Agri-Food and Biosciences Institute ®

Northern Ireland
Disease Surveillance Report

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October to December 2012

Disease Surveillance and Investigation Branch

These are some of the matters discussed in the Northern Ireland animal disease surveillance quarterly report for 1 October to 31 December 2012.

- Pulmonary embolism in a five-year-old cow
- Necrotising pancreatitis in a 13-month-old heifer
- Schmallenberg virus detected by PCR in a stillborn calf
- Fasciolosis outbreaks in sheep
- GM2 Gangliosidosis in a seven-month-old Jacob lamb

CATTLE:

Respiratory diseases

Respiratory disease was identified in 119 cattle postmortem submissions between October and December 2012.

The most common pathogens identified included *Pasteurella multocida* (thirty cases), *Mannheimia haemolytica* (twenty-two cases), *Trueperella* (formally *Arcanobacterium*) *pyogenes* (nineteen cases), *Mycoplasma bovis* (nineteen cases), parasitic husk (eleven cases) and *Histophilus somni* (six cases).

A two and a half year-old bull died in October after a period of chronic ill thrift. The bull had been purchased the previous June. A patent lungworm infection was present with adult worms visible in the trachea and bronchi. Lung histology was typical of verminous pneumonia. *M. haemolytica* type type A6 was also recovered from the lungs.

Two five-month-old calves from a veal unit with a history of pneumonia were examined. The calves had been vaccinated for bovine respiratory syncytial virus and infectious bovine rhinotracheitis. On postmortem examination consolidated lungs were present in both calves. Calf B also had emphysematous bullae in the diaphragmatic lung lobes. Both calves had sub-optimal rumen pH, which suggested that nutritional stress may have been a predisposing factor for the pneumonia. *Pasteurella multocida* isolated from lung tissue of both calves. BVDV was also detected in the lung tissue of calf B suggesting that circulating BVDV field virus may have been a predisposing factor in this pneumonia outbreak. *Mycoplasma bovis* antigen was also detected in lung from calf A, underlining the multifactorial aetiology of bovine respiratory disease.

A five-year-old cow with a history of recumbency and death within 24 hours was examined. On postmortem examination there was pulmonary consolidation of the middle and caudal lobes, associated with emboli in many blood vessels of affected lobes. The abdomen was markedly distended by the enlarged uterus, which contained approximately 180-190 litres of allantoic fluid and a near term calf. The hydrallantois, was associated with extensive adventitial placentation in the intercotyledonary areas. Adventitial placentation may be associated with inadequate caruncle surface area to allow for placental attachment and develops as primitive attachments in the areas between the placentomes. In this animal pulmonary emboli were the likely cause of death however their development may have been precipitated by abnormal vascular flow though the aberrant portions of the placenta. The referring veterinary surgeon reported two prior cases of suspect hydrallantois on the farm within the previous six weeks, but none subsequently.

A six-month-old calf that was being treated for pneumonia and septicaemia died. There had been two other deaths from a group of twenty housed calves. The submitted calf had a severe necrotising fibrinopurulent rhinitis and tracheitis which extended to small bronchioles. Infectious bovine rhinotracheitis virus was detected.

Alimentary diseases

BVD/Mucosal disease

Of 4604 blood samples that were tested for bovine viral diarrhoea virus (BVDV) by virus isolation or antigen capture ELISA 301 (6.5 per cent) were positive. In addition, 8 of 562 (1.4 per cent) submitted tissues and nasal mucus samples were positive by immunofluorescence. Three cases of mucosal disease were confirmed at postmortem examination during this period.

A three-month-old calf with sudden onset diarrhoea was submitted for postmortem examination. The remaining calves in the batch were in poor condition and had diarrhoea. There was a perforation in the left crus of the diaphragm overlying the reticulum, with a fragment of wire extending from the reticulum into the diaphragm. There was copious foetid, purulent fluid in the left cranial quarter of the abdomen with pus and fibrin coating the adjacent viscera and forming fibrinous adhesions. There was dark purple consolidation of the left lung lobes with fibrinous and haemorrhagic tags on the pleural surface. The rumen contents were wet and porridge-like with extensive clumping and matting of the rumen papillae to which the rumen contents adhered. Rumen pH was significantly low (pH: 4.9). The ultimate cause of death in this calf was associated with traumatic reticuloperitonitis, diaphragmatic

perforation and secondary unilateral pleuropneumonia. However, there were underlying abnormalities in the rumen appearance (papilla clumping) and abnormal rumen contents, which indicated an acidic rumen environment for a period of time. An assessment of the feeding regime was recommended.

A ten-month-old housed calf died suddenly. This was the second death from a batch of twelve. On postmortem examination there were extensive chronic bovine papular stomatitis lesions over palate and gingival and a caecal intussusception with localised peritonitis was also present. Numerous coccidial oocysts were seen histologically in the caecal mucosa while *Bacillus licheniformis* was isolated from liver, lung and brain.

On histopathological examination of the brain there were multiple areas of karyolysis and increased cellular eosinophilia with loss of parenchymal definition. This was associated with multiple blood vessels in the neuropil and adjacent meninges that were surrounded by degenerating neutrophils. Many of these vessels had walls infiltrated by degenerate neutrophils. Long slender bacilli were numerous in the "faded" areas, particularly around cuffed vessels.

A 13-month-old heifer with a history of wasting over the previous four months was examined. No other heifers from the batch of 20 were affected. On postmortem examination a multifocal necrotising pancreatitis with abscessation was seen. The cause of the pancreatitis was not apparent.

Neonatal enteritis

The pathogens identified in neonatal bovine faecal samples during the quarter are shown in Table 1.

Overall, *Cryptosporidium* species and rotavirus were the most common pathogens identified.

Other enteric conditions

Parasitic ova found in ruminant faeces samples submitted during the period are shown in Table 2.

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out by microscopic examination with Ziehl-Neelsen staining on 346 bovine faecal samples. Eight samples (2.3 per cent) contained acid-fast organisms typical of MAP. Of 6642 bovine blood samples that were tested for antibodies to MAP 540 (8.1 per cent) were positive.

Reproduction and mammary disease

Abortion

Specimens from 156 bovine abortions and stillbirths were examined during this period. Significant pathogens were detected in 84 cases (53.8 per cent). Of these *Leptospira* Hardjo (14 cases, 9 per cent) and *T. pyogenes* (14 cases, 9 per cent) were the most commonly identified pathogens. Other pathogens identified included *Salmonella* Dublin (11 cases, 7.1 per cent), *Neospora caninum* (9 cases, 5.8 per cent), *Bacillus licheniformis* (9 cases, 5.8 per cent), *E. coli* (8 cases, 5.1 per cent) and BVDV (6 cases, 3.8 per cent). A summary of the main causes of bovine abortion in Northern Ireland during 2012 is given in Figure 1.

Figure 1. Main causes of bovine abortion in 2012.

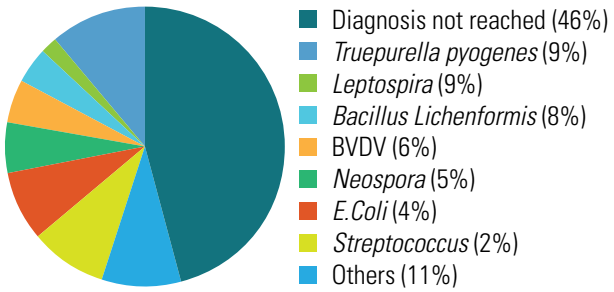


TABLE 1: Pathogens identified in neonatal bovine faecal samples in Northern Ireland, October to December 2012

	Number	
Pathogen	**Tested**	**Positive (%)**
Cryptosporidium species	558	163 (29.2%)
Rotavirus	563	164 (29.1%)
Coronavirus	563	37 (6.6%)
Escherichia coli K99	244	13 (5.3%)

TABLE 2: Endoparasitic infections in ruminants in Northern Ireland, October to December 2012

	No of parasitic ova						
	Total	**Negative**	**+**	**++**	**+++**	**++++**	**% positive**
Liver fluke							
Bovine	1501	1329	148	22	2	0	11.5%
Ovine	448	330	56	40	16	6	26.3%
Paramphistome							
Bovine	1502	888	316	239	51	8	40.9%
Ovine	446	360	53	28	5	0	19.3%
Coccidia							
Bovine	1682	1351	276	34	17	4	19.7%
Ovine	461	224	188	43	5	1	51.4%
Strongyle worm egg count		**<500 epg**	**≥500 epg**				
Bovine	1630	1572	58				3.6%
Ovine	448	325	123				27.5%

≥ 500 eggs per gram of faeces (epg) was considered of likely clinical significance (+ Low, ++ Moderate, +++ High, ++++ Very high)

Two euthanised newborn calves with suspect Schmallenberg virus (SMV) infection were examined. Calf A had ankylosis of the limb joints. Calf B had doming of the cranial vault and massive bilateral hydrocephaly of the forebrain. Both dams were vaccinated for BVDV and leptospirosis. Calf A has tested positive for SMV by RT-PCR in the following tissues: small intestine, brain, kidney, liver and lung. All samples from calf B tested negative for SMV.

Mammary disease

Mastitis

A total of 659 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. Eighty-eight (13.4 per cent) samples yielded cultures of more than two organisms and were considered to be potentially contaminated. No bacteria were cultured in a further 141 samples. *E. coli* was the most frequently isolated organism and accounted for 20.9 per cent of isolates cultured.

Other frequently identified organisms included: *Streptococcus uberis* (13.2 per cent), *Streptococcus* species (10.9 per cent), Staphylococcus aureus (10.6 per cent), Streptococcus alpha-haemolytic (9.6 per cent), *Streptococcus dysgalactiae* (3.8 per cent), non-haemolytic *Staphylococcus* species (3.8 per cent), *Bacillus lichenformis* (3.5 per cent) and *Pseudomonas* species (3.5 per cent).

Neurological disease

Clostridium botulinum type D toxin was diagnosed in eight cases during the 4th quarter of 2012.

Four 15-month-old Friesian bulls from a bull finishing unit died suddenly or after a very short course of illness. The bulls had subnormal temperatures and were recumbent for a brief period before death. Botulinum toxin C/D was detected by ELISA in two bulls that were submitted for postmortem examination.

A seven-month-old bull calf was found in lateral recumbency showing neurological signs. The calf was treated with antibiotics, but gradually deteriorated and was euthanased. At gross postmortem examination there were haemorrhagic foci in the brain and necrotic foci in the larynx and oesophagus. A pneumonia was seen in the anterior lung lobes and a fibrinosuppurative pericarditis was present. Infectious thrombotic meningoencephalitis was diagnosed histologically. No significant bacteria were cultured from the carcase. *Mycoplasma bovis* antigen was detected in the pneumonic lung.

Bovine Neonatal Pancytopaenia

A total of nine cases of bovine neonatal pancytopaenia (BNP) were diagnosed during the reporting period. Two two-week-old calves that were bleeding from the rectum were submitted as suspect BNP cases. On postmortem examination one calf had widespread haemorrhages. The gross postmortem findings in the other calf were navel ill with severe necrotising oesophagitis, reticulitis, rumenitis and omasitis. Melena and scattered serosal haemorrhages were also present. Histology, in both cases, showed an absence of bone marrow stem cells consistent with a diagnosis of BNP.

BNP was also confirmed in a three-week-old calf, whose dam had produced a BNP affected calf in the previous year.

SMALL RUMINANTS: SHEEP

Respiratory diseases

Respiratory disease was identified in 19 ovine postmortem submissions during this quarter.

Jaagsiekte (six cases), *Pasteurella multocida* (four cases) and *Mannheimia haemolytica* (three cases) were the most common diagnoses.

Jaagsiekte was diagnosed in a 3-4 year-old well-conditioned, heavily pregnant ewe that was found dead. There were miliary pale masses in the left lung ranging from 1 mm diameter and several focal masses of 6-7 cm in the left diaphragmatic lobe. Histological findings were characteristic of Jaagsiekte.

Alimentary diseases

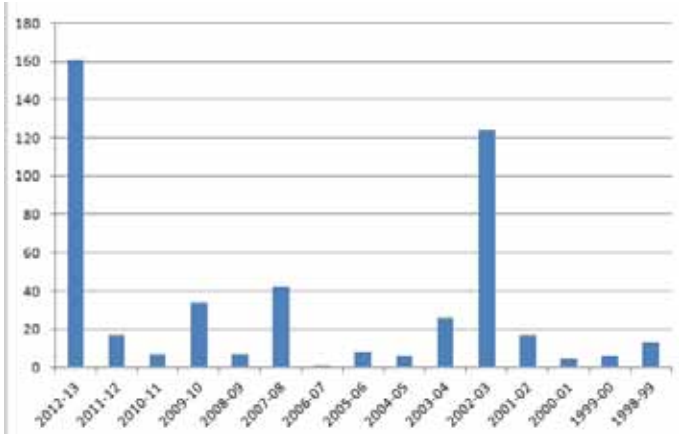
Johne's disease

Sixteen ovine faecal samples were examined microscopically using Ziehl-Neelsen staining for MAP. No samples contained acid-fast organisms typical of MAP. Six ovine blood samples were tested for antibodies to MAP, none of which were positive. Johne's disease was diagnosed in a four-year-old ewe, from a flock of 80, that had shown signs of ill thrift for the previous two months. Three other similar deaths had occurred within the previous year.

Fasciolosis

Since September 2012, the number of cases of acute and subacute fasciolosis diagnosed at AFBI's Stormont and Omagh veterinary laboratories has been higher than in any other recent fluke season (Figure 2).

Figure 2. Number of cases of acute and subacute fasciolosis diagnosed at AFBI's veterinary laboratories from 1998 to 2013 in the periods September to February.



The reasons include:
(1) a mild winter of 2011-12, which allowed survival of metacercariae on the ground, facilitating early season infection in grazing animals;
(2) high rainfall in summer of 2012, which promoted the breeding and wide dispersal of Galba trunactula, the intermediate snail host; and
(3) increasing triclabendazole resistance, meaning that on many sheep farms triclabendazole-based flukicides were no longer fully effective in reducing the burden of early juvenile flukes migrating in the liver parenchyma.

Furthermore, many sheep farmers had abandoned the use of triclabendazole, whether effective or not on their particular premises, on the basic of anecdotal accounts of lack of efficacy of the drug. In some submissions, evidence of partial susceptibility in local fluke populations has been obtained from histological examination of representative samples of flukes.

This supports the contention that in some populations at least, use of triclabendazole will remove a proportion of the fluke burden in cases of acute fasciolosis, and thus may save some animals that otherwise would have died. The advice distributed to producers is that in the face of outbreaks of acute fasciolosis triclabendazole should still be used, but in addition to, for example, closantel which will remove any late immature or adult flukes present, and so help to further reduce the overall parasite burden. No other flukicide is available that offers the wide spectrum of activity that characterises triclabendazole.

Three cases of larval paramphistomosis were diagnosed in the western counties of Northern Ireland during this quarter. Concurrent fasciolosis was also seen in two of these cases.

A six-month-old lamb was submitted in early October with a history of enteritis of several days' duration and of treatment for coccidiosis. Immature paramphistomes were found in the abomasum (900) and small intestine (24,000) confirming larval paramphistomosis. Significant numbers of immature fluke were also found in the liver (61 fluke, age range 1-13 weeks) with haemorrhagic tracts visible throughout the liver paremchyma.

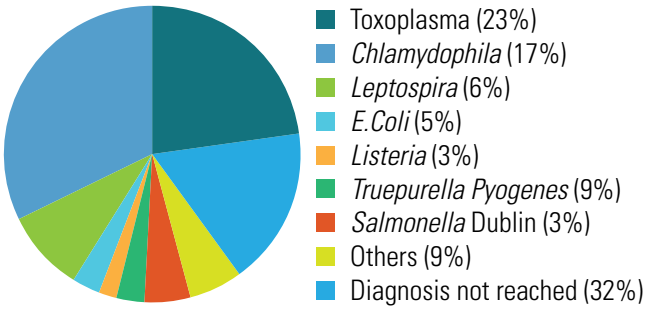
Reproductive diseases

Specimens from 15 ovine abortions and stillbirths were examined during the 4th quarter. Significant pathogens were detected in 9 cases (60 per cent).

Pathogens identified included:
Toxoplasma (4 cases, 20 per cent),
Chlamydophila (1 case, 6.7%),
Leptospira (1 case, 6.7 per cent) and
Salmonella Arizonae (1 case 6.7 per cent).

A summary of the main causes of sheep abortion in Northern Ireland during 2012 is given in Figure 3.

Figure 3. Main causes of ovine abortion in 2012.



Neurological diseases

A seven-month-old purebred Jacob lamb was submitted for necropsy after euthanasia following the development of progressively deteriorating neurological signs, including hindlimb weakness and abnormal gait. Postmortem examination revealed the ewe lamb to be in moderate body condition with no gross lesions visible. Histological findings included widely distributed neuronal distension by foamy to granular cytoplasm (Figure 4).

The neuronal intracytoplasmic granules stained positively with luxol fast blue (Figure 5) and electron microscopy revealed membranous cytoplasmic bodies within neurons. These findings are consistent with a lysosomal storage disease.

Figure 4. Neuronal cell bodies distended by foamy cytoplasm, peripherally displacing the nucleus. Haematoxylin and eosin X400.

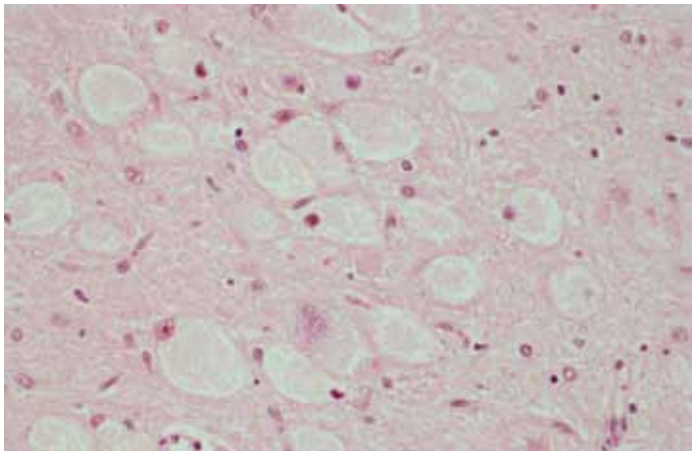
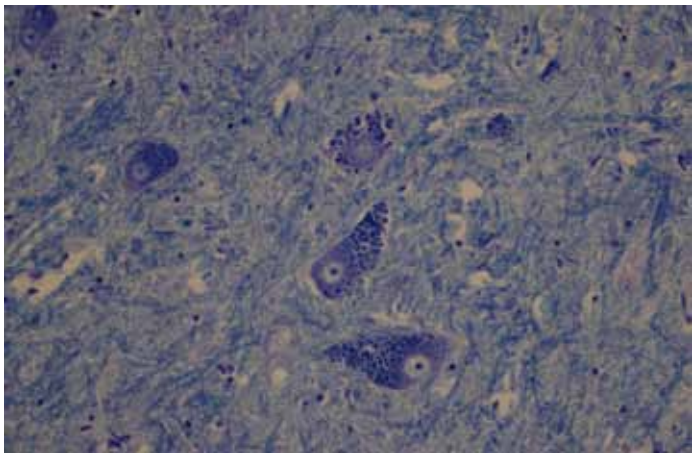


Figure 5. Neuronal intracytoplasmic granules. Luxol fast blue x400.



Subsequent genotyping carried out by Cambridge University Hospital identified the presence of homozygous G444R mutation, which confirmed a diagnosis of GM2 Gangliosidosis. Genotyping detected two further lambs in the flock homozygous for the mutation and on postmortem examination there were similar histological changes within the central nervous system. GM2 Gangliosidosis is a genetic defect caused by an autosomal recessive gene mutation resulting in diminished activity of the enzyme Hexoaminidase A, which leads to a build up of G(M2) Ganglioside. Further testing is being undertaken to determine the prevalence of this mutation within this flock.

Meningitis caused by *Mannheimia haemolytica* was diagnosed in an 8-month-old lamb, which was found dead. *M. haemolytica* was isolated in profuse culture from the brain and meninges. Another lamb was found dead the previous week. Sporadic cases or small outbreaks of *Mannheimia meningitis* can affect either ewes or lambs.

Sheep: Other diseases

Three eighteen-month-old ewes from a flock of 47 were submitted for postmortem examination. The ewes had been foaming at the mouth and staggering prior to death. A further six ewes were also showing similar clinical signs. The ewes had all broken out into a neighbour's garden and rhododendron leaves were found in the rumen contents.

Arthritis of the atlantoaxial joint due to *Streptococcus pluranimalium* was diagnosed in an 11-month-old horned ram lamb. The lamb had presented clinically with a history of stiffness of the limbs and kicking at the abdomen progressing to recumbency and death within 24 hours. Four other lambs in the batch had similar clinical signs

HORSES:

Twenty-five swabs were examined for the presence of *Tayorella equigenitalis* during this quarter, all of which were negative. Six swabs were cultured from a horse with a history suggestive of strangles, 2 of which were positive.

PIGS:

Four pigs were submitted from a unit in which there had been a problem with increasing mortalities over the previous month.

Two eleven-week-old pigs had *Streptococcus suis meningitis*. *S. suis meningitis* was also found in a five month old pig. A five week old pig form this unit had a purulent lesion around the pituitary from which a profuse growth of *T. pyogenes* was recovered.

Three 16-week-old pigs were submitted for examination from a unit with a history of pneumonia. The pigs had been vaccinated for enzootic pneumonia, porcine circovirus and porcine reproductive and respiratory syndrome. One pig had lesions typical of *Actinobacillus pleuropneumoniae* and *A. pleuropneumoniae* was isolated from the lungs. A second pig had a chronic-active fibrinosuppurative epicarditis and the third pig had a vegetative endocarditis from which *S. suis* was isolated.

BIRDS: Poultry

Erysipelas was diagnosed as the cause of sudden death of a turkey in early December. There had been one other death from this group of thirty, but no others were ill at the time of submission. On postmortem examination the turkey was in good condition. The carcase was dark and congested. The liver was enlarged and friable and the spleen was enlarged and congested. *Erysipelothrix rhusiopathiae* was isolated from the liver, spleen and kidneys.

This summary has been compiled by the Veterinary Sciences Division of the Agri-Food and Biosciences Institute (AFBI*) of Northern Ireland and is based on diagnostic submissions to AFBI's veterinary laboratories at Stormont, Belfast, and Omagh, Co Tyrone.
http://www.afbini.gov.uk/index/services/diagnostic/adds.htm
*AFBI was created on 1st April 2006 as the amalgamation of DARD Science Service and the Agricultural Research Institute of Northern Ireland. AFBI operates a farm animal disease diagnostic service on behalf of the Department of Agriculture and Rural Development for Northern Ireland.