Agri-Food and Biosciences Institute

Northern Ireland disease surveillance Quarterly Report

October to December 2006

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Highlights:

- Nasal tumour in a dairy heifer
- *Salmonella* Kottbus in cattle
- Outbreak of botulism in dairy cattle
- Systemic pasteurellosis in lambs
- Black disease in a mare

These are among the matters discussed in the Northern Ireland animal disease surveillance quarterly report for October to December 2006.

CATTLE

Respiratory diseases

Pneumonia was the principal pathological finding in 102 carcase submissions between October and December 2006. *Mycoplasma bovis* (20 cases) *Mannheimia haemolytica* (18 cases), *Pasteurella multocida* (17 cases), parasitic husk (*Dictyocaulus viviparus*) (14 cases) and *Histophilus somni* (9 cases) were the most common pathogens isolated in these cases. Infectious bovine rhinotracheitis virus (IBRV) was also identified in 5 cases, bovine respiratory syncytial virus (RSV) in 4, parainfluenza III virus (PI3V) in two, and bovine viral diarrhoeal virus (BVDV) in one.

One case involved an 18-month old steer which was submitted for postmortem examination in October. Numerous adult lungworm were visible in the airways and lungworm larvae were observed histologically. Lungworm larvae were also present in two of five faecal samples submitted from cohort animals on the same farm. A second case involved a four-year old bull that was euthanised following traumatic injuries from another bull. At postmortem examination there was severe pulmonary overinflation with subpleural and subcutaneous emphysema. Histological examination revealed a heavy burden of lungworm larvae, with a limited inflammatory response. Other findings included severe bruising of the bladder wall, extensive blood clots in the bladder lumen, and renal haemorrhage along with acute interstitial inflammation. These latter changes are suggestive of trauma to the caudo-ventral abdomen.

A two-year-old cow was submitted from a herd of 140, in which a number of deaths had recently occurred. At postmortem examination there was consolidation of approximately 25 percent of the lung parenchyma, centred mainly on the cranioventral lobes, and a severe diphtheritic tracheitis. Histologically there was focal necrotising bronchointerstitial pneumonia and abscessation. There was also a severe fibrinonecrotic tracheitis. Infectious bovine rhinotracheitis (IBR) virus was detected by virus isolation. *Arcanobacterium pyogenes* was also isolated from samples of lung, liver and spleen, and *Mycoplasma bovis* antigen detected in lung tissue by immunofluorescent labelling.

One unusual case involved a 22-month old in-calf dairy heifer, which was

submitted with a history of severe coughing. At postmortem examination there was obstruction of the nasal passages by a large tumour mass, which appeared to originate from the ethmo-turbinate region. Histological examination was suggestive of an embryonal rhabdomyosarcoma, a diagnosis that is consistent with the tumour location and age of animal affected.

Alimentary diseases

BVD / Mucosal disease

A total of 551 blood samples were tested by virus isolation or antigen capture ELISA for BVD virus. Of these, a positive result was obtained from 54 samples (10%). In addition 419 submitted tissues and nasal mucus samples were tested by immunofluorescence for BVD virus, of which 11 (2.6%) were positive. One case involved a one year old heifer which had presented with pyrexia, profuse mucoid / bloody diarrhoea and ulceration of the muzzle and hard palate. BVD viral antigen was detected by ELISA; however the animal was also positive serologically for malignant catarrhal fever.

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out by microscopic examination (Ziehl-Neelsen staining) on 261 bovine faecal samples. Twenty-eight (11%) contained acid-fast organisms typical of MAP. A total of 1142 bovine blood samples were tested for antibodies to MAP; 109 samples (10%) tested positive. One of these cases involved a three-year old pedigree suckler cow, with a history of intermittent scouring. A high level of acid-fast organisms was observed microscopically in the faeces and the animal was also positive on MAP serology. Follow-up testing showed that the 15-month-old bull progeny of the cow was the only other animal in the herd that was positive by serology, highlighting the importance of mother to off-spring transmission.

Neonatal enteritis

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

Table 1:
Pathogens identified in neonatal bovine faecal samples in Northern Ireland, October to December 2006.

	Number	
Pathogen	Tested	Positive (%)
Cryptosporidium species	400	86 (22%)
Rotavirus	266	68 (25%)
Coronavirus	262	13 (5%)
Escherichia coli K99	216	14 (6%)

Four calves, aged from four days to two weeks, were submitted for postmortem examination in November from a farm that had experienced 31 other deaths over the previous three months. All four animals had heavy infections of *Cryptosporidium*, with rotavirus infection also identified in samples from two animals.

Other enteric conditions

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

Table 2:

Endoparasitic infections in ruminants in Northern Ireland, October to December 2006.

		Number		Number of parasites				Percentage
	Total	Negative	With > 800 epg*	+	++	+++	++++	positive
Liver fluke								
Bovine	680	630		45	4	1	0	7.3%
Ovine	111	108		3	0	0	0	2.7%
Coccidia								
Bovine	760	599		148	4	3	6	20.2%
Ovine	116	45		68	3	0	0	61.2%
Strongyle worm egg count								
Bovine	311		32					10.3%
Ovine	64		28					43.7%

* > 800 eggs per gram of faeces (epg) was considered of likely clinical significance

\+ Low, ++ Moderate, +++ High, ++++ Very high

Salmonellosis, due to *Salmonella* Typhimurium DT104, was diagnosed on one farm, which was experiencing diarrhoea in both young calves and adult cows, with six deaths over the previous three weeks. Postmortem examination of one calf revealed an enlarged bronzed liver and a watery enteritis. *Salmonella* Typhimurium was isolated in septicaemic pattern from this calf and also from faecal samples submitted from two other calves on the farm.

A small cluster of *Salmonella* Kottbus on four farms from one geographical area was also diagnosed during the quarter. In one of these, high levels of the organism were isolated from both a faecal sample and the foetus of a cow, which had aborted at approximately seven months gestation. In a second case high levels of this organism were isolated from the faeces of an 18-month-old bull, which had presented with watery diarrhoea.

Reproductive and mammary diseases

Abortion

One hundred and thirty-four bovine abortions submissions were examined between October and December 2006. Pathogens associated with bovine abortion were detected in 73 cases (54 per cent). Overall *Leptospira* Hardjo was the most commonly identified pathogen, being detected in 19 cases (14 per cent of total submissions). *Salmonella* Dublin was isolated from 14 cases (10 per cent), *Arcanobacterium pyogenes* from 11 cases (8 per cent) and *Bacillus licheniformis* from 9 cases (7 per cent). *Neospora caninum* infection was identified in 10 cases (7 percent), In one case, a high level of *Histophilus somni* was isolated in pure culture from the stomach contents of a 7-8 month old aborted calf; examination for other causes including *Leptospira* and *Neospora* spp. was negative. *Histophilus somni* is more commonly associated with pneumonia,

myocarditis and meningoencephalitis in cattle and cases of abortion due to the organism are generally uncommon.

The different causes of abortion diagnosed in bovine submissions throughout 2006 are shown in Figure 1. In total 471 postmortem submissions of abortion material from cattle were received, of which significant pathogens were identified in 229 (49 per cent). In 29 cases (6 per cent) more than one abortifacient agent was found. Overall the most common causes of abortion identified were leptospirosis (15 per cent of submissions), *Arcanobacterium pyogenes* (7 per cent), *Bacillus licheniformis* (7 per cent), neosporosis (6 per cent) and *Salmonella* Dublin (6 per cent).

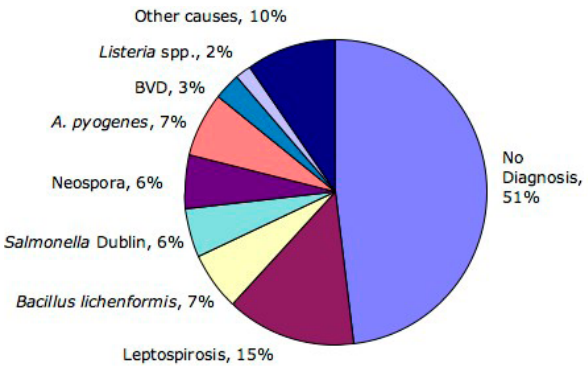

Fig 1: Causes of bovine abortion in submissions during 2006.

(Data expressed as a percentage of submissions, with two or more abortifacient agent identified in a percentage of cases)

Mastitis

A total of 804 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. Forty-three samples yielded cultures of three or more organisms and were considered to be potentially contaminated. No bacteria were cultured in a further 349 samples. *E. coli* was the organism most frequently isolated and was present in 21% of samples where microorganisms were identified. *Streptococcus uberis* was cultured from 16% of samples, *Staphylococcus aureus* from 11% of samples and *Streptococcus dysgalactiae* from 3% of samples. In one case high levels of *Staphylococcus aureus* were isolated from milk samples from all four quarters of a cow which had presented with an acute toxic mastitis 12 hours post-partum. Whilst *Staph. aureus* is more commonly isolated from cases of chronic mastitis, peracute cases, which can become gangrenous, occasionally occur.

Nervous diseases

Botulism was diagnosed on two farms during the quarter. In the first, an adult cow with a history of recumbency was submitted from a farm, which had suffered four other deaths in the previous week. Postmortem examination revealed a marked segmental haemorrhagic enteropathy, and *Clostridium botulinum* Type C was identified from small intestinal contents. Clostridium botulinum Type C2 toxin has been previously associated with intestinal haemorrhage. A further outbreak of botulism was suspected in a dairy herd in which 58 animals died in December. Clinical presentations included recumbency, paresis and sudden deaths. A postmortem examination was performed on five cows. Clostridium botulinum type D toxin was detected in the small intestinal contents of one cow and in the small intestinal contents, rumen contents and faeces of a second cow. Other significant post-mortem findings included a severe interdigital dermatitis

in one cow and a chronic foreign body reticuloperitonitis in another cow. All of the deaths occurred in either lactating dairy cows or dry cows.

A decomposing foal carcase had been observed at harvest time in a field from which round-baled hay was made and it was suspected that this may have been the source of toxin. This hay was fed to the cows along with grass silage and maize silage through a feeder wagon. One animal, the stock bull, presented with clinical signs suggestive of botulism but subsequently made a full recovery. All cattle on farm were subsequently vaccinated with toxoid of Clostridium botulinum types C and D.

Other diseases

An 11-month old heifer was submitted with a history of reluctance to move, rigidity, drooling and latterly recumbency. At postmortem examination a circumscribed tumour, histologically suggestive of an astrocytoma, was found in the frontal region of the brain with extension into the ethmo-turbinate region.

A pure growth of *Streptococcus dysgalactiae* was isolated from the joint fluid submitted from a three-year old cow with history of cellulitis / arthritis. Whilst *Strep. dysgalactiae* is a recognised cause of polyarthritis in lambs, in cattle it is more typically recorded as a cause of mastitis.

A four- month-old calf was submitted with a history of straining. At post-mortem examination there was rupture of the bladder, with a large volume of fluid in the abdomen and a severe fibrino-necrotic peritonitis. Examination of the penile urethra showed that it was obstructed over much of its length with grey necrotic debris.

SHEEP

Reproductive diseases

Samples from 10 ovine abortions were examined during the fourth quarter of 2006. Recognised pathogens were detected in seven cases, with one case having more than a single pathogen identified. Overall toxoplasmosis was diagnosed in four cases, along with one case each of abortion involving *Listeria ivanovii*, *Salmonella* Dublin, *Campylobacter* spp. and *Arcanobacterium pyogenes*.

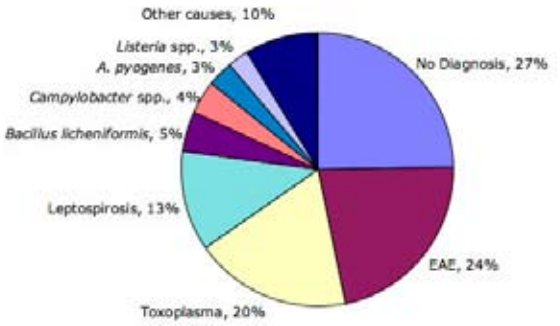

Fig 2: Causes of ovine abortion in submissions during 2006
(Data expressed as a percentage of submissions, with two or more abortifacient agent identified in a percentage of cases)

The different causes of abortion diagnosed in ovine submissions throughout 2006 are shown in Figure 2. In total 250 postmortem submissions of abortion material were received, of which significant pathogens were identified in 182 (73 per cent). In 24 cases (10 per cent) more than one abortifacient agent was found. Overall the most common causes of abortion identified were

Chlamydophila abortus (EAE) (24 per cent of cases), toxoplasmosis (20 per cent), leptospirosis (13 per cent), *Bacillus licheniformis* (5 per cent) and *Campylobacter* spp. (4 per cent).

Alimentary diseases

Eleven ovine faecal samples were examined microscopically for *Mycobacterium avium* subspecies *paratuberculosis* (MAP), of which one contained acid-fast organisms typical of MAP. One of five ovine blood samples tested for antibodies to MAP was also positive.

Respiratory diseases

Pneumonia was identified as the principal pathological finding in 11 ovine carcase submissions during the fourth quarter of 2006. *Mannheimia haemolytica* was the most common cause, having been isolated in three cases.

Sheep pulmonary adenomatosis (Jaagsiekte) was diagnosed in two cases. One of these involved a 7 month-old ram, which had presented with a history of progressive weight loss following purchase by the farmer three months earlier. At postmortem examination a large pale firm mass affecting most of the right cranial lung lobe was found, along with further smaller lesions distributed throughout much of remaining lung parenchyma. The diagnosis was confirmed on histopathology. Cases of sheep pulmonary adenomatosis are more commonly seen in sheep 2-4 years old, but as in this case, are occasionally reported in younger animals.

Nervous diseases

One four-year-old and two eighteen-month old ewes, in which scrapie was suspected clinically, were submitted for postmortem examination. Clinical signs included progressive weakness, ataxia, incoordination, head tremor and the presence of a 'nibble' reflex. A diagnosis of scrapie was confirmed on histopathology and by 'Biorad' rapid test.

Other diseases

Systemic pasteurellosis was diagnosed on two separate farms during the quarter. In the first, postmortem examination of a nine-month old lamb, which had been found dead at pasture revealed necrotic erosions in the tonsilar crypts and ulcerative necrotic lesions throughout the length of the oesophageal mucosa (Figure 3). Similar necrotic lesions in the pharynx and oesophagus were also observed in two of three lambs submitted from the second farm. High levels of *Bibersteinia* (formerly *Pasteurella) trehalosi* were isolated in septicaemic pattern in both cases.

Figure 3
Oesophageal ulceration in lamb with systemic pasteurellosis

Caseous lymphadentis (CLA) was diagnosed in a two-year-old ram

which was submitted for postmortem examination following a three-month period of weight loss. Internal abscesses containing bright green pus were detected in the bronchial and caudal mediastinal lymph nodes and in the liver, with a high level of *Corynebacterium pseudotuberculosis* isolated on bacterial culture. The ram had been bought in one year earlier and the flock had previously been considered free of CLA.

Other diseases

Two four-day-old lambs were submitted in February from a flock with a high incidence of joint-ill. Lambs were born healthy, becoming stiff and recumbent with death following a few days later. Arthritis due to *Streptococcus dysgalactiae* was detected at postmortem examination. This organism causes arthritis in lambs under 4 weeks of age. Lambs usually acquire the infection from environmental sources (pens, paddocks) in the first two weeks of life. Some ewes within a flock may carry these bacteria in the vagina and are probably responsible for the original environmental contamination. Attention to environmental hygiene, navel dipping and disinfection of stomach tubes used for colostrum administration are important issues to address in the face of an outbreak.

PIGS

Three twelve week old pigs were submitted in October, from a 500 pig unit which had a problem of pigs coughing over the previous three weeks. At postmortem examination there was a severe bronchopneumonia and pleurisy in all three animals, with high levels of *Pasteurella multocida* isolated on bacterial culture.

A 10-week old pig was submitted from a unit which had a previous history of wasting disease on the farm. Medium levels of porcine circovirus type 2 (PCV-2) antigen were detected in cryostat sections of the mesenteric lymph node and there was histological evidence of lymphoid depletion in the mesenteric lymph node and spleen. High levels of *Salmonella* Typhimurium were isolated from the internal organs.

HORSES

Following the occurrence of a case of equine infectious anaemia in Northern Ireland in August, which was linked to the EIA outbreak in the Republic of Ireland (VR, November 25, 2006, vol 159 pp 753-754), a total of 717 samples from at risk and other animals were tested for EIA between October and December; all were negative.

Fifty-five swabs and other samples were examined for the presence of the contagious equine metritis organism; all were negative. Twenty-three nasal swabs and other samples were cultured from equines with a history suggestive of strangles. *Streptococcus equi* was detected in four samples from three separate premises.

Rhodococcus equi was isolated from the lung tissue of a three-month old foal that had been submitted for postmortem examination. The foal had previously shown signs of a persistent chronic cough, severe respiratory distress, pyrexia and had a marked leucocytosis on haematology. At postmortem examination there was pulmonary consolidation and abscessation.

Two cases of gastric rupture were diagnosed in seven and eight month-old foals which had been submitted for postmortem examination from separate premises. In both cases there was

a history of sudden death. Findings at necropsy were similar in the two cases with tears evident on the greater curvature of the stomach and finely chopped grass present in the peritoneum. Further enquiries revealed that both foals had had access to fresh lawn cuttings.

A seven–year old mare with a history of sudden death was submitted from a farm which had suffered eight similar deaths over the previous two months. A necrotic liver lesion, typical of Black disease, with localised peritonitis and excess pericardial fluid were the main observations at necropsy (Figure 4). Black disease is generally an uncommon diagnosis in equines, but has been recorded sporadically at VSD.

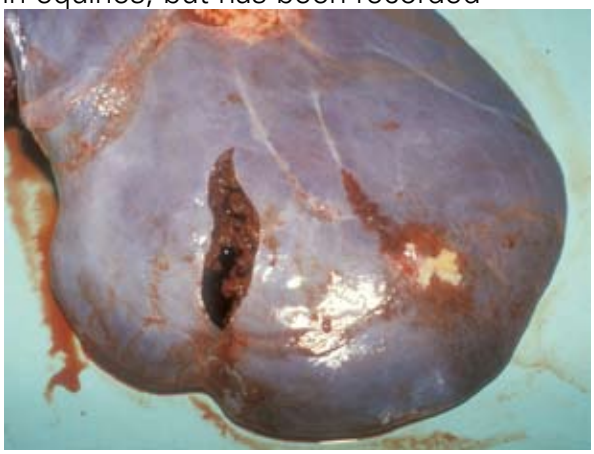

Figure 4
Hepatic lesions in a mare with Black disease

DEER

Two five-month old red deer calves which had died suddenly were submitted for postmortem examination. Both were from a commercial deer farm that had experienced three other deaths, out of a batch of 120, over the previous week. A single small focus of necrosis with associated peripheral inflammation was detected in the liver of one animal. A high level of *Yersinia pseudotuberculosis* was isolated from the small intestine and mesenteric lymph node of both animals, with lower levels present in the samples of lung from one and liver from the other.

ZOO SPECIES

Postmortem examination of an adult kangaroo revealed enlargement of the heart with myocardial petechiation and subpleural ecchymotic haemorrhages, with free blood in the chest cavity. Histologically there was pulmonary congestion, widespread haemorrhages, thrombosis, and septic emboli in many blood vessels, associated with colonies of small rod-shaped bacteria. In the heart there was myocardial congestion with interstitial petechial haemorrhages and subepicardial ecchymotic haemorrhages and bacterial colonies in some blood vessels. *Pasteurella* spp. was cultured in large numbers and in a septicaemic pattern.

An eleven-month giraffe, which had been losing condition for the previous two weeks, was also submitted for postmortem examination. This revealed a partial impaction of the distal gastro-intestinal tract with a large amount of gritty material.

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 operates a farm animal disease diagnostic service on behalf of the Department of Agriculture and Rural Development for Northern Ireland.