no food safety concerns with this product and sales were allowed to continue. Following microbiological and epidemiological investigations it was concluded that there was adequate epidemiological information to link the source of the outbreak to the soft cheese produced by the farm. Pasteurisation was put in place for the production of this soft cheese, and HACCP processes have been fully reviewed, and enhanced control measures are in place. There have been no further cases and the outbreak has been declared over.

STEC O145 outbreak: A cluster of human STEC O145 cases were found to be associated with the consumption of milk products from a dairy farm in North West England, with an onset from mid-July 2022. Investigations identified that there appeared to have been a transient issue with pasteurisation, and there were issues raised regarding the cleaning and storage of milk crates which made external contamination of packaging also plausible. Advice was provided by the OCT on improvements that were required for on-farm pasteurisation and for optimising the cleansing and storage of the milk crates.
There can be transient colonisation of cattle with STECs, and although the outbreak strain was not detected in the cattle faeces samples, the negative laboratory results did not rule the dairy farm out as the source of the human outbreak. It was concluded that there was adequate epidemiological information to link the dairy farm to the source of the outbreak. There were improvements made at the farm, especially in their HACCP processes, and the OCT are satisfied that adequate control measures are in place.

3.3 *Corynebacterium ulcerans*

Corynebacterium ulcerans was first isolated from cases of throat infection 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. diphtheriae*. 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 SRUC Veterinary Services in Scotland by throat swabbing of in-contact companion animals.

During Q3 2022 APHA has been involved in the management of several cases of *Corynebacterium ulcerans*. These investigations are multidisciplinary and APHA works closely with public health colleagues to investigate, manage, and provide advice regarding the animals involved. Typically APHA will also liaise closely with the private veterinary

surgeon to facilitate surveillance swabs, treatment and post treatment clearance swabs as appropriate.

There have been four animal index cases with no other cases identified within other household animals, and there has been one animal index case with an in-contact positive household animal identified. With these five cases there are no associated human cases.

There has been one outbreak where the index case was human. This has been extensively investigated and several in-contact humans have also tested positive for *C. ulcerans*. *C. ulcerans* was not isolated from the animals in the household.

There is one non-resolution of an index animal case first identified in May 2022 which is still under management. Treatment compliance and chronic disease are thought to have contributed to this non-resolution. On the initial investigation no associated animal or human positive cases were identified, but given the length of time this animal has been in the household while potentially shedding this zoonotic organism, all in contact humans and animals are being reassessed by the incident management team.

3.4 Q fever *(Coxiella burnetii)*

Comparisons of Q-fever data in quarter 3 of previous years should be made with caution because from April 2021 Q fever has been a Reportable disease. This means that there is likely to have been increased surveillance for Q fever following April 2021.

As stated in section 2.4 there were two Q fever PCR positive cases. Each case (from two dairy herds located in England) had one sample which had tested positive as follows:

APHA received a report of a British bulk milk sample which had tested positive for *Coxiella burnetii* by PCR in an overseas laboratory. The farm had experienced some infertility issues and some bovine abortions. One aborted cow had tested antibody positive for *C. burnetii* and following this the above bulk milk PCR test was performed. The private vet investigated further and advised that laboratory testing (including the examination of foetuses) gave no definitive diagnosis for the abortions, although several infectious causes were ruled out. Mineral testing has revealed some issues that need correcting and then the fertility situation will be reassessed.

The second case comprised a placental sample which was submitted to APHA Penrith from a dairy cow which had aborted a dead calf. Unfortunately the cow was euthanased as she developed peritonitis and did not respond to treatments with antibiotics and anti-inflammatories. The herd of approximately 800 cattle, comprised all-year-round housing of the cows and an automatic (robotic) milking system. There were no other recent known abortions on farm. As this farm is part of a higher education establishment there are many visitors to the farm (including students and higher education staff).

Although APHA did not perform the post mortem examinations of placentae and bovine foetuses for these two farms, APHA provided comprehensive advice to the private vets

including information on bovine abortion investigations and laboratory testing. For these two submissions we did not receive any fixed placenta to perform histopathological examination to determine if there was any placentitis caused by infection with *C. burnetii*. For both cases zoonoses advice about *C. burnetii* was provided including the Q fever advisory farmer information leaflet. There were no reports of any ‘flu-like’ or other human illness in the farmer, farm workers, and visitors. Milk from both farms was only sold commercially (i.e. for pasteurisation).