

## Disease Surveillance and Investigation Branch

### Northern Ireland Disease Surveillance Report, 1st January to 31st March 2011

- Liposarcoma in cattle
- Choke in sheep
- Ethylene glycol poisoning in poultry
- Parasitic proventriculitis in an ostrich
- Deaths in mute swans

These are some of the matters discussed in the Northern Ireland animal disease surveillance quarterly report for 1st January to 31st March 2011

#### CATTLE:

##### Respiratory diseases

Respiratory disease was identified in 90 cattle postmortem submissions between January and March 2011.

The most common pathogens identified included *Mannheimia haemolytica* (17 cases), *Pasteurella multocida* (11 cases), *Mycoplasma bovis* (ten cases), infectious bovine rhinotracheitis virus (IBRV) (seven cases), *Arcanobacterium pyogenes* (six cases) and *Histophilus somni* (four cases).

Pneumonia due to combined IBRV, *M. haemolytica* and *M. bovis* infection was diagnosed in a five-month-old suckler calf with lesions of fibrinonecrotic bronchopneumonia and tracheal congestion. *M. haemolytica* type A1 was recovered in large numbers from lung cultures and the lung tissue was positive for *M. bovis* antigen. IBRV was isolated from tracheal tissue.

##### Alimentary diseases

##### BVD / Mucosal disease

Of 4141 blood samples that were tested for bovine viral diarrhoea virus (BVDV) by virus

isolation or antigen capture ELISA 246 (5.9 per cent) were positive.

In addition, nine of 232 (3.9 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.

Rotavirus and corona virus infection were diagnosed in a nine-day-old suckler calf submitted with a history of diarrhoea and dehydration. *Escherichia coli* K99 antigen detection results were negative. Histological lesions of focal hepatoparenchymal necrosis caused suspicion of salmonellosis but no significant organisms were recovered from intestinal and systemic cultures, possibly due to antimicrobial therapy.

Three ten-day-old calves were submitted from the same farm with a history of diarrhoea and dehydration. Intensive antimicrobial therapy had been undertaken prior to submission.

One calf was found to have rotavirus and coronavirus infection and an untypeable (K99 negative) ESBL-positive *E. coli* was recovered from the caecum of this calf. The other calves both showed suppurative bronchointerstitial pneumonia and in one case there was ruminal, abomasal and caecal ulceration associated with the presence of numerous fungal hyphae in the mucosa and submucosa. These lesions were considered likely to have resulted from antimicrobial use.

Advice was given concerning correct approaches to treatment. Tests for the presence of BVDV antigen were negative in all three cases.

### 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 384 bovine faecal samples. Eighteen samples (4.7 per cent) contained acid-fast organisms typical of MAP.

Of 7315 bovine blood samples that were tested for antibodies to MAP 376 (5.1 per cent) were positive.

### Nutritional and metabolic disease

Hepatopathy was diagnosed in an adult cow submitted with jaundice. At necropsy the liver was found to be enlarged, discoloured (yellowish) and firm with distension of the bile ducts and gall bladder. Histological examination showed severe generalised periportal and bridging fibrosis, infiltration by mixed inflammatory cells, focal hepatoparenchymal necrosis and marked biliary hyperplasia. There was widespread biliary retention.

The gross and histopathological findings suggested that the liver of this cow displayed severe chronic changes associated with bile retention.

TABLE 1: Pathogens identified in neonatal bovine faecal samples in Northern Ireland, January to March 2011.

Pathogen	Number	
	Tested	Positive (%)
<i>Cryptosporidium</i> species	446	176 (39.5%)
Rotavirus	629	227 (36.1%)
Coronavirus	638	40 (6.3%)
<i>Escherichia coli</i> K99	312	5 (1.6%)

Table 2: Endoparasitic infections in ruminants in Northern Ireland, January to March 2011.

	No of parasitic ova						
	Total	Negative	+	++	+++	++++	% positive
<b>Liver fluke</b>							
Bovine	797	693	83	20	1	0	13.1%
Ovine	79	63	9	5	1	1	20.3%
<b>Paramphistome</b>							
Bovine	797	448	155	138	34	22	43.8%
Ovine	79	54	13	10	2	0	31.6%
<b>Coccidia</b>							
Bovine	910	814	82	6	5	3	10.5%
Ovine	102	62	25	7	1	7	39.2%
<b>Strongyle worm egg count</b>							
		<500 epg	≥500 epg				
Bovine	873	851	22				2.5%
Ovine	101	89	12				11.9%

≥ 500 eggs per gram of faeces (epg) was considered of likely clinical significance

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

There was no evidence of fasciolosis. Liver copper levels were low (5.5 µg per g; normal range: 25 to 100 µg per g) whilst those in the kidney were high (235 µg per g; normal range: 4 to 6 µg per g). It was considered likely that hepatopathy and fibrosis due to biliary stasis had significantly reduced the copper storage capacity of the liver leading to secondary elevation of levels of copper in the kidneys.

### Reproductive and mammary diseases

#### Abortion

Specimens from 154 bovine abortions and stillbirths were examined during the quarter. Significant pathogens were detected in 76 cases (49.4 per cent). Of these, *A. pyogenes* (19 cases, 12.3 per cent) was the most commonly identified pathogen.

Other pathogens identified included *Bacillus licheniformis* (12 cases, 7.8 per cent), BVDV (12 cases, 7.8 per cent), *Neospora caninum* (11 cases, 7.1 per cent), *Leptospira* Hardjo (nine cases, 5.8 per cent), *E. coli* (seven cases, 4.5 per cent) and *Salmonella* Dublin (six cases, 3.9 per cent).

The different causes of abortion and stillbirth diagnosed in bovine submissions throughout 2010 are shown in Figure 1. The most common pathogens identified included *Leptospira* species (12 per cent), *Salmonella* Dublin (7 per cent), *B. licheniformis* (7 per cent) and *Neospora* species (6 per cent). No significant pathogens were detected in 42 per cent of cases.

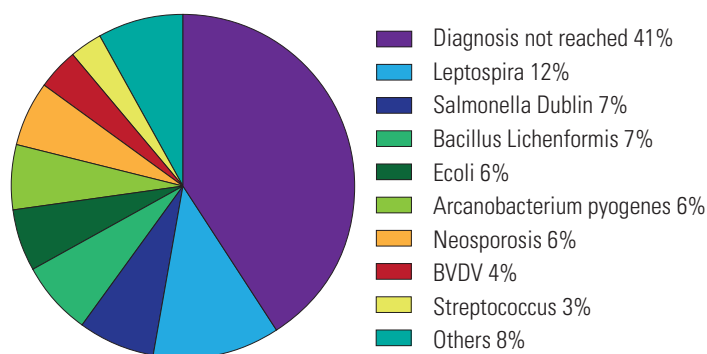


Figure 1. Causes of bovine abortion in 2010

#### Haemorrhage of the reproductive tract in a heifer

A two-year-old heifer was submitted for necropsy with a history of vaginal bleeding. Examination showed the presence of a re-epithelialised tear in the lateral wall of the

vagina where a blood clot was protruding from a 3.0 mm defect in the wall overlying an eroded medium sized artery.

#### Mastitis

A total of 853 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. Eighty samples (9.0 per cent) yielded cultures of more than two organisms and were considered to be potentially contaminated. No bacteria were cultured in a further 115 samples.

*E. coli* was the most frequently isolated organism and accounted for 20.6 per cent of isolates cultured. Other frequently identified organisms included:

- Streptococcus uberis* (12.1 per cent),
- B. licheniformis* (9 per cent),
- Staphylococcus aureus* (7.9 per cent),
- other *Streptococcus* species (8.9 per cent),
- other *Staphylococcus* species (7.8 per cent),
- Pseudomonas* species (6.3 per cent),
- Enterococcus* species (5.6 per cent)
- Streptococcus dysgalactiae* (2.9 per cent),
- other *Bacillus* species (2.9 per cent),
- Aerococcus* species (2.4 per cent) and
- Corynebacterium bovis* (2.4 per cent).

#### Neurological diseases

*Clostridium botulinum* type D toxin was identified in one suspect botulism case during the 1st quarter of 2011.

Cerebellar hypoplasia was diagnosed in a day-old calf submitted for necropsy; immunofluorescence testing for the presence of BVDV antigen was carried out with negative results.

Trauma was considered to be the cause of fatal brain haemorrhage in a four-month-old calf housed with two cows and a bull. At necropsy there was extensive haemorrhage over the cerebellum and along the base of the brain from the pituitary fossa caudally. No fractures were detected.

#### Bovine neonatal pancytopenia.

Four cases of bovine neonatal pancytopenia (BNP) were recorded during the reporting period. Current advice is that farmers should avoid feeding the colostrum of known BNP cows to their own or other calves.

Colostrum from cows which have not produced a BNP calf should be used and any excess stored for future use. The use of 'safe' colostrum from another herd may only be undertaken after rigorous herd health checks, including a consideration of the risk of Johne's disease transfer.

#### Cardiac abscessation

Two cases of cardiac abscessation in beef stirks of around twelve-months of age were recorded; in each case *A. pyogenes* was recovered from the lesions seen in the left ventricular and atrial walls.

#### Aortic thrombosis

A five-month-old calf with a history of respiratory signs progressing to recumbency was euthanased and submitted for examination. At necropsy; navel ill and fibrinous polyarthropathy; aneurysm and abscessation of the left umbilical artery; thrombosis of the left iliac artery and extensive ischaemic damage to the soft tissue of the left hind limb were detected.

#### Liposarcoma in a cow

A five-year-old cow was submitted with a history of chronic diarrhoea and wasting, Johne's disease was suspected on the basis of the clinical presentation. On gross postmortem examination a large (15 cm x 15 cm) multi-nodular, mass was observed on the ileocaecal junction and a similar, white well demarcated mass was detected on the liver adjacent to the gall bladder. The ileocaecal and hepatic lymph nodes were enlarged. On histological examination, the two masses were of similar composition and showed features consistent with ileal transmural and hepatic liposarcoma.

### SMALL RUMINANTS: SHEEP

#### Respiratory diseases

Respiratory disease was identified in 18 ovine postmortem submissions during this quarter. Jaagsiekte (eight cases), *M. haemolytica* (four cases), and laryngeal chondritis (three cases) were the most common diagnoses.

Two instances of Jaagsiekte (ovine pulmonary adenocarcinoma) from the same flock were diagnosed during the reporting period, the first in a yearling sheep (hogget) and the second in two adult ewes. In both cases the diagnosis was confirmed by histology. Secondary bacterial pneumonia due to *M. haemolytica* was present in both ewes.

#### Alimentary diseases

Choke due to oesophageal impaction was diagnosed in ewes from two flocks. In the first instance a bolus of dry silage was found at the level of the thoracic inlet in a four-year-old ewe. In the second flock there was a more a more serious problem with deaths in eight out of a batch of three hundred young ewes. Necropsy showed the oesophagus to be completely impacted with a mixture of barley, yellow maize and mash.

#### Johne's disease

Four 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 was tested for antibodies to MAP, one of which was positive.

#### Nutritional and metabolic disease

A suspected case of congenital haemochromatosis was diagnosed in a day-old lamb. On gross examination the liver had a mottled parenchyma. Histologically there was a marked biliary stasis with golden brown pigment in the bile ducts and hepatocytes. Perl's stained sections confirmed iron pigment in hepatocytes.

#### Reproductive diseases

Specimens from 197 ovine abortions and stillbirths were examined during this quarter. Significant pathogens were detected in 118 cases (59.9 per cent).

Of these, *Chlamydophila abortus* was the most commonly identified pathogen and was detected in 49 cases (24.9 per cent).

Other pathogens identified included:

*Toxoplasma gondii* (33 cases, 16.8 per cent), *E. coli* (14 cases, 7.1 per cent) and *Leptospira* (9 cases, 4.6 per cent).

The different causes of abortion and stillbirth diagnosed in ovine submissions throughout 2010 are shown in Figure 2. (next page)

The most common causes identified were *C. abortus* (17 per cent), *T. gondii* (16 per cent) and leptospirosis (9 per cent).

No significant pathogens were detected in 31 per cent of cases.

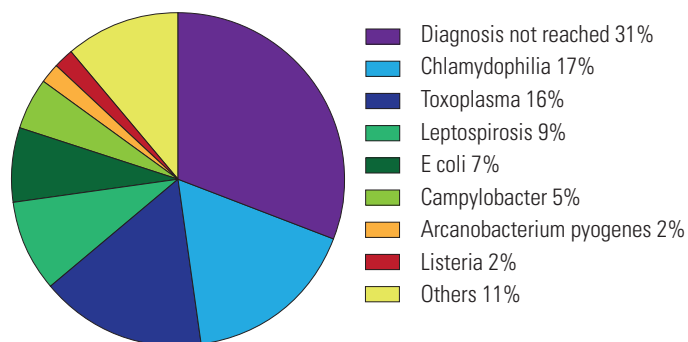


Figure 2. Causes of ovine abortion in 2010

A Texel flock had a problem with possible 'hairy shaker' lambs. Affected lambs were bright and alert but showed full body tremors. Blood samples were examined from two lambs. Both samples were 'low positive' for the presence of border disease virus (BDV) antibodies and positive for the presence of BVDV antigen by ELISA. Further investigations are ongoing.

#### Neurological diseases

Two cases of listeriosis were confirmed by postmortem examination during the first quarter of 2011.

#### Urinary tract disease

Urolithiasis was diagnosed in a ten-month-old ram, one of five to die from a group of three hundred. At necropsy there was preputial oedema with gritty substance on the mucosal surface of the prepuce. The vermiform appendage was plugged by pale substance and mucous. The terminal penile urethra was plugged by a firm mass of mucus and pale substance extending for around five centimetres.

There was an additional blockage at the sigmoid flexure. Urolithiasis in rams and wethers is usually caused by struvite calculi and is associated with the feeding of concentrates high in magnesium and phosphorous. Lowering the levels of magnesium and phosphorous, reducing concentrate intake and providing roughage and fresh water are useful preventive measures. Acidification of the urine by use of ammonium chloride in the feed or water may also be recommended.

#### Skin diseases

No cases of sheep scab were confirmed during the first quarter of 2011.

#### HORSES:

All 178 swabs that were examined for the presence of *Tayorella equigenitalis* were negative. Ten swabs were cultured from horses with a history suggestive of strangles, one of which was positive.

Three equine cases were examined during the period January to March 2011, including two aborted foetuses.

Of the aborted foetuses examined leptospire were detected by immunofluorescence in the kidney of one case. No definitive cause of abortion was determined in the other case. One case was examined for gastrointestinal disease, with a history of unresponsive colic. Strangulated small intestine which had prolapsed through the omentum was detected with associated fibrinous peritonitis.

#### PIGS;

Torsion of the spleen was diagnosed at necropsy of an adult sow, submitted with a history of sudden death. At necropsy the spleen was turgid with engorgement of the blood vessels of the gastro-splenic ligament.

#### BIRDS: Poultry

Ethylene glycol poisoning was diagnosed in two young birds that had died suddenly in a backyard flock. At necropsy the kidneys were enlarged and pale, with numerous bi-refringent, intratubular crystals (Figure 3). The flock owner was able confirm the contamination of the drinking water with ethylene glycol (antifreeze).

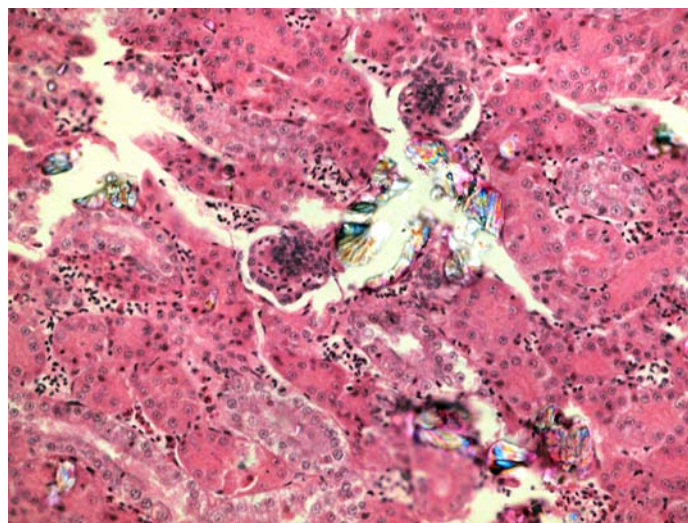


Figure 3. Bi-refringent crystals in the renal tubules of a chicken due to ethylene glycol poisoning (Haematoxylin and Eosin x 400 under cross polarising filters)

### BIRDS: Cage and aviary

An adult pelican (*Pelicanus species*) was submitted from a zoological collection with a history of weakness and collapse. At necropsy evidence was found of mild peritonitis with oedematous swelling of the legs.

Histologically there was moderately severe disseminated acute heterophilic hepatitis. In the spleen there were multiple pyo-granulomas present throughout the pulp, each featuring a caseous core surrounded by multinucleate macrophages. Sections stained with Ziehl Neelsen revealed the presence of moderate numbers of acid-fast microorganisms associated with the splenic pyogranulomas. A diagnosis of avian tuberculosis was made.

Parasitic proventriculitis likely due to *Libyostrongylus douglassii* (wireworm) was diagnosed in an adult farmed ostrich (*Struthio camelus*). The mucosa of the proventriculus and ventriculus appeared thickened on gross examination.

Histologically there were numerous nematode larvae within the mucosal glands and there were numerous larvae and strongylid type eggs within the disrupted koilin layer. A faecal egg count detected 15200 strongylid type eggs per gram. Advice was given on the effectiveness of fenbendazole, levamisole or ivermectin to treat the infection.

### WILDLIFE and EXOTICS:

Twenty-three mute swans (*Cygnus olor*) from eight separate sites in Northern Ireland were examined during the reporting period. All tested negative for avian influenza by RT-PCR and one was tested for PMV-1, also with a negative result. Botulism and lead poisoning were also ruled out as potential causes of the reported die offs.

To put these events into context there have also been reports of increased mute swan mortalities in Scotland and England with very similar backgrounds and findings to the Northern Ireland cases. The mortality events all occurred since the start of the year, mute swans have been the only species to have been affected and, in most cases, birds have been in good nutritional condition. It also appears that all of these events have occurred in waters where swans were fed.

In the Great Britain cases the main causes of death have been necrotic enteritis (*Clostridium perfringens* infection) and hepatic amyloidosis.

There were two confirmed necrotic enteritis cases in Northern Ireland, but it was not possible to rule this out in other cases due to autolysis. Amyloidosis was suspected in several cases and hepatic necrosis suggestive of bacterial infection via damaged intestinal mucosa was detected in some birds. Bacterial air sacculitis was a common feature. *E. coli* and *Riemerella anatipestifer* were recovered from intestinal and systemic cultures in a small number of birds.

Necrotic enteritis is caused by *C. perfringens*. This organism is part of the normal intestinal flora and causes disease when there are factors such as high intestinal carbohydrate levels, which cause *C. perfringens* overgrowths. It has also been postulated that a high carbohydrate diet in swans may have predisposed to hepatic amyloidosis in the absence of chronic inflammation.

Parasitic damage is a known predisposing cause of necrotic enteritis and the birds examined had enteric parasites. In particular the presence of acanthocephalans (Thorny Headed Worms) in the some swans was probably the main predisposing factor as the worms had penetrated the intestinal wall (Figure 4). Acanthocephalans have a two host life-cycle with freshwater crustaceans being the intermediate host.

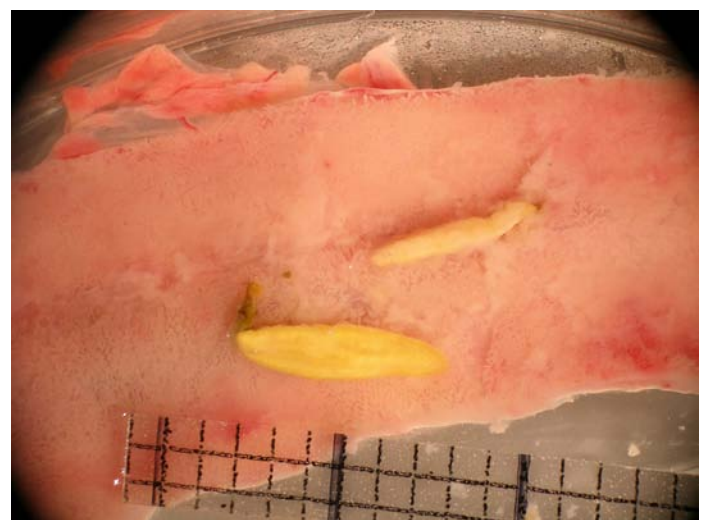


Figure 4: Acanthocephalans buried in the small intestinal mucosa of a mute swan (Scale 1cm ruler, 2mm squares)

Schistomes (trematodes) (Figure 5) were also found in the mesenteric or hepatic portal vein of several birds and it should be noted that schistosomes are potentially zoonotic. The free swimming cercarial stage of their life cycle can penetrate the skin of humans and cause a condition known as 'swimmers itch'.

The findings point to a combination of environmental events predisposing to the deaths. These events together resulted in change of diet, increased stocking density and increased bacterial loads as well as potentially increased stress.

Parasitism was also a significant factor particularly on one ornamental lake with a high stocking density, and acanthocephalans appear to be particularly pathogenic in swans. Many birds had hepatic necrosis with others suffering from generalised bacterial infections. It is likely that the primary damage would have been to the intestine walls, with a compromised intestinal barrier resulting in liver and generalised infections.

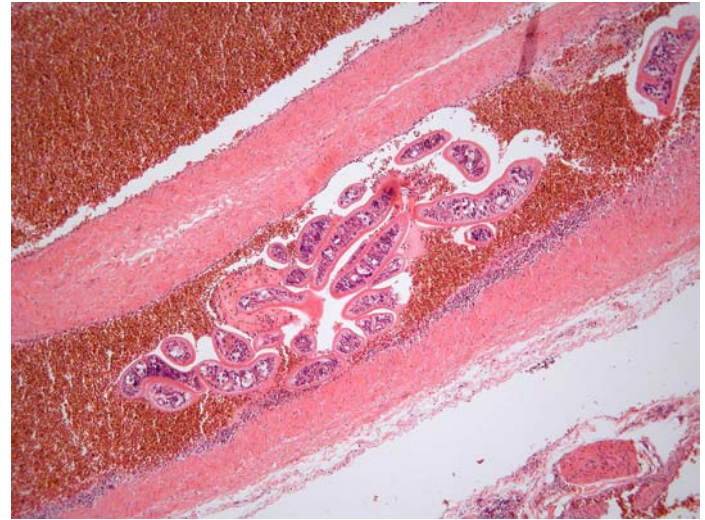


Figure 5. Schistosomes in a mesenteric blood vessel of a mute swan (Haematoxylin and Eosin x 100)

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.