Animal &
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Agency

Zoonoses and Veterinary Public Health

Quarterly report Q1 – January to March 2023

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 relevant VIDA data for Quarter 1 (January to March 2023).

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. TB. Information concerning notifiable or reportable zoonoses is recorded elsewhere, some under specific projects such as FZ2000 (*Salmonella*). *Coxiella burnetii* (Q fever), avian chlamydiosis (in psittacines) and brucellosis in dogs were made reportable under the Zoonoses Order in 2021 and are included in this report.

1. General scanning surveillance

1.1 Zoonoses VIDA data for Great Britain: January to March 2023

Table 1 (collated 27 April 2023) summarises clinical diagnoses of zoonoses and infections shared between animals and humans from specimens submitted to APHA and SRUC Veterinary Investigation Centres for the three-month period between January and March 2023 and compares the findings with the data for the same quarter in 2022 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.

Table 1. General scanning surveillance: Zoonoses VIDA data for Great Britain January to March 2023 – all species

Table notes:

- blank cells indicate that a diagnosis is not available for that species
- birds: data for birds includes domestic and wild birds
- wildlife: data for wildlife includes mammals only

VIDA codes	Diagnosis	2021	2022	2023	Cattle	Sheep	Goats	Pigs	Birds	Misc.	Wildlife
311	Babesiasis	0	0	0	0	-	-	-	-	-	-
258 & 659	*Brachyspira pilosicoli* /intestinal spirochaetosis	6	12	10	-	-	-	10	0	-	-
013	*Campylobacter* fetopathy	51	104	110	2	108	0	-	-	0	0
282	Chlamydiosis (*C. psittaci*)	0	1	0	-	-	-	-	0	-	-
014	*Chlamydia abortus* fetopathy	184	115	103	0	100	3	-	-	0	0
732	*Corynebacterium pseudotuberculosis (CLA)*	2	8	2	-	1	1	-	-	-	-
318	Cryptosporidiosis	124	92	69	68	1	0	0	0	0	0
362	Cysticercosis	2	0	0	-	0	-	-	-	-	-
193	Dermatophilus infection	2	0	0	0	0	0	-	0	0	-
022, 133 & 615	Erysipelas	3	8	7	-	1	0	6	0	0	-
371, 372 & 373	Fasciolosis	91	62	49	19	26	2	-	-	2	0
363	Hydatidosis	0	0	0	-	0	-	-	-	-	-
015, 136 & 139	Leptospirosis (all categories)	1	2	0	0	0	0	0	-	0	0

VIDA codes	Diagnosis	2021	2022	2023	Cattle	Sheep	Goats	Pigs	Birds	Misc.	Wildlife
016, 140, 150, 189 & 711	Listeriosis (all categories)	90	76	44	10	31	2	0	0	1	0
217	Louping ill	0	1	0	0	0	-	-	0	-	-
225	Orf (parapox virus)	6	3	3	-	3	0	-	-	0	-
152,153, 157, 158	*Pasteurella multocida* pneumonia /pasteurellosis	44	66	58	38	8	0	11	1	0	0
223	Pseudocowpox (parapox virus)	0	0	0	0	-	-	-	-	-	-
027 & 262	Q Fever/*Coxiella burnetii*	0	3	2	1	0	1	-	-	0	0
374	Red Mite *(Dermanyssus gallinae)*	0	1	0	-	-	-	-	0	-	-
195	Ringworm	3	1	0	0	0	0	0	0	0	0
379, & 392	*Sarcoptes scabei infection*	2	2	0	0	-	0	0	-	0	-
024, 171, 172 & 644	Streptococcal infection (excluding bovine mastitis)	39	24	22	-	1	0	19	0	0	2
745	Swine influenza	9	14	4	-	-	-	4	-	-	-
026 & 315	Toxoplasmosis (incl. fetopathy)	133	106	92	-	92	0	-	-	0	0
142	Tuberculosis (excl. bovine *M. bovis*)	13	8	9	-	-	0	0	2	6	1
034 & 154	Yersiniasis (incl. fetopathy)	6	6	6	-	4	0	1	0	1	0

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 information on a few noteworthy cases, of zoonotic interest from material submitted to the APHA (England and Wales), SRUC Veterinary Services (Scotland), and partner post-mortem providers between January and March 2023.

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.

February and March are the busiest months for ovine abortion investigations. Veterinary Investigation Officers (VIOs) provide zoonoses advice to private veterinary surgeons to pass on to their farm clients when potentially zoonotic organisms are identified. Potentially zoonotic organisms that may be detected during ovine abortion investigations include *Chlamydia abortus*, *Toxoplasma gondii*, *Campylobacter* sp., *Listeria* sp., *Salmonella* sp. and *Coxiella burnetii.*

Advice on the risks of infections that can be transmitted via contact between pregnant women and parturient / post-parturient animals is provided on the GOV.UK website: Pregnancy: advice on contact with animals that are giving birth. Public Health Wales have issued similar guidance: Advice issued to pregnant women during lambing season - Public Health Wales (nhs.wales)

An interesting ongoing investigation in which there may be possible zoonotic or zooanthroponotic implications comprises the detection of parvovirus in sheep.

Unusual presentation and detection of a protoparvovirus in a lamb

A six-month-old lamb was submitted to Starcross Veterinary Investigation Centre to investigate the cause of death. Another lamb had died, and approximately 20 lambs within the group of 60 were losing condition and diarrhoeic. On necropsy the submitted lamb was found to have died from pneumonia caused by *Mannheimia haemolytica* and *Mycoplasma ovipneumoniae*. Histopathological examination revealed chronic parasitic gastroenteritis caused by both worms and coccidia, which would account for the poor condition of the lamb and may have predisposed to the pneumonia.

The lamb also had a dermatitis affecting the lips. Orf (which is caused by parapox virus) was suspected. On Electron Microscopy a parvovirus was detected, but not parapox virus.

Histopathological examination of a section of affected skin also resulted in the detection of *Dermatophilus congolensis* (a bacterium which causes infection of the skin in animals). Next generation sequencing revealed the presence of two parvoviruses: a parvovirus related to Flumine parvovirus 21 and a protoparvovirus. On sequencing there was also no evidence of parapox virus. The source of the two parvoviruses was uncertain; river water was one potential possibility as Flumine parvovirus 21 has been detected in river waters (in the literature). These lambs were at pasture and the only source of water was a stream that runs through the farm and which has a sewage works beside it. Sheep drink downstream from the treated sewage discharge point. Overspills of untreated sewage have also been observed.

Similar viruses to our sequenced protoparvovirus have been detected in a child with diarrhoea in Tunisia, and in the faeces of healthy sheep and goats in Hungary. The viruses detected from sheep and goats, including the virus detected in this case, are very closely related to the human virus, [99.5% amino acid identity for the NS1 (non-structural protein) and 93.1% for the VP1 (virus capsid protein) for the virus detected in this case] and according to the literature, may have zoonotic potential.

Additional testing of faeces, small intestinal content, liver, kidney, and lung from this lamb using a PCR developed following our initial sequencing was positive for protoparvovirus in all samples, indicating systemic infection, however it is unclear what pathological effects are caused by this virus in sheep, and further work needs to be done. Further faecal sampling on farm of lambs in the same management group revealed positive protoparvovirus PCR results in 3/10 animals, indicating wider circulation in the flock.

Further work is also required to establish if this protoparvovirus is present in sheep in other flocks in Great Britain. If so, further epidemiological studies will be required to determine zoonotic or zooanthroponotic potential.

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. The United Kingdom Food Security Report 2021 indicated that there were 54,979 laboratory-confirmed infections in 2020, 68,006 in 2019, and 67,984 in 2018. Note, there may have been an impact of the COVID-19 pandemic on the 2020 figures.

This Zoonoses and Veterinary Public Health 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

In Q1 2023 there were a total of 125 *Campylobacter* isolates identified by the APHA Starcross laboratory, which were mainly from ruminant abortions and comprised:

- bovine – a total of 6 isolates: 1 *C. fetus venerealis intermedius*, 1 *C. fetus fetus*, 2 *C. jejuni*, and 2 *C. sputorum*
- ovine – a total of 119 isolates: 4 *C. coli*, 106 *C. fetus fetus*, and 9 *C. jejuni*

Scotland

SRUC Veterinary Services had a total of 115 *Campylobacter* isolates during Q1 2023 which were:

- bovine – there was 1 isolate which was *C. fetus venerealis intermedius*
- ovine – a total of 15 isolates: 11 *C. fetus* not-typed, 2 *C. jejuni*, 1 *C. coli,* and 1 *C. sputorum*
- canine – a total of 89 isolates: 70 *C. upsaliensis,* 15 *C. jejuni,* 2 *C. coli,* 1 *C. lari*, and 1 non-typed *Campylobacter* sp.
- feline – a total of 8 isolates: 2 *C. upsaliensis* and 6 *C. jejuni*
- zoo animals – a total of 2 isolates: 1 *C. upsaliensis* (from a snow leopard) and 1 *C jejuni* (from a red bellied 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 January and March 2023, a total of 85 kidney specimens (kidneys from 11 cattle, 72 pigs, and 2 foxes) were examined by real-time PCR for pathogenic leptospires. There were no positive kidney test results. 14 of the submitted samples (3

cattle samples and 11 pig samples) were unsuitable for testing (most of these were too autolysed).

2. In Q1 2023, a total of 790 serum samples from a range of species were tested for *Leptospira* antibodies. A summary of the serology findings for dogs, pigs, and cattle is provided in Table 2. 140 canine sera were tested for export purposes and 38 for diagnostic purposes. 138 porcine samples were tested for *L*. Bratislava; 426 bovine samples were tested for *L*. Hardjo bovis.

Table 2. Single *Leptospira* serovars tested in dogs, pigs, and cattle – expressed as percentage positive for the number of samples tested for each serovar

Table notes:

- for each year, Q1 is the period from January to March
- more than one serovar may be detected in a serum sample
- abbreviations used in this table:
    - Canine E. = canine export (dogs tested for export purposes)
    - Canine D. = canine diagnostic (dogs tested for diagnostic purposes)

Species	Serovar	Total tested: Q1 2023	% Positive	Total tested: Q1 2022	% Positive
Canine E.	*L*. Canicola	140	11.4	122	3.3
Canine E.	*L*. Icterohaemorrhagiae	26	15.4	24	0
Canine D.	*L*. Australis	12	75	32	28.1
Canine D.	*L*. Autumnalis	11	0	24	4.2
Canine D.	*L*. Bratislava	38	7.9	44	6.8
Canine D.	*L*. Canicola	28	28.6	48	2.1
Canine D.	*L*. Copenhagenii	33	24.2	52	15.4
Canine D.	*L*. Grippotyphosa	6	33.3	19	10.5
Canine D.	*L*. Icterohaemorrhagiae	32	6.3	45	0
Canine D.	*L*. Pomona	6	0	18	5.6
Canine D.	*L*. Sejroe	7	57.1	9	0
Porcine	*L*. Bratislava	138	24.6	78	16.7
Bovine	*L*. Hardjo bovis	426	2.6	353	9.1

In addition to single serovars, Leptospira pools (multiple serovars) are tested on a significant number of canine, porcine, and bovine samples. Pooled serovars are not included in the above data.

3. Between January and March 2023 there were 7 bulk *L.* Hardjo antibody milk tests (for monitoring purposes) which gave the following results: 2 (28.6%) were negative, 0 (0%) were low positive, 1 (14.3%) was mid positive and 4 (57.1%) were high positive.

   For comparison, between January and March 2022 there were 11 bulk *L.* Hardjo antibody milk tests with the following results: 4 (36.5%) were negative, 4(36.5%) were low-positive, 1 (9%) was mid-positive and 2 (18%) 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 years difficult.

2.3 Mycobacteria (excluding bovine cases of *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 Official Veterinarians at abattoirs.

Our testing protocol has changed and since 30 March 2022, all new submissions from non-bovine animals have been tested by PCR which detects the *M. tuberculosis* complex and *M. bovis*. If positive for the *M. tuberculosis* complex and *M. bovis*, the sample is sent for culture to harvest growth to establish the WGS clade of *M. bovis*.

If positive for the *M. tuberculosis* complex and negative for *M. bovis*, an unvalidated PCR for *M. microti* is carried out. If the PCR is positive for *M. microti*, there is no further testing. If the PCR for *M. microti* is negative, culture is carried out to establish the Mycobacterium present (possibilities include other members of the *M. tuberculosis* complex such as *M. tuberculosis* or *M. caprae*).

This means that we will not be receiving results for a wide range of *Mycobacterium* sp. as previously. A summary of potentially zoonotic non-statutory mycobacteria identified during the calendar year will be provided in the annual (Q4) report.

An interesting case which was investigated during Q1 2023 is described below.

Mycobacterium microti in a cat

Mycobacterium microti was found to be the cause of granulomatous skin lesions in a two-year-old cat which was submitted to APHA for post mortem examination. The cat was a house cat, had never been outside, and was fed on a commercial diet. The cat had presented with a skin lesion at the private veterinary surgery. Histopathological examination of the biopsied lesion revealed a multifocal to coalescing chronic, active granulomatous dermatitis and cellulitis. Acid fast organisms were identified following a Ziehl-Neelsen stain which raised concerns regarding TB infection. At this stage the cat was euthanased and submitted to APHA. Post mortem findings comprised multifocal to coalescing nodules within the skin overlying the gastrocnemius muscle, an enlarged

popliteal lymph node, and 1mm to 2mm diameter multifocal to coalescing white nodules throughout the lungs. PCR identified the causative organism as *M. microti*. Rodents including mice and voles are the reservoir of infection and cats contract the disease through ingestion or bites. Infection of other animals including pigs, ferrets and dogs have been described. *M. microti* is considered to be a zoonotic pathogen which can infect humans through spillover hosts such as cats and dogs or faecal contamination of the environment.

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 placentae (or foetal samples). 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

Comparisons of Q-fever data in quarter 1 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.

During the period January to March 2023 a total of 43 samples (from 29 submissions) were tested for the presence of *Coxiella burnetii* by PCR at the APHA Q fever National Reference Laboratory, Penrith Veterinary Investigation Centre. The samples comprised 16 placental samples, 20 foetal fluid samples, 1 foetal stomach contents sample, 3 spleen samples, 1 kidney sample, 1 brain sample, and 1 stomach contents sample. The *C. burnetii* PCR has been validated for placental and foetal fluid samples, although other samples are also tested.

These samples were from 12 cattle, 12 sheep, and 5 goat submissions. 10 samples tested positive for *C. burnetii* (4 cattle samples from 3 farms, 0 sheep samples and 6 goat samples from 1 farm). In addition, the detection of *C. burnetii* in 11 bovine bulk milk samples by PCR at an overseas laboratory (9 from English dairy farms, 2 from Welsh dairy farms) were reported to APHA. Further information about the positive 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 submission numbers and serotypes from porcine diagnostic material submitted during the

period January to March 2023 are shown below, with data for the previous two years (Q1 2022 and Q1 2021) for comparison.

Table 3. *Streptococcus suis* serotypes from porcine diagnostic material

Table note:

- UT = untypeable

	1	2	3	4	5	7	8	9	13	14	16	19	24	33	34	UT	Total
Q1 2021	3	11	1	-	2	13	2	-	1	4	1	-	1	1	-	3	**43**
Q1 2022	5	10	2	-	-	2	-	1	-	3	-	-	-	-	-	5	**28**
Q1 2023	2	14	2	3	-	3	-	-	-	-	-	1	-	-	1	5	**31**

Serotype 2 was the most common serotype in Q1 2023 and Q1 2022 and there was less spread across serotypes in Q1 2023 and Q1 2022 compared to Q1 2021. Serotype 7 was the most common serotype in Q1 2021 with Serotype 2 second commonest. Interestingly there was a high proportion of untypeable samples in Q1 2023 and Q1 2022.

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 March 2023, 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 January to March 2023 38 ovine samples and no caprine samples were submitted for Toxoplasma serology. There were positive titres in 16 of the ovine samples. Toxoplasma fetopathy figures for sheep and goats are provided in Table 1.

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:

Guidelines on the roles and responsibilities of agencies involved in 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 Public Health England 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 March 2023 APHA has assisted a multidisciplinary Outbreak Control Team with an incident of cryptosporidiosis linked to a milk vending machine. The investigation is ongoing and an update will be provided in the next quarterly report.

Quarter 2 is traditionally the busiest time for cryptosporidiosis investigations and is related to the frequency of open farm visits undertaken by families or school groups around the Easter holiday and Bank Holidays. 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 appropriate hand-washing facilities including soap, rather than antimicrobial gel (which is not effective for this pathogen) is extremely important.

3.2 STEC

Shiga toxin-producing *Escherichia 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 Q1 2023 APHA continued to assist with a STEC O157 incident which commenced in Q4 2022. Human cases of diagnosed STEC O157 from earlier incidents in the summer 2022 and the latest incident (October – November 2022) had an identical whole genome sequence (WGS) - all these human cases were epidemiologically linked to the same Open Farm. In Q4 2022 an APHA Veterinary Investigation Officer (VIO) visited the farm at the request of the Incident Management Team. Forty fresh environmental (floor, field, or pen) faeces samples (from a range of animal species) were collected. These samples comprised sheep, goat, cattle, pig, alpaca, rabbit and guinea pig faeces. *Escherichia coli* O157 was not detected in 39 of the samples, however there was a suspect organism cultured by APHA in one of the pig samples. This sample underwent further investigation including WGS analysis which confirmed the pig isolate was an identical strain to the human cases.

Further multidisciplinary team meetings took place with discussion of the recommendations for improvements made within the APHA farm visit report. This report advised the risk to the public from zoonotic infections could be reduced further by making some improvements to supervision of animal contact, improving handwashing facilities, and making improvements to some of the animal exhibits. Reference was made to the Industry Code of Practice for visitor attractions. The three pigs (which were all healthy) in the pen that the positive sample originated from were also moved off farm to another location. The pig pen was thoroughly cleaned and disinfected, ensuring no public access in the interim. APHA advised that although problems on farm had been identified and remediated, there are continuous potential ongoing zoonotic risks when members of the public visit open farms, and it was important to continue to follow the guidelines within the Industry Code of Practice. The farm successfully operated over the Easter period.

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.

The guidance for the public health management of toxigenic *C. ulcerans* in companion animals in England is now available online:

[Public health management of toxigenic C. ulcerans in companion animals]

The tables below contain data from tables in Appendix 4 of the companion animal guidelines, and include the years 2017 to 2021. The data for 2022 is still being analysed and will be published in a later Zoonoses and Veterinary Public Health report.

Table 4a. Toxigenic *C. ulcerans* human index cases, with positive contacts for animals and humans, 2017 to 2021

Table note:

- the data refers to positive human index cases in England

Year	Human index cases	Positive contacts: animal	Positive contacts: human
2017	1	0	0
2018	3	0	0
2019	8	1	2
2020	1	0	0
2021	7	2	0
Total	**20**	**3**	**2**

Table 4b. Toxigenic *C. ulcerans* animal index cases, with positive contacts for animals and humans, 2017 to 2021

Table note:

- the data refers to positive animal index cases in England

Year	Animal index cases	Positive contacts: animal	Positive contacts: human
2017	1	0	0
2018	2	0	0
2019	7	0	0
2020	2	0	0
2021	2	0	0
Total	**14**	**0**	**0**

The animal index cases and animal contacts are companion animals, cats and / or dogs. Of note, for the cases investigated for the five-year period 2017 to 2021, there were no positive animal contacts and no positive human contacts for animal index cases; whereas for the human index cases there were both positive human contacts and positive animal contacts, as detailed in Table 4a.

During Q1 2023 APHA were involved with assisting the UKHSA Incident Management Teams with four toxigenic *Corynebacterium ulcerans* incidents which comprised three human index cases and one animal index case. 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.

The three human index cases (unrelated incidents) presented with leg ulcers. All three cases had close contact with dogs. Follow-up of the dogs resulted in no detection of *C. ulcerans* for the first case, and the detection of toxigenic *C. ulcerans* for the second case. For the third case the three contact dogs were not amenable to swabbing. All three human cases recovered and humans that had been in close contact with the index case tested negative. The in-contact positive dog (second human index case) was treated with a cefovecin antibiotic, and tested negative following treatment, prior to clearance swabs being taken. The clearance swab tested positive for toxigenic *C. ulcerans* and the dog is being treated with a different antibiotic. An update will be provided in the next quarterly report.

The animal index case involved a four-year-old male Labrador, the only pet in the household. This dog had a history of chronic enteropathy and chronic respiratory disease. There had been regular visits to the vet during the last year. Respiratory swabs taken in December 2022 resulted in no significant bacterial growth. Silent regurgitation – micro-aspiration may have caused a chronic pneumonia.

In February 2023 the dog presented with a recurrent cough, with sputum expelled, and underwent a referral veterinary investigation. Suspect *C. ulcerans* was detected by a private veterinary laboratory in a fluid sample obtained from the right lung, in addition to a sample of sputum submitted a week earlier. The UKHSA Respiratory and Vaccine Preventable Bacteria Reference Unit confirmed the isolate was a toxigenic *Corynebacterium* sp.

The dog was initially treated with amoxicillin-clavulanic acid for four days, then was changed to a 16-day course of erythromycin. Human contacts were followed-up by the Health Protection Team and all human contacts that required swabbing returned a negative result. APHA followed up a dog from another household which had close contact with the index case during the infectious period. This second dog was healthy and bacteriology on an oropharyngeal swab resulted in no detection of *C. ulcerans*. The clearance oropharyngeal swab from the index dog also resulted in no detection of *C. ulcerans*, and the dog was reported to have recovered.

3.4 Q fever *(Coxiella burnetii)*

During Q1 2023 there were three separate dairy farms where *Coxiella burnetii* was detected by PCR in a placental sample from an aborted cow. Two of these farms were farms which had performed an industry-linked *C. burnetii* bulk milk PCR test which had returned a positive result. The bovine abortion investigations by APHA were on two cows (one from each farm) which had aborted following the bulk milk testing – these investigations were to further assist the private veterinary surgeons of the two farms to determine whether *C. burnetii* was involved in these two abortions. Unfortunately the placental samples did not include cotyledons and were too autolysed for meaningful histopathological examination.

There was one goat farm which submitted several aborted goat kids to APHA Starcross for investigation. On this farm 25 to 30 housed Boer goats were due to kid during February to April. In mid-January some Boer goats were noted to have 'wet tails' and abortions were suspected but no foetuses were found. Following this four does aborted third trimester foetuses which comprised three sets of twins and one set of triplets, with placentae. The does were reported to appear well in themselves. On post mortem examination the placentae and foetuses were grossly unremarkable, although some of the placentae and foetuses were severely autolysed. Acid fast organisms resembling *Coxiella* sp. were observed on MZN smear of three placental samples and *C. burnetii* was detected in placental and foetal fluid samples by PCR. There was no evidence of placentitis on histopathological examination, although these examinations were compromised by autolysis. There were no other significant bacteria detected in cultures nor any other pathogens detected by histopathological examination.

For all ruminant abortion investigations and reports of the detection of *C. burnetii* APHA provides comprehensive advice to private veterinary surgeons including information about optimising ruminant abortion investigations, laboratory testing, and zoonoses advice for private vets to pass on to their farmer clients.

3.5 Avian chlamydiosis (psittacosis)

Chlamydia psittaci, the causative agent of avian chlamydiosis (psittacosis) can cause serious human illness. The disease has been described in many species of birds, particularly in parrots, parakeets, budgerigars and cockatiels. Other commonly affected birds include pigeons and doves. Ducks and turkeys may also be affected, but chickens less frequently. Birds can carry the organism without any signs of disease, or they can become mildly to severely ill. Information is available at the following links:

https://www.gov.uk/guidance/psittacosis

https://www.hse.gov.uk/agriculture/zoonoses-data-sheets/psittacosis.pdf

Avian chlamydiosis (in psittacines) is reportable to APHA.

In Q1 2023 there were no diagnoses of avian chlamydiosis recorded in the VIDA database, nor any reports of avian chlamydiosis in psittacine birds.

4. *Brucella canis*

Since July 2020 there has been a large increase in the number of incidents of canine brucellosis due to infection with *Brucella canis*. APHA, in liaison with health protection agencies across Great Britain, has been involved in investigating these. The UK Chief Veterinary Officer advised on this potential zoonotic disease in a letter published in the Vet Record in February 2021. Changes to the Zoonoses Order in 2021 included an amendment which added dogs to the list of animals in which the detection of *Brucella* sp. is reportable.

Once a dog is infected with *B. canis* the only way to eliminate the risk of disease transmission is euthanasia, whether or not the dog is showing clinical signs. Treatment is not recommended as it is very difficult to cure an infected dog. If owners choose to pursue treatment, it is important to note that this can be expensive as it involves several weeks of therapy with antibiotics. Antibiotics in combination (often referred to as dual antibiotic therapy) provide the best option, but even this is often unsuccessful at eliminating the infection. There is also no way of determining that treatment has been successful. Recurrence of disease is common, even after continual use of antibiotics, as the bacteria can hide in parts of the body that are hard for antibiotics to reach. Therefore, the dog may remain infected, be susceptible to recurrence of illness, and be an ongoing source of infection for other dogs and humans even if outwardly healthy.

In the first quarter of 2023, there were 22 epidemiologically separate incidents reported to the APHA *Brucella* National Reference Laboratory where there has been strong evidence of infection with *Brucella canis*. Investigations into these incidents has resulted in the testing of 103 dogs in total, of which 43 dogs were found to be serologically positive for *B. canis*. Please note that many of these cases have been determined on the basis of serology and epidemiology rather than definitively confirmed as infected by bacterial culture, which is not an appropriate frontline diagnostic test.

Compared to the same period last year, the number of incidents in the first quarter for 2023 has increased more than two-fold. This increase is most-likely due to the greater awareness of the presence of *B. canis* within the UK. Clinical signs of infection have varied between the 22 seropositive (index) dogs: 19 dogs had no clinical signs, one dog presented with discospondylitis, and two dogs presented with spinal pain.

21 of the incidents identified during this quarter were associated with the importation of dogs into the UK. The majority of these imported dogs originated from Romania (14), but they also came from Bosnia (1), Greece (1), Japan (1), Portugal (1), Russia (1), Serbia (1), and Spain (1).

The index case of incident 22 comprised bacteriological isolation of *B. canis* from cultures of blood from a puppy (discospondylitis case). The puppy was also seropositive for *B. canis.* It was born at an unlicensed breeding premises in Wales. This is an ongoing and complex multidisciplinary investigation involving APHA, Public Health Wales, UKHSA and Local Authority teams. This far in the investigation 82 related dogs have been tested and 22 were found to be serologically positive (including the puppy). An update will be provided in the next Zoonoses and Veterinary Public Health quarterly report.