



Monitoring the field occurrence of appropriate animal diseases can highlight the potential for zoonotic transmission and provide a sentinel for human environmental and foodborne health risks. These reports, which primarily relate to farmed animal species, summarise the surveillance activities of the Veterinary Laboratories Agency (VLA) and the Scottish Agricultural College (SAC) Veterinary Services for non-statutory zoonoses and infections shared between man and animals in Great Britain using data gathered by the network of diagnostic laboratories. Quantitative diagnostic data for confirmed clinical disease incidents is provided by the Veterinary Investigation Diagnostic Analysis (VIDA) surveillance system. Summaries of joint veterinary/medical investigations into incidents and outbreaks of non-statutory zoonotic disease and associated activities are also included, together with publications funded by the project. This report covers the 12 month period between January and December 2010. The Non-Statutory Zoonoses project (FZ2100) is funded by Defra through the VLA's Food and Environmental Safety programme and also uses returns from the Emerging Diseases and Welfare programmes. Information concerning compulsorily notifiable or reportable zoonoses is recorded elsewhere under other projects such as FZ2000 (Salmonella).

- **Annual VIDA figures for non-statutory zoonoses in GB**
- **Sheep and goat abortion data for 2010**
- **Q fever and VTEC O157 activities**
- **Summaries from targeted surveillance for main non-statutory zoonoses**
- **Publications in 2010 funded by FZ2100**

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1. General scanning surveillance

1.1 Non-Statutory Zoonoses VIDA data for Great Britain 2010

This table (collated 21/01/10) summarises confirmed clinical diagnoses of non-statutory zoonoses and infections shared between animals and man from specimens submitted to VLA and SAC laboratories during 2010 and compares the findings with those in 2009 and 2008. It includes rare zoonotic infections and those for which zoonotic potential is confined predominantly to immuno-compromised individuals. Diagnoses use strict criteria and are recorded (once only per incident) using the Veterinary Investigation Diagnostic Analysis (VIDA) system. The list is subject to selection, submission and testing bias. It is not definitive and excludes notifiable or reportable diseases (notably salmonellosis, which is recorded elsewhere). It is intended only as a general guide for veterinary and public health professionals to the diagnosed occurrence of non-statutory animal-associated infections in predominantly farmed animal species in GB.

Diagnosis	Total (all species)			Diagnoses in 2010						
	2008	2009	2010	Cattle	Sheep	Goats	Pigs	Birds ¹	Misc	Wildlife ²
Babesiosis	18	27	24	24						
<i>Brachyspira pilosicoli</i> /intestinal spirochaetosis	53	45	45				20	25		
Brucella in marine mammals	6	4	0						0	0
Campylobacter fetopathy	155	152	233	29	204	0			0	0
Chlamydiosis (<i>C. psittaci</i>)	1	3	8					8		
<i>Chlamydophila abortus</i> fetopathy	349	307	346	3	338	5			0	0
<i>Coryne. pseudotuberculosis</i> (CLA)	69	40	57		51	6				
Cryptosporidiosis	1333	1346	1660	1563	78	7	2	4	6	0
Cysticercosis	0	2	1		1					
Dermatophilus infection	30	16	9	3	5	0		0	1	
Erysipelas	52	64	36		8	0	17	11		
Fasciolosis	1824	2222	1925	1363	502	15			45	0
Hydatidosis	0	0	0		0					
Leptospirosis (all categories)	29	5	4	4	0	0	0		0	0
Listeriosis (all categories)	196	176	221	54	152	10	0	2	2	1
Louping ill	25	33	44	6	37			1		
Orf (parapox virus)	44	37	40		40	0				
<i>Pasteurella multocida</i> pneumonia/pasteurellosis	298	317	358	197	96	1	48	14	1	1
Pseudocowpox (parapox virus)	6	1	0	0						
Q Fever/ <i>Coxiella burnetii</i>	5	3	4	1	1	2			0	0
Red Mite (<i>Dermanyssus galinae</i>)	17	20	38					38		
Ringworm	27	22	23	17	3	2	1	0	0	0
<i>Sarcoptes scabiei</i> infection	11	10	18	1		7	0		10	
Streptococcal infection (excluding bovine mastitis)	160	141	143		8	0	130	1	2	2
Swine influenza	17	14	36				36			
Toxoplasmosis (incl. fetopathy)	201	206	218		215	1			1	1
Tuberculosis (excl. <i>M. bovis</i>)	38	49	49			0	2	19	26	2
Yersiniosis (incl. fetopathy)	32	33	14		8	0		1	3	2

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

¹ Includes both domestic and wild birds ² Mammals only Misc miscellaneous exotic farmed species

Comments

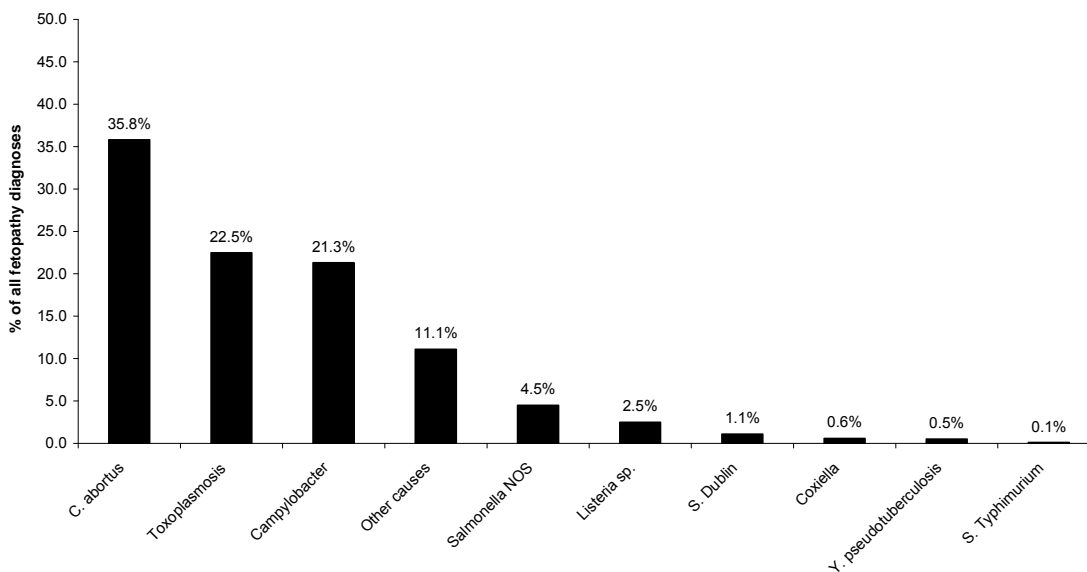
The number of diagnoses of swine influenza doubled in 2010 compared with 2009 and 2008. This was attributed to the introduction of a more sensitive screening assay resulting in an increase in the number of positive submissions. A(H1N1)pdm09 has become firmly established in the UK pig population, now accounting for the majority of positive cases. This virus currently co-circulates with endemic strains of swine influenza (H1N2, H1N1) and raises questions as to the longer term dynamic in terms of virus strain dominance or coexistence with the potential for further genetic reassortment.

There was also a significant rise in the number of cases of campylobacter abortion (mainly due to non-thermophilic strains in sheep – see 2.1). Cryptosporidiosis in calves also showed a further increase compared with previous years, as did listeriosis. Fasciolosis cases fell slightly after increases in recent years. The numbers of diagnoses of other conditions was similar to previous years or there were too few diagnoses to make any meaningful observations. More detailed specific information on scanning surveillance diagnoses and trends for endemic diseases is available from: <http://vla43/index/corp-science-programmes/prog-end-intro/prog-end-species-groups.htm>

1.2 Sheep and goat abortions 2010

In view of the large number of potentially zoonotic infections involved in abortions in these species, additional information (mainly from the first quarter of 2010) is shown separately below; any relevant comments about fetopathies in these species are included in Section 1.3. General advice to pregnant women during the lambing season is available on the HPA and Defra websites:

All incidents of fetopathy in sheep and goats in Great Britain in 2010 as a percentage of all fetopathy diagnoses reached (n = 959)



1.3 Recent reports from VLA and SAC diagnostic laboratories

This section provides an up-to-date overview of the main diagnoses and observations concerning zoonotic non-statutory diseases and infections shared between man and animals based on submissions to the VLA (England and Wales) and SAC (Scotland), during the period October to December 2010. The inclusion of SAC findings began in the second FZ2100 quarterly report of 2010. For various reasons some incidents referred to may not always be included in table 1.1 above. Further information is provided in the reports by the VLA species groups <http://vla43/index/corp-science-programmes/prog-end-intro/prog-end-species-groups.htm>. Monthly surveillance

reports from the VLA Emerging Diseases and Welfare programme and from SAC also appear in the Veterinary Record <http://veterinaryrecord.bmj.com/>

Cattle

Severe suppurative bronchopneumonia due to *Pasteurella multocida* was seen in calves on several holdings. *P. multocida* was also confirmed as causing terminal septicaemia in a calf with bovine neonatal pancytopenia (BNP). Babesiosis was seen in a recumbent suckler cow and in another cow from an area of Wales where babesiosis has only been recognised in the last 18 months. Tick activity continued into December in this area despite the extremely cold weather. Causes of bovine abortion included: *Streptococcus pluranimalium*, *Campylobacter fetus*, *Listeria monocytogenes* and *Yersinia pseudotuberculosis*. Cryptosporidiosis was a common cause of enteritis in calves less than two weeks of age. Fasciolosis was a frequent diagnosis, leading to ill thrift and diarrhoea. Louping ill was diagnosed in a two-year-old dairy heifer. Leptospirosis was suspected by serology as the cause of a high barren rate in a spring calving suckler herd. *Streptococcus pneumoniae* was identified as the cause of septicaemia and death in a two week old calf.

Sheep and goats

Subacute and chronic fasciolosis were commonly seen in samples received for both screening and diagnostic testing. Orf was confirmed in a group of ewes with scabby ears and on a separate occasion from a tup with multiple lesions affecting the head and feet. Caseous lymphadenitis (CLA) caused by *Corynebacterium pseudotuberculosis* was confirmed in an abscessated submandibular lymph node. CLA was also confirmed on serological testing of goats where six of seven affected animals were seropositive by ELISA. Polyarthritis due to *Erysipelothrix rhusiopathiae* affected six of 90 ewes. *Yersinia pseudotuberculosis* enteritis was diagnosed in seven-month-old lambs with acute foul smelling diarrhoea. Listeriosis (*L. monocytogenes*) was confirmed on several occasions, including in a group of dairy sheep with typical neurological signs of facial paralysis, circling progressing to recumbency and also in two other flocks with similar signs. *L. ivanovii* was isolated from the liver, spleen and brainstem confirming listeria septicaemia and encephalitis in a six month old lamb with diarrhoea and neurological signs. Abortion diagnoses in early lambing flocks included *Chlamydophila abortus* (enzootic abortion of ewes) and *Y. pseudotuberculosis*. Louping ill was confirmed on several occasions and in some cases large numbers of ticks were present. Samples of wool and scab from a ewe with scaling alopecic areas on the face revealed *Trichophyton verrucosum* ringworm.

Pigs

P. multocida was isolated on several units including from a group of finishers with coughing and increased mortality rates and as the cause of septicaemia in outdoor replacement gilts. Erysipelas was diagnosed in two cases where affected pigs had respiratory signs, vegetative endocarditis, polyarthritis and pericarditis. *Streptococcus suis* type 2 meningitis, polyarthritis, polyserositis and septicaemia was a frequent diagnosis in growing pigs. Septicaemia was also recorded due to *S. suis* types 3, 7 and 8. Swine influenza was identified by detection of virus in nasal swabs in four-week-old weaners with signs of coughing and meningitis. Concurrent *S. suis* type 2 meningitis was confirmed. The samples tested negative for pandemic H1N1 2009 influenza virus. *Brachyspira pilosicoli* was diagnosed as the cause of loose faeces in one herd.

Birds

Respiratory cryptosporidiosis was diagnosed in six 14 week old wild grouse presented with purulent sinusitis and tracheitis. This is the first recorded report of cryptosporidiosis in this species. Fowl cholera due to infection with *Pasteurella multocida* was confirmed in turkeys on two holdings. Avian tuberculosis was diagnosed in a free range hen with typical liver lesions and in a buzzard in poor body condition. Pneumonia and air sacculitis due to *Yersinia pseudotuberculosis* was seen in a small flock of 30 day old Barbary ducks. *Dermanyssus gallinae* (red mite) were seen in several submissions from chickens. *E. rhusiopathiae* was identified in a flock with high mortality rate characterised by sudden deaths, recumbency and increased respiratory effort.

Miscellaneous

Sarcoptic mange was diagnosed in llamas with crusty skin lesions. *Streptococcus bovis* septicaemia (with concurrent coccidiosis) were confirmed in a Lechwe. *Y. pseudotuberculosis* was identified as the cause of severe necrotising enteritis in a two year old Red Forest Buffalo bull. The buffalo had been kept in an enclosure

with monkeys, frequent carriers of *Yersinia sp. Streptococcus equi ssp zoepidemicus* was isolated from the placenta of an equine fetus, the dam subsequently died of endometritis.

2. Specific scanning and targeted surveillance and other studies

2.1 Campylobacter

Human campylobacteriosis due to thermophilic campylobacters is a major cause of food poisoning, although non-thermophilic strains (such as *C. fetus*) can also (rarely) cause severe systemic zoonotic illness. A total of 273 campylobacter isolates (mainly from ruminant abortion cases) were identified by the VLA during 2010: 202 were from ovines, 60 bovine, 8 avian, 1 red deer, 1 equine and 1 kangaroo. One hundred and fifty three (76%) of the ovine isolates were *C. fetus fetus*, compared to 63% in 2009, with the remaining 49 (24%) a mixture of enteric strains (37% in 2009). Of the 34 (57%) venereal bovine isolates, 27 (45%) were *C. fetus venerealis intermedius* compared to 33% in 2009, 5 (8%) were *C. fetus fetus* (15% in 2009) and 2 (3%) *C. fetus venerealis* (9% in 2009). The remaining 26 (43%) (same % as in 2009) were a mixture of enteric (thermophilic) strains. Isolates from avian species comprised 5 (63%) *C. jejuni* and 3 (37%) *C. coli*. Isolates from miscellaneous species were all *C. jejuni*.

2.2 Hepatitis E (HEV)

The majority of the VLA HEV activity in 2010 related to the EU FP7 project VITAL, which seeks to devise a monitoring system for virus contamination of food, supported by the results of virus detection in samples of food from production through to point of sale. The VLA collected and tested samples of pig products from abattoirs, processing plants and retail outlets. In addition a team of food safety experts from within the VITAL consortium conducted an audit at each premises from which samples were obtained, accompanied by completion of an extensive questionnaire by local managers. All sample types were tested with real-time standardized PCR protocols for HEV (target virus) and Porcine Adenovirus (PAdV - indicator of faecal contamination). HEV was detected at different levels in samples from the production phase and from the point of sale. In-vitro studies are ongoing to determine the viability of the HEV detected in these samples. PAdV was detected only in the production phase, both from pig samples and from environmental swabs collected. The VITAL PhD study to inform virus elimination procedures is currently examining the effect of UV and chemical disinfection of surfaces on the inactivation of HEV, using the 3D in-vitro propagation method.

The VLA also began work as a partner in a Scottish CSO-funded HEV project: Epidemiology and Identification of Potential Transmission Routes of Autochthonous Hepatitis E virus (HEV) in Scotland and clinical relevance of HEV in chronic liver disease. The VLA is examining pig sera to provide antibody prevalence and isotype data, and advice in terms of zoonotic transmission routes. The VLA has also taken part in discussions and begun a collaborative programme with other members of Club5 to exchange technology and harmonise HEV diagnostic techniques.

2.3 Hydatid

The Welsh Assembly Government hydatid control scheme continued for a third year in the south Powys region of Wales. The results from the preceding two years indicate that the prevalence of infection in dogs may be stable, rather than increasing as previously thought. The prevalence of infection of *Echinococcus granulosus* among farm dogs was about 10%, with one or more infected dogs detected on 20% of farms. There is also evidence of clustering of infected farms within the control area. There appears to be no current evidence for transmission to humans at these farm dog prevalence levels. However, we should be wary of dismissing the risk of transmission to humans as cases can take decades to become apparent. The regional control and awareness scheme continues.

2.4 Leptospirosis

Targeted surveillance by VLA for leptospirosis is variously achieved by analysis of results from: (1) RT-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); 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. Results are somewhat biased but do provide some indication of what serovars are likely to be circulating in animals in GB.

1) In 2010, a total of 508 specimens from a range of mammalian species (mainly cattle and pig fetal kidneys) in E & W were examined by real-time PCR for pathogenic leptospires. Of the 432 samples suitable for testing, two (0.71%) of 282 bovine samples (0.4% in 2009) and one (0.76%) porcine samples (none in 2009) were positive. In addition, one sample from a water vole tested positive. The numbers are too few to reach any conclusions but there is no field evidence to suggest that leptospirosis is a significant animal health problem in England or Wales.

2) During 2010, 200 (25%) of 814 tests undertaken for *L. Hardjo* bulk milk monitoring were negative, 155 (19%) were low positive, 95 (12%) were mid positive and 364 (45%) were high positive. In 2009, the comparable figures (777 tests) were 27% negative, 16% low positive, 12% mid positive and 45% high positive. These findings are stable and indicate serological evidence of potentially active infection (mid and high positives) in about 57% of dairy herds from the population submitting samples during each of the previous two years. The significance of these observations is heavily influenced by persistence of antibody, vaccination status and selection bias but it is unlikely that many fully vaccinated herds submitted samples for testing so these results are likely to be fairly representative of unvaccinated herds in England and Wales.

3) 9371 serum samples (E & W data) from a range of species were examined in 2010. Of 3407 canine sera, 35.18% and 15.5% were positive to *L. Canicola* and *L. Icterohaemorrhagiae* respectively, compared to 41.4% and 17.9% for 2009; of 4715 bovine samples examined for *L. Hardjo bovis*, 22.2% were positive (23.2% in 2009); 28.2% of 559 porcine samples tested for *L. Bratislava* were positive (13.7% in 2009). Other significant serovars noted included 5 dogs positive to *L. Bratislava*, 4 dogs positive to *L. Copenhageni* and 5 horses were positive to *L. Icterohaemorrhagiae*.

2.5 Mycobacteria (excluding *M. bovis*)

Since *Mycobacterium bovis* became notifiable in all species in 2006, the number of samples examined by VLA 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 2010 is given below.

M. avium was isolated from pigs (36), alpaca (3), and red deer (1). *M. microti* was isolated from alpaca (5) and pigs (2). Other isolates were *M. fortuitum* from pigs (2), *M. celatum* from a pig (1), *M. gordonae* from pigs (3) and *M. szulgai* from pigs (4). Unclassified mycobacteria were isolated from alpaca (3), pigs (68), sheep (1) and roe deer (1).

2.6 Streptococcus suis

Streptococcus suis isolates from diagnostic material submitted to VLA regional laboratories (RLs) are typed further for disease surveillance purposes. The numbers and serotypes from porcine diagnostic material submitted to RLs during 2010 are shown below with data from previous years for comparison.

Year	1	2	3	4	5	7	8	9	10	12	14	15	16	21	22	23	24	26	28	29	31	33	1/2	UT	Totals
2006	8	42	5	6		1	1	1		2	1	1									1	1	2	1	73
2007	6	54	15	3		6	1	6	1			2	1								1		3	5	104
2008	8	54	5	4	1	10	6	4			1		3		1								3	15	115
2009	9	56	4	5	2	4	5	2			1		3	1			1	1	1	1		1	1	18	116
2010	14	41	10	8		7	4	4		1	8		2			1	1						3	4	108

Streptococcus suis type 2 again predominated.

2.7 Toxoplasmosis

The European Food Safety Authority (EFSA Journal 2007, 583, 1-64) has 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 VLA on sera submitted to RLs. The findings presented below provide a summary of the serological status of samples submitted for diagnosis, monitoring and screening purposes during 2010 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.

In sheep in 2010, 340 (44%) of 781 sera tested (from 171 separate submissions) were positive for *T.gondii* compared with 321 (44%) of 732 sera (from 174 submissions) in 2009. In pigs, 26 (27%) of 97 sera (two submissions) were positive. In other species, 8 (30%) of 27 samples (15 submissions), tested positive.

In a separately funded project (OZ0151), the seroprevalence of *T. gondii* in breeding ewes in Great Britain was measured using sera taken during the 2009 *Brucella melitensis* survey. The findings are still being evaluated and will be published by Defra in due course.

2.8 Q fever

Overall, there was no evidence of an increase in Q fever in livestock based on submissions to VLA Regional Laboratories and SAC Disease Surveillance Centres during 2010. Q fever was diagnosed on four holdings: all were associated with abortions; diagnosis was made by routine examination of stained placental smears with the newly introduced PCR (Jones and others 2010- Section 4) used for confirmation. In the fourth quarter of 2010 a single case of Q fever was recorded in a dairy herd where there was a single abortion.

In 2010, PCR was used to test samples from a total of 61 submissions (31 cattle, 14 sheep, 12 goats, 3 birds and 1 alpaca) for diagnostic purposes. Two submissions from cattle, three from sheep and five from goats were positive (total 11 samples from four premises, including multiple testing on same farm).

A PCR survey using abortion material collected from randomly selected abortion submissions during 2010/11 where Q fever was not suspected is still in progress. Testing of 192 ovine cotyledons, all from different farms did not reveal any positives which indicates that prevalence in the sample population is less than 1% (95% confidence). Testing of samples from other species (cattle, goats, South American camelids and pigs) will be completed by the end of March 2011.

A seroprevalence survey (OZ0145) using sera from the GB *Brucella melitensis* survey in 2008 was completed during the year and the findings will be published on the Defra website and submitted to a peer review journal in due course. This survey showed a low prevalence in sheep flocks and goat herds, which was supported by the PCR results above. A separate Defra-funded related project (OZ0152) to determine within herd sero-prevalence and spread of *C. burnetii* infection in a large infected dairy goat herd is also underway and will be completed by March 2011.

The validation of an ELISA (Horigan and others) for Q fever serological diagnosis to replace the outmoded CFT was completed and has been submitted for peer review publication (Section 4).

2.9 Verocytotoxigenic *E.coli*

VTEC O157 in camelids

A 12 month survey of verocytotoxigenic (VTEC) O157 in camelids using samples submitted to VLA regional laboratories 2009-2010 suggested that the prevalence in these species (approximately 2 %) was not significantly different to other farmed species. This survey was initiated following the detection of VTEC O157 in a significant number of camelids examined during human outbreak investigations on premises open to the public 1997-2007 (Pritchard and others 2009, Veterinary Record 164, 545-549). A short account is being prepared for publication.

3. Investigations into zoonotic and potentially zoonotic incidents

The VLA has worked closely with the HPA and other agencies in the production of guidelines for the surveillance and joint investigation of zoonotic diseases in England and Wales. These guidelines are now in operation and can be found at: http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1240530336599. VLA collaborations with the HPA in the investigation of zoonotic incidents are also included in HPA Zoonoses newsletters: <http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1234254474768?p=1234254474768>

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 HPA/NPHS and in collaboration with the National Cryptosporidium Reference Unit, Swansea and follow jointly agreed guidelines.

There was only one investigation in 2010. In May, the VLA assisted a local HPU with the investigation of an outbreak of cryptosporidiosis linked to an open farm in the North of England. Faecal samples were collected from a group of guinea pigs that were identified by the Outbreak Control Team as a possible source of infection. All of 14 samples tested were negative using the sensitive fluorescent antibody test. Sheep were considered to be the probable source of human infection.

3.2 VTEC O157

Verocytotoxin-producing *E.coli* (VTEC) O157 outbreak investigations are undertaken according to agreed guidelines at the request of CsCDC of HPA/NPHS where an animal-associated source is suspected, and variously involve collaboration with other organisations, including the Environmental Health departments of Local Authorities and the Health and Safety Executive. Determination of phage type (PT), Verocytotoxin (VT) type and comparison of human and animal isolates by pulsed field gel electrophoresis (PFGE) and variable number of tandem repeat (VNTR) analysis are performed by the *E. coli* / Shigella / Yersinia / Vibrio Reference Unit of the Laboratory of Gastrointestinal Pathogens, HPA Centre for Infections, Colindale. If isolates from animals circumstantially implicated in outbreaks have the same PT and indistinguishable PFGE or VNTR profiles from human cases, this is taken as confirmatory evidence of a causal association. In practice, there can be minor profile variation amongst some isolates associated with an outbreak investigation. VNTR profiles of strains within an outbreak can also show variation at a single tandem repeat locus; application of this method is under development. Other VTEC O157 PTs may be detected incidentally during the investigation of animal premises.

Investigations in 2010 are shown in the table below.

Premises/month	Species tested	VTEC O157 positive	Phage types
Agricultural Field (Cheshire, March)	Cattle, sheep	None	
Open farm (N. Yorks, May)	Multiple species (≥10)	Cattle, sheep, goats, pigs, equines	21/28 *
Commercial Farm (Devon, June)	Cattle, Sheep	None, although O157 VT-negative from cattle, sheep	1 (VT-negative) [†] Molecular typing still underway
Open farm (S Yorks, June)	Multiple species (≥10)	Cattle, sheep, goats, pigs, camelids	1 *, 21/28 *
Open farm (Devon, July)	Cattle, goat, chicken	Cattle	21/28 *
Open farm (E. Yorks, August)	Sampling not undertaken [‡]		
Open farm (Bucks, August)	Outbreak of VT-negative <i>E. coli</i> O157, PT1; sampling not undertaken [†]		
Country estate (Cheshire, Sept)	Deer implicated, sampling not undertaken [‡]		
Nursery/ agric college (W. Sussex, Sept)	Sampling not undertaken [‡]		

* Molecular profiling indicated matches between human isolates and some or all of the isolates from animal species in this investigation.

[†] VLA assisted in the investigation of two outbreaks involving non-verocytotoxinogenic strains of *E.coli* O157, PT1, only one of which involved animal sampling.

[‡] In a number of investigations either involving within family outbreaks, or where no clear link to livestock could be established, advisory support without sampling was given.

4. Publications

The publications listed below (including those in press) were funded or part funded from FZ2100 during 2010:

Featherstone, C. A., Marshall, J. A., Giles, M., Sayers, A. R., & Pritchard, G. C. (2010). *Cryptosporidium* species infection in pigs in East Anglia. *Veterinary Record* 166, 51 - 52.

Featherstone, C.A., Giles, M., Marshall, J.A., Mawhinney, I.C., Holliman, A & Pritchard, G.C (2010). *Cryptosporidium* species in calves submitted for diagnostic postmortem examination in England and Wales. *Veterinary Record* 167, 979-980

Hill, A., Nally, P., Chalmers, R.M., Pritchard, G.C & Giles, M (2010) Quantitative Risk Assessment for Zoonotic Transmission of *Cryptosporidium parvum* Infection Attributable to Recreational Use of Farmland *Journal of zoonoses and public health* Online proof doi: 10.1111/j.1863-2378.2010.01350

Horigan, M.W., Bell, M.M., Pollard, T.R., Sayers, A.R & Pritchard, G.C. Q fever diagnosis in domestic ruminants: comparison between Complement Fixation and commercial ELISA tests. Submitted to *Journal of Veterinary diagnostic Investigation* (provisionally accepted)

Hutchinson, J.P., Smith, R.P., Tanya., Cheney, E.A., Lynch, K & Pritchard, G.C. Verocytotoxin-producing and attaching and effacing activity of *Escherichia coli* isolated from diseased farm livestock. *Veterinary Record* (In press)

Jones, R.M., Twomey, F., Hannon, S., Errington, J., Pritchard, G.C & Sawyer, J (2010) Detection of *Coxiella burnetii* in placenta and abortion samples from British ruminants using real-time PCR *Veterinary Record* 167, 965-967

Taylor, J., Saveedra-Campos, M., Harwood, D., Pritchard, G., Raphaely, N., Kapadia, S., Efstratiou, A., White, J & Balasegaram, S (2010) Toxigenic *Corynebacterium ulcerans* infection in a veterinary student in London, United Kingdom, May 2010. *Eurosurveillance* July 2010

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