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Annual Report 2023

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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 summarise the surveillance activities of the Animal and Plant Health Agency (APHA), APHA partner post mortem providers and Scotland's Rural College (SRUC) Veterinary Services in Scotland, for zoonoses and infections shared between humans and animals in Great Britain, using data (which primarily relates to farmed animal species) gathered by the network of Veterinary Investigation Centres. Quantitative diagnostic data for all of Great Britain is provided by the Veterinary Investigation Diagnosis Analysis (VIDA) surveillance system. Summaries of veterinary public health investigations into incidents and outbreaks of zoonotic disease and associated activities are also included. This report covers the relevant VIDA data for 2023 with the provision of the total data for the 12-month period between January and December 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. The FZ2100 project also uses returns from scanning surveillance projects.

This report provides information about non-statutory zoonoses, as well as *Coxiella burnetii* (Q fever), avian chlamydiosis (in psittacines), and brucellosis in dogs, which were made reportable in Great Britain in 2021. The detection of *C. burnetii* and brucellosis in dogs were made reportable through amendments to the Zoonoses Order (2021). The psittacosis (Ornithosis) Order is the legislation that covers avian chlamydiosis. 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 specified animal species, for example, TB, which is notifiable in all mammals. Information concerning notifiable and other reportable zoonoses is recorded elsewhere, some under specific projects such as FZ2000 (*Salmonella*).

1. General scanning surveillance

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

Table 1 (collated 06 February 2024) summarises clinical diagnoses of zoonoses and infections shared between animals and humans from specimens submitted to APHA, APHA partner post mortem providers and SRUC Veterinary Investigation Centres for the 12-month period between January and December 2023. The table also compares the latest findings with the data for the preceding two years, 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 Diagnosis 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 Great Britain.

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

Table notes:

- '-' in a cell indicates 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	45	23	27	27	-	-	-	-	-	-
258 & 659	*Brachyspira pilosicoli* / intestinal spirochaetosis	68	51	68	-	-	-	67	1	-	-
013	*Campylobacter* fetopathy	73	117	172	7	165	0	-	-	0	0
282	Chlamydiosis (*C. psittaci*)	1	2	0	-	-	-	-	0	-	-
014	*Chlamydia abortus* fetopathy	214	146	150	1	146	3	-	-	0	0
732	*Corynebacterium pseudotuberculosis (CLA)*	27	29	17	-	13	4	-	-	-	-
318	Cryptosporidiosis	357	252	243	224	17	1	1	0	0	0
362	Cysticercosis	4	2	0	-	0	-	-	-	-	-
193	Dermatophilus infection	4	4	6	3	3	0	-	-	0	0
022, 133 & 615	Erysipelas	22	24	23	-	4	0	16	3	0	-
371, 372 & 373	Fasciolosis	230	155	166	85	68	7	-	-	6	0
363	Hydatidosis	0	0	0	-	0	-	-	-	-	-

VIDA codes	Diagnosis	2021	2022	2023	Cattle	Sheep	Goats	Pigs	Birds	Misc.	Wildlife
015, 136 & 139	Leptospirosis (all categories)	4	5	5	3	0	0	1	-	0	1
016, 140, 150, 189 & 711	Listeriosis (all categories)	177	128	116	30	79	5	0	0	1	1
217	Louping ill	23	36	32	4	21	-	-	4	3	-
225	Orf (parapox virus)	31	25	36	-	35	1	-	-	0	-
152,153, 157, 158	*Pasteurella multocida* pneumonia /pasteurellosis	219	217	297	201	62	0	31	3	0	0
223	Pseudocowpox (parapox virus)	0	0	0	0	-	-	-	-	-	-
027 & 262	Q Fever/*Coxiella burnetii*	3	3	8	7	0	1	-	-	0	0
374	Red Mite *(Dermanyssus gallinae)*	12	4	3	-	-	-	-	3	-	-
195	Ringworm	5	3	5	3	1	0	0	0	0	1
379, & 392	*Sarcoptes scabei infection*	3	2	1	0	-	0	1	-	0	-
024, 171, 172 & 644	Streptococcal infection (excluding bovine mastitis)	127	96	123	0	6	0	104	3	2	8
745	Swine influenza	50	30	49	-	-	-	49	-	-	-
026 & 315	Toxoplasmosis (incl. fetopathy)	162	135	167	-	167	0	-	-	0	0
142	Tuberculosis (excl. bovine *M. bovis*)	28	23	19	-	-	0	0	4	11	4
034 & 154	Yersiniasis (incl. fetopathy)	20	15	17	-	7	1	7	0	2	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 findings of zoonotic interest from material submitted to the APHA (England and Wales), APHA partner post mortem providers and SRUC Veterinary Services (Scotland) during 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, which can be found on the APHA VET Gateway website.

The species expert group quarterly reports provide comprehensive details on scanning surveillance activities throughout 2023, covering avian, cattle, small ruminant, pigs, miscellaneous and exotic farmed species, and wildlife.

Leptospirosis in a jaundiced piglet

Seven deaths in a litter of 14 piglets in a small breeder-finisher herd prompted submission of the most recent piglet to die at three weeks of age in October 2023. The litter was noted to be growing less well than expected, although the remaining piglets were not showing other clinical signs and appeared to be eating well. The sow was in good health. The sow and her piglets were housed on straw with concentrate pig creep feed being offered. No vaccines were being used and no treatments had been given.

The submitted piglet had a yellow tinge to the snout, oral mucous membranes and sclera. The subcutaneous tissues were markedly yellow. Peritoneal and pericardial fluids were also yellow. In addition to the generalised jaundice, the most striking lesions were pinpoint haemorrhages over the surfaces of both kidneys, with congestion and haemorrhages extending into the parenchyma to the corticomedullary junction. No other significant findings were noted at post mortem examination.

The marked jaundice in combination with the kidney pathology were suggestive of systemic leptospirosis and PCR testing detected pathogenic Leptospira serovar DNA in the kidney, confirming this diagnosis. There was no evidence of septicaemia on bacteriological testing from several sites. Other causes of jaundice and kidney haemorrhages were ruled out. Testing sera from recovered or in-contact pigs in the cohort for antibodies to Leptospira serovars was offered to identify the specific serovar involved in the disease.

Although leptospirosis diagnoses are not numerous, the autumn occurrence of systemic leptospirosis has been noted in previous years and may relate to rodent feed sources

becoming scarce and ambient temperatures falling, resulting in rodents (and possibly other wildlife) coming into greater contact with pigs when seeking food and shelter.

Advice was provided on the control of leptospirosis and on reducing the risk of zoonotic leptospire infection. Effective rodent control is particularly important as urine from infected rodents also represents a transmission risk to people. The advice regarding the zoonotic risk is similar to that for other zoonotic agents present on pig farms. People working with pigs should routinely wear outer clothing and boots dedicated to the pig unit and practise good personal hygiene. Gloves should be used to handle afterbirths, aborted and stillborn piglets, and when assisting at farrowings; gloves are also recommended for artificial inseminations and assisted matings. The particular concerns relevant to leptospire infection relate to contamination of people's mouths, noses, eyes or open wounds by pig urine, afterbirth and aborted or stillborn piglets. Further information can be found at https://www.gov.uk/guidance/leptospirosis.

Campylobacteriosis was the most common cause of ovine abortion in 2023

Analysis of ovine abortion data for Great Britain held in the APHA's Veterinary Investigation Diagnosis Analysis database found that campylobacteriosis was the most common cause of abortion in sheep for the 2023 lambing season, closely followed by toxoplasmosis and *Chlamydia abortus* (the cause of ovine enzootic abortion). The prevalence of toxoplasmosis in 2023 was similar to previous years whereas cases of enzootic abortion have gradually decreased in recent years. Abortion caused by *Campylobacter* species tends to peak every three to four years; the exact reason for this is unknown but is suspected to be the result of the gradual replacement of immune animals with naïve replacements. As well as abortion, infection can also result in the birth of live, weak lambs. Up to 20 % of a group may abort but ewes generally remain well in themselves, although infection with *C. jejuni* can occasionally cause a mild transient diarrhoea.

Campylobacter fetus and *C. jejuni* are the most common species associated with sheep, but occasionally other isolates, such as *Campylobacter coli* and *Campylobacter sputorum*, may be found, all of which may inhabit the ovine gastrointestinal tract and gall bladder as commensals. The estimated prevalence of *Campylobacter* species in sheep is 25 to 30 % and a seasonal pattern is apparent for *C. jejuni*, with peak prevalence in the summer months. In agreement with previous studies, *C. fetus* was the most common species associated with ovine abortion in 2023, accounting for 91 % of *Campylobacter* abortions. *C. jejuni* accounted for 5.6 %.

Increased *Coxiella burnetii* PCR tests on bovine samples

In 2023 there was a notable increase in bovine test requests for the APHA *Coxiella burnetii* PCR test. There are several reasons for this increase. APHA are part of an international consortium where extensive research is in progress to improve our understanding of *C. burnetii*. The aim of this research is to improve molecular surveillance techniques for *C. burnetii* and to assess host adaptation and virulence factors of different *C. burnetii* strains, including the zoonotic potential of different *C. burnetii* strains in Europe including the UK. The APHA Q fever National Reference Laboratory have been performing PCR testing on a range of tissue samples from bovine and caprine abortions which has increased the number of *C. burnetii* positive samples, especially those for cattle submissions given that these are substantially higher than goat submissions. The samples which have resulted in the detection of *C. burnetii* will undergo additional research.

The veterinary profession is also more aware of *C. burnetii*, in part related to an Industry promotion, where free bovine bulk milk *C. burnetii* PCR tests have been supported by a pharmaceutical company. This PCR test is performed in an overseas laboratory. Detection of *C. burnetii* in bovine bulk milk from British herds is statutorily reportable to APHA. On reporting to APHA some private vets have been interested in performing additional investigations to try and better understand the potential role of *C. burnetii* in cases of bovine abortion and stillbirth. Thus increased testing via APHA Veterinary Investigation Centres for the investigation of bovine abortions and bovine stillbirths has also occurred. These investigations are comprehensive and include testing for a range of bovine abortion pathogens.

The data for *C. burnetii* is presented in section 2.4 of this report. It is important to note that an increase in the detection of *C. burnetii* does not necessarily equate to an increased prevalence.

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 2023 there were a total of 142 *Campylobacter* isolates (5 in Quarter 4) identified by the APHA Starcross laboratory, which were mainly from ruminant abortions and comprised:

- Bovine – a total of 9 isolates: 4 *C. fetus venerealis intermedius*, 1 *C. fetus fetus*, 2 *C. jejuni*, and 2 *C. sputorum*. In Quarter 4 there were 2 *C. fetus venerealis intermedius*.
- Ovine – a total of 133 isolates: 4 *C. coli*, 120 *C. fetus fetus*, and 9 *C. jejuni*. In Quarter 4 there were 3 *C. fetus fetus*.

Scotland

SRUC Veterinary Services had a total of 348 *Campylobacter* isolates during 2023 (80 in Quarter 4), which were:

- Bovine – a total of 6 isolates: 3 *C. fetus venerealis intermedius*, 1 *C. fetus* not-typed, 1 *C. jejuni*, and 1 *C. sputorum.* In Quarter 4 there were 2 *C. fetus venerealis intermedius* and 1 *C. fetus* not-typed .
- Ovine – a total of 22 isolates: 17 *C. fetus* not-typed, 2 *C. jejuni*, 2 *C. coli,* and 1 *C. sputorum.* In Quarter 4 there was 1 *C. coli.*
- Canine – a total of 291 isolates: 216 *C. upsaliensis,* 66 *C. jejuni,* 3 *C. coli,* 3 *C. lari*, and 3 non-typed *Campylobacter* sp. In Quarter 4 there were 49 *C. upsaliensis,* and 19 *C. jejuni.*
- Feline – a total of 27 isolates: 13 *C. upsaliensis,* 13 *C. jejuni,* and 1 *C. lari.* In Quarter 4 there were 3 *C. upsaliensis* and 5 *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). There were no isolates in Quarter 4.

2.2 Leptospirosis

Targeted surveillance by APHA for leptospirosis is variously achieved by analysis of results from:

1. RT(real-time)-PCR for pathogenic leptospires on appropriate diagnostic samples.

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).

3. Bulk milk tank antibody testing by enzyme-linked immunosorbent assay (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 2023, a total of 247 kidney specimens (kidneys from 46 cattle, 191 pigs, 1 deer, 6 foxes and 3 wild boar) were examined by real-time PCR for pathogenic leptospires. There were two positive kidney test results, one from a pig and one from a fox. 29 of the submitted samples (13 cattle samples and 16 pig samples) were unsuitable for testing (these were too autolysed).

2. During 2023, a total of 2,379 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. 471 canine sera were tested for export purposes and 170 for diagnostic purposes. 511 porcine samples were tested for *L.* Bratislava; 1,041 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:

- 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)
- The total tested columns are the numbers of samples tested for each serovar
- The % positive is the percentage of each tested serovar which gave a positive result, for example 11.5 % of 471 canine export samples tested were positive for *L.* canicola antibodies

Species	Serovar	Total tested: 2023	% Positive	Total tested: 2022	% Positive
Canine E.	*L.* Canicola	471	11.5	529	6.6
Canine E.	*L.* Icterohaemorrhagiae	53	9.4	47	2.1
Canine D.	*L.* Australis	44	86.4	81	61.7
Canine D.	*L.* Autumnalis	43	4.7	70	2.9
Canine D.	*L.* Bratislava	161	10.6	159	8.8
Canine D.	*L.* Canicola	148	26.4	167	13.8
Canine D.	*L.* Copenhagenii	153	36.0	168	29.8
Canine D.	*L.* Grippotyphosa	17	35.3	47	19.1
Canine D.	*L.* Icterohaemorrhagiae	155	10.3	158	8.9
Canine D.	*L.* Pomona	18	5.6	44	4.5
Canine D.	*L.* Sejroe	14	42.9	23	26.1
Porcine	*L.* Bratislava	511	24.1	283	18.7
Bovine	*L.* Hardjo bovis	1,041	5.5	815	7.0

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 December 2023 there were 32 bulk milk *L.* Hardjo antibody tests (for monitoring purposes), which gave the following results: 7 (21.9 %) were negative, 2 (6.3%) were low positive, 5 (15.6%) were mid positive, and 18 (56.2%) were high positive.

For comparison, between January and December 2022 there were 47 bulk milk *L.* Hardjo antibody tests (for monitoring purposes) which gave the following results: 17 (36.2%) were negative, 7 (14.8%) were low positive, 6 (12.8%) were mid positive and 17 (36.2%) 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 has increased, particularly from pets and camelids. Samples from pigs are mainly submitted by Official Veterinarians at abattoirs.

The APHA 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 testing protocol means that we do not receive results for as wide a range of non-statutory *Mycobacterium* sp. as compared to the historic testing protocols.

During 2023 a total of 19 submissions (Table 1) had a VIDA-coded diagnosis of tuberculosis. These were diagnostic submissions of animal carcases or tissue samples where suspicious lesions had been found on post mortem examination. These were from 4 bird submissions, 11 miscellaneous species submissions, and 4 wildlife submissions. The bird submissions (3 chickens and 1 wild bird of unknown species) were cases of avian tuberculosis, which is caused by infection with *M. avium* ssp. *avium.* The miscellaneous species comprised 1 alpaca, and 10 domestic cats. *M. microti* was detected in the alpaca and in 4 cats. *M. bovis* was detected in 6 cats. The wildlife submissions were of deer and in all 4 *M. bovis* was detected.

During 2023 samples from a range of species were examined by APHA. These include the above non-bovine mammalian species with findings as follows. This data was accessed on 09 February 2024 and may change as some cultures were still ongoing from Q4 2023:

- Alpaca: 7 *M. bovis*, 2 *M. microti*
- Deer: 68 *M. bovis*, 7 *M. tuberculosis* complex
- Pig: 19 *M. bovis*, 5 *M. microti*, 1 *M. tuberculosis* complex
- Sheep: 7 *M. bovis*

- Goat: 27 *M. bovis*
- Cat: 13 *M. bovis*, 13 *M. microti*, 2 *M. tuberculosis* complex
- Ferret: 1 *M. microti*

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 Modified Ziehl-Neelsen (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. Find more information on Q fever for farmers.

Comparisons of Q-fever data with previous years should be made with caution because from April 2021 Q fever has been a reportable disease. In 2023 there was a notable increase in bovine test requests for the APHA *Coxiella burnetii* PCR test (commented on in section 1.2). It is important to note that an increase in the detection of *C. burnetii* does not necessarily equate to an increased prevalence.

During 2023 (January to December 2023) a total of 150 samples were tested for the presence of *Coxiella burnetii* by PCR. These 150 samples were from 100 cattle submissions (123 samples), 13 sheep submissions (15 samples) and 6 goat submissions (12 samples). The samples comprised 69 placental samples, 41 foetal fluid samples, 4 foetal stomach contents, 6 spleen samples, 2 brain samples, 1 kidney sample, 3 vaginal/uterine fluid samples and 24 vaginal swabs. At the APHA Q fever National Reference Laboratory the *C. burnetii* PCR has been validated for placental and foetal fluid samples, although other samples are also tested on agreement with the customer.

44 of the cattle samples tested positive for *C. burnetii* which were 18 placental samples, 2 foetal fluid samples, 1 spleen sample, 1 brain sample, 1 vaginal/uterine fluid and 21 vaginal swabs. The positive samples were from 35 submissions and these submissions were from 30 farms.

8 of the goat samples (2 placental samples and 6 foetal fluid samples) tested positive for *C. burnetii.* The positive samples were from 3 submissions and these submissions were from 2 farms. *C. burnetii* was not detected in the submitted sheep samples.

In 2023, the fetopathy due to *C. burnetii* VIDA code was assigned to 8 submissions (7 cattle submissions and 1 goat submission).

In addition, the detection of *C. burnetii* in 74 bovine bulk milk samples by PCR at an overseas laboratory (64 from English dairy farms, 9 from Welsh dairy farms and 1 from a Scottish dairy farm) were reported to APHA.

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 2023 are shown below, with data for the previous two years (2022 and 2021) for comparison.

Table 3. *Streptococcus suis* serotypes from porcine diagnostic material, 2021 to 2023

Table notes:

- UT = untypeable
- 1/2 = is a recognised distinct serotype which reacts with both 1 and 2 antisera
- for columns that refer to more than one serotype – for example 10, 11 – the number in brackets indicates the serotype

	1/2	1	2	3	4	5	6	7	8	9	10, 11	13, 14	16, 19	21, 24	33, 34	UT	Total
2021	-	15	32	6	3	2	-	22	5	5	1 (10) 1 (11)	2 (13) 8 (14)	1 (16)	1 (21) 1 (24)	1 (33) 1 (34)	7	**114**
2022	-	15	36	5	2	1	-	11	1	3	-	4 (14)	-	-	-	13	**91**
2023	1	7	36	5	5	-	2	10	2	-	-	3 (13) 3 (14)	1 (19)	-	2 (34)	9	**86**

Serotypes 1, 2, and 7 were the most common serotypes, with serotype 2 the most common serotype for all 3 years (2021, 2022, and 2023). Serotype 7 was second most common for 2021 and 2023, whilst serotype 1 was second most common in 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 Veterinary Investigation Centres. The findings presented below provide a summary of the serological status of samples submitted for diagnosis, monitoring and screening purposes during 2023 (January to December 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 is diagnosed through antigen (PCR) testing of placental cotyledon.

51 ovine samples and no caprine samples were submitted for Toxoplasma serology in 2023. Of the 51 ovine samples 26 were seropositive. 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.

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.

The Industry Code of Practice for preventing or controlling ill health from animal contact at visitor attractions is available on the National Farm Attractions Network website.

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 the UK Health Security Agency (UKHSA) and Public Health Wales (PHW) and in collaboration with the National Cryptosporidium Reference Unit, Swansea, and follow jointly agreed guidelines.

Consultant(s) in Public Health Medicine (CsPHM) lead on these zoonoses investigations in Scotland.

In 2023 APHA assisted with the public health investigation of seven *C. parvum* outbreaks of human disease linked with an animal origin (five in England and two in Wales). One of the outbreaks was an incident of cryptosporidiosis epidemiologically linked to a milk vending machine. Of the other human *C. parvum* outbreaks, three were epidemiologically linked to open farms, two to commercial farms (one of these had diversified into an open farm), and one to a farm shop premises which had animals on site. More information is available in the Zoonoses and Veterinary Public Health quarterly report for April to June 2023.
For two of the outbreaks APHA performed animal sampling (involving the collection of freshly voided faeces samples). This was for the on-farm vending machine investigation and for one of the open farm investigations. Testing of the animal samples resulted in the detection of *C. parvum* DNA which matched the human cases in both of these outbreaks.

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 and 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 (HSE). Determination of virulence factors, including shiga toxin genes 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 STECs or WGS types may be detected incidentally during the investigation of animal premises.

During 2023 APHA assisted with the investigation of two Shiga toxin-producing *Escherichia coli* (STEC) human outbreaks which were epidemiologically linked to separate animal-contact visitor attraction premises. For both outbreaks APHA visited the premises at the request of the Incident Management Team (IMT) and collected fresh environmental (floor, field, or pen) faeces samples from an epidemiologically appropriate range of animal species.

The first was a STEC O157 incident which commenced in Q4 2022. There was a suspect *E. coli* O157 cultured by APHA in a pig sample. This sample underwent further investigation including WGS analysis which confirmed the pig isolate was an identical strain to the human cases. Further information is available in the Zoonoses and Veterinary Public Health quarterly report for January to March 2023.

STEC O157 and STEC O26 were implicated in the second outbreak. There was a strong epidemiological link established for the cases with an animal-contact visitor attraction premises. The outbreak strains of STEC O157 and STEC O26 were not detected in the animal samples. Due to intermittent shedding and asymptomatic carriage of this organism, negative sampling results can only be interpreted as STEC O157 and STEC O26 were not detected on the day of sampling. They do not confirm absence of the organism on the premises. Further information is available in the Zoonoses and Veterinary Public Health quarterly report for July to September 2023.

For animal-contact visitor attraction premises, compliance with the Industry Code of Practice: Preventing or Controlling Ill Health from Animal Contact at Visitor Attractions is important to minimise the risk of human exposure to zoonotic pathogens of animal origin. The most commonly identified deficiencies at animal contact visitor attractions generally include: suboptimal handwashing facilities (number, accessibility, appropriateness); suboptimal supervision of animal contact; contamination of walkways with soiled animal bedding or faeces; and unclear demarcation of animal contact versus non-contact areas.

For both of these animal contact visitor attraction premises improvements were made to rectify identified deficiencies and both outbreaks were declared over by the relevant IMT.

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, skin lesions, nasal discharge and other anatomical sites of domestic pets such as dogs and cats. APHA and SRUC Veterinary Services in Scotland assist public health colleagues in the investigation of human cases of *C. ulcerans* where there has been animal contact, by liaising with the private veterinary surgeon and providing animal related advice.

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

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 the taking of and testing of surveillance swabs, antibiotic treatment, and post-treatment clearance swabs as appropriate. APHA also provides advice on health and safety procedures for private veterinary surgeons and pet owners, including information on cleaning of pet bedding and pet toys. Comprehensive information is available in the companion animal public health guidance (link above).

During 2023 APHA were involved in assisting the UKHSA Health Protection Teams with 39 toxigenic *Corynebacterium ulcerans* incidents. In addition APHA assisted with a feline animal index case that was located in Wales, working with Public Health Wales.

These 40 toxigenic *C. ulcerans* incidents comprised 11 human index cases and 29 animal index cases. The 29 animal index cases comprised 16 dogs, 9 cats, 3 horses and 1 hedgehog. During each quarter APHA assisted with human and animal index cases as follows:

- Q1 - 3 human index cases and 1 canine animal index case
- Q2 – 1 human index case and 3 animal index cases (2 feline index cases, 1 canine index case)
- Q3 – 3 human index cases and 6 animal index cases (2 canine index cases, 2 feline index cases, 1 equine index case, and 1 hedgehog index case)
- Q4 – There were 4 human index cases and 19 animal index cases (12 dogs, 5 cats (including the one in Wales), and 2 horses). In addition, one of the Q2 animal index dogs which had recovered and had previous negative clearance swabs, presented again with the detection of toxigenic *C. ulcerans* in Q4

Of note, for the last two years (2022 and 2023) there has been a marked increase in the identification of toxigenic *C. ulcerans* animal index cases in the third and fourth quarter, compared to previous years.

The Q1, Q2 and Q3 animal index cases have been commented on in earlier Zoonoses and Veterinary Public Health quarterly reports. Throughout 2023 clinical presentations for the index cats and index dogs have been variable and include skin infections, skin wounds, nail bed infections, ear infections, upper respiratory tract infections, abscesses, and systemic infections. For the horses one had an eye infection and two had dermatitis involving the lower leg. The hedgehog had infected ears.

The hedgehog and horses recovered with no *C. ulcerans* detected on bacteriology of clearance swabs. Many of the index cats and dogs have recovered, and achieved negative post treatment clearance swabs. Some of the cat and dog index cases are ongoing and an update will be provided in the next Zoonoses and Veterinary Public Health quarterly report. For a small number of animal index cases there have been other pets in the household which have tested positive with the detection of toxigenic *C. ulcerans* on surveillance swabbing.

Some of the index pets have had chronic health conditions including chronic skin conditions, neoplasia, and mixed infections. Some pets have been euthanased because of severe health problems and not because of the *C. ulcerans* infection.

3.4 Q fever *(Coxiella burnetii)*

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. Find more information on Q fever for farmers.

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.

Transmission of *C. burnetii* to humans is most frequently due to inhalation of contaminated aerosols or contaminated dusts. Aerosolized bacteria are spread in the environment by infected animals after normal births or abortion. Birth products contain the highest concentration of bacteria, but *C. burnetii* is also found in urine, faeces and milk of infected animals.

Compared to aerosol transmission, milk is considered low risk. However the general advice is that it is not advisable to ingest unpasteurised milk. There are also other zoonotic organisms that can be acquired from the ingestion of unpasteurised milk.

APHA provided advice at the request of an Incident Management Team (IMT) during the third quarter in 2023 following the detection of *C. burnetii* by PCR in a placental sample from an aborted cow. On the affected farm four cows had recently aborted and there had also been four premature (near-term) calvings in a group of 250 autumn calving dairy cows. The farm

was not usually open to the public, however they had held an open day in the summer. The IMT were aware that *C. burnetii* is present on many farms around the country, as shown by wider bulk milk sampling, and were also aware of the need to consider proportionality of the public health response.

The consensus of the IMT was to raise awareness with local GPs and hospitals in the region about Q fever symptoms in humans, so it can be considered as a differential diagnosis (both as an acute and chronic infection). This included highlighting groups at particular risk, and advice on testing and treatment.

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. Avian chlamydiosis (in psittacines) is reportable to APHA. Further information on psittacosis infection is available online at:

Psittacosis - Public Health England guidance

Psittacosis - HSE factsheet

During 2023 there were no VIDA diagnoses of avian chlamydiosis, not were there any reports to APHA of the detection of *Chlamydia psittaci* in psittacine birds.

APHA provided veterinary advice to public health colleagues regarding a human case of confirmed psittacosis involving a family who were caring for a parrot. Both parents and two sons in the family were reported to be infected with *C. psittaci*. The parrot had been cared for by different keepers and was considered the most likely source of human infection, however testing of the parrot to confirm if it was the source of human infection could not be done as the parrot was deceased.

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 incidents. The UK Chief Veterinary Officer advised on this potential zoonotic disease in a letter published in the Vet Record in February 2021. Amendments to the Zoonoses Order in 2021 added dogs to the list of animals for which brucellosis is a reportable disease in Great Britain.

Further information is available in APHA's Canine Brucellosis: Summary information sheet and in our list of frequently asked Brucella canis testing questions.

General information for the public and dog owners is available on the GOV.UK website: Brucella canis: information for the public and dog owners.

The Human Animal Infections and Risk Surveillance group (HAIRS) Brucella canis risk assessment outlines the current risk to the UK human population from canine brucellosis.

The British Small Animal Veterinary Association (BSAVA) have published a scientific document on the BSAVA library..

During Q4 (October to December) 2023, there were 51 epidemiologically separate incidents which had evidence of infection with *Brucella canis*. These 51 incidents had moderate to high risk factors (which comprised positive serology plus at least one other risk factor) for *B. canis* infection. All of the incidents were reported to the relevant public health authorities. Investigations into these incidents resulted in the testing of 53 dogs in total (inclusive of the index), of which 51 were found serologically positive for *B. canis*.

All incidents identified within this quarter were associated with the importation of dogs into the UK. Index dogs originated from Belarus (1), Bosnia (5), Bulgaria (2), China (1), Croatia (1), Cyprus (1), Greece (2), Europe, country not stated (1), Macedonia (1), Romania (28), Russia (1), Serbia (1), Spain (1), and imported from an unknown source (4). One dog originated from within the UK, however, this dog's dam was of Russian origin.

Clinical signs of infection have varied between these 51 seropositive index dogs. Five dogs presented with clinical signs consistent with infection and 36 dogs were asymptomatic. For 10 dogs the clinical status was unknown as this information was not stated within the sample submission forms. For dogs presenting with clinical signs, one or more of the following clinical signs were reported: lameness or joint pain, pyrexia, lethargy, or reproductive disturbances. 33 dogs were neutered, 11 dogs were entire, and the neuter status was unknown for seven dogs.

A total of 187 epidemiologically separate incidents were recorded in 2023, four of which tested serologically negative after repeat testing. The number of incidents may change as further epidemiological information becomes available. These 187 incidents were associated with the import of dogs from multiple countries. When considering data it is important to understand that there may be higher numbers of dogs imported from some countries than dogs imported from other countries. The numbers of index dogs that have been listed for each quarter in the

Zoonoses and Veterinary Public health reports for 2023 are reflective of the numbers of imports, and should not be interpreted as indicative of prevalence.

5. Imported disease summaries for dogs and cats

In recent years, there has been an increase in the number of companion animals imported into the UK. In some cases, little is known about the medical history of these animals and therefore the risk of importing diseases, which are not endemic in the UK, is increasing. Additionally, with the change in climate there is also the risk of the change in distribution of vectors. APHA's Imported disease summaries for Dogs and Cats (August 2022) document provides a short summary of some of the diseases that could be imported into the UK with the importation of dogs and cats. This list is not exhaustive but provides a useful summary and signposts to further information for some conditions of concern.

Within the document there is information with additional links for a range of diseases, many parasitic. The following diseases are included: Babesiosis, *Dirofilaria repens*, *Echinococcus multilocularis*, *Ehrlichiosis*, Heartworm, Leishmaniasis, *Onchocerca lupi* parasitosis, Rabies, Sporotrichosis, Thelaziasis and Tongue worm (*Linguatula serrata*).