Agri-Food and Biosciences Institute

Northern Ireland disease surveillance
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Northern Ireland disease surveillance, April to June 2008

- *Clostridium botulinum* type A toxin detection in a cow
- Cutaneous lymphosarcoma in a three-year-old cow
- Meticillin resistant *Staphylococcus aureus* isolated from a horse
- Infectious avian encephalomyelitis in pheasants

- **These are some of the matters discussed in the Northern Ireland animal disease surveillance quarterly report for April to June 2008**

CATTLE

Respiratory diseases

Respiratory disease was identified in 64 cattle submitted for postmortem examination between April and June 2008. The most common pathogens identified included *Mannheimia haemolytica* (thirteen cases), *Pasteurella multocida* (nine cases), *Histophilus somni* (seven cases), *Arcanobacterium pyogenes* (six cases), *Infectious Bovine Rhinotracheitis* virus (IBRV) (four cases) and *Mycoplasma bovis* (three cases).

One of the problems investigated involved two five-month-old calves that were submitted from a farm experiencing an acute outbreak of respiratory disease. At postmortem examination both animals had severe necrotising tracheitis, with secondary purulent pneumonia. IBRV was detected by immunofluorescence in samples of lung and / or trachea from both animals.

A case of parasitic pneumonia was diagnosed in a two-month-old calf that was submitted for postmortem examination in mid-May. For a month prior to death the calf had access to pasture that had been previously grazed by young calves. Postmortem findings included widespread lobular consolidation, with numerous adult lungworm present in the trachea.

A diaphragmatic hernia was diagnosed in a 12-week-old calf with a clinical history of respiratory distress. At postmortem examination loops of small intestine were evident in the thoracic cavity and there were adhesions between the intestinal mesentery, parietal pleura and diaphragm. The calf also had five fractured ribs on one side of the ribcage that were consistent with dystocia and it is possible that a difficult birth may also have resulted in the diaphragmatic herniation.

Alimentary diseases

BVDV / Mucosal disease

A total of 665 blood samples were tested by virus isolation or antigen capture ELISA for bovine viral diarrhoea virus (BVDV), of which 114 (17.4 per cent) were positive. In addition, 207 submitted tissues and nasal mucus samples were tested by immunofluorescence for BVDV, 9 (6.4 per cent) were positive. Four cases of mucosal disease were confirmed at postmortem examination during the period.

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.

Endoparasitic infections

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

	Number	
Pathogen	Tested	Positive (%)
Cryptosporidium species	540	232 (43.0%)
Rotavirus	359	113 (31.5%)
Coronavirus	358	5 (1.4%)
Escherichia coli K99	235	8 (3.4%)

Table 1: Pathogens identified in neonatal bovine faecal samples in Northern Ireland, April to June 2008.

		No of parasitic ova					
	Total	**Negative**	**+**	**++**	**+++**	**++++**	**% positive**
Liver fluke							
Bovine	574	395	107	53	12	7	31.2%
Ovine	214	184	18	7	3	2	13.8%
Coccidia							
Bovine	742	586	110	23	7	16	21%
Ovine	293	68	133	46	32	14	76.8%
Strongyle worm egg count		**<500 epg**		**≥500 epg**			
Bovine	643	591		52			8.1%
Ovine	277	230		47			17%

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

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

Table 2: Endoparasitic infections in ruminants in Northern Ireland, April to June 2008.

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out by microscopic examination (Ziehl-Neelsen staining) on 312 bovine faecal samples. Ten samples (3.2 per cent) contained acid-fast organisms typical of MAP. A total of 1583 bovine blood samples were tested for antibodies to MAP, of which 172 samples (10.9 per cent) were positive.

Other enteric conditions

A two-month-old suckled calf with a history of scour was examined postmortem. Grossly there was a severe necrotising ileitis, enlargement of the kidneys and streaking of the renal cortices. Tests for BVDV, Malignant Catarrhal Fever and other common enteric pathogens were all negative. Necrotising enteritis syndrome of spring born suckled calves was suspected. In this condition the pathological changes are very similar to BVDV infection, though BVDV is not recovered. In this case the primary pathology was of severe vasculitis and thrombosis in the intestine and kidney with associated renal infarction. BVDV can also cause vasculitis and thrombosis, but may not be identified in all cases of post-natal infection, due to the presence of maternal antibodies.

A four-year-old dairy cow that was at grass during the day and fed on maize silage at night, died 12 hours after presenting with a full abdomen and greatly decreased milk yield.

At postmortem examination, a large perforated abomasal ulcer was evident, with leakage of stomach contents into the abdomen and a secondary fibrinous peritonitis (Fig 1).

Fig 1 Fibrinous peritonitis in a cow secondary to a perforated abomasal ulcer

A 21-month-old bullock that had died suddenly was submitted for postmortem examination. The animal had a history of recent diarrhoea and weight loss but had appeared to recover prior to death. On gross examination, the liver was pale, firm and fibrotic, with thickening of the bile ducts. Histologically, there was a loss of normal hepatic architecture, marked diffuse fibrosis, bile duct proliferation, reduced hepatocyte numbers and hepatocyte megalocytosis. These changes are strongly suggestive of pyrrolizidine alkaloid toxicity, with ragwort being the most likely cause.

Fifteen cases of salmonellosis due to *Salmonella* Dublin were diagnosed in postmortem submissions during the quarter. The majority of these cases were in young calves with a smaller number of incidents in adult animals. One case involved a two-month-old calf

submitted from a farm that had three other recent deaths. At postmortem examination the carcase was congested and jaundiced with enlarged lymph nodes, pericarditis and myocardial ecchymoses. Histologically there was multifocal hepatoparenchymal necrosis, focal necrosis and thrombosis in the spleen and a broncho-interstitial pneumonia. A high level of *S*. Dublin was isolated in a septicaemic pattern on bacteriology.

Reproductive and mammary diseases

Abortion

Specimens from 78 bovine abortions and stillbirths were examined during the quarter. Significant pathogens were detected in 38 cases (48.7 per cent). Of these, *Leptospira* Hardjo was the most commonly identified pathogen, and was detected in 25 cases (32.1 per cent of cases). Other pathogens identified included *Neospora caninum* (six cases, 7.7 per cent), *Bacillus licheniformis* (five cases, 6.4 per cent), *Arcanobacterium pyogenes (*four cases, 5.1 per cent), BVDV (three cases, 3.8 per cent) and *Salmonella* Dublin (one case, 1.3 per cent).

Mastitis

A total of 898 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. Sixty-seven (8 per cent) samples yielded cultures of more than two organisms and were considered to be potentially contaminated. No bacteria were cultured in a further 157 samples.

Escherichia coli was the most frequently isolated organism and accounted for 21.0 per cent of isolates cultured. Other frequently identified organisms included *Streptococcus uberis* (15.7 per cent of isolates), *Streptococcus dysgalactiae* (3.2 per cent), *Enterococcus* spp. (4.0 per cent) *Staphylococcus aureus* (11.0 per cent) and other *Staphylococcus* spp (5.8 per cent).

Neurological diseases

Lead poisoning was diagnosed in carcass submissions from two farms during the quarter. One case involved two three-month-old suckler calves that had been found dead at pasture. No gross abnormalities were detected at postmortem examination but elevated kidney lead levels (103 and 146 µg per g, reference range 0 to 25 µg per g) were found in both animals. A previous case had also been diagnosed in another calf from the same farm approximately four weeks earlier. The source of the lead was not found.

Clostridium botulinum type A toxin was detected in abomasal contents of a cow submitted for postmortem examination in April. The animal had been losing weight over a number of weeks and had become recumbent prior to being euthanised. Botulinum toxin A is not reported to be pathogenic in cattle, but is one of the botulinum toxins capable of causing disease in humans. The Food Standards Agency was informed of this toxin detection. In this case it was thought that the Type A toxin was likely to have been an incidental finding.

Malnutrition in the latter stages of pregnancy was the more likely cause of the clinical signs, which were not consistent with botulism. A further two cases of botulism due to *Clostridium botulinum* type D were also diagnosed during the quarter.

Two ten-day-old calves that died subsequent to showing neurological signs were submitted for postmortem examination. In both calves there was gross and histological evidence of acute meningitis. *Arcanobacterium pyogenes* was isolated on bacteriology from the brain of one calf and from the hock swab of the other, and it was thought likely that both cases were sequelae to perinatal navel infections. In a second similar case acute meningitis was diagnosed in a one-week-old calf. High levels of *E. coli* were isolated from a range of internal organs as well as the brain, indicating that the meningitis had occurred as part of a colisepticaemia.

Other diseases

Cutaneous lymphosarcoma was diagnosed in a three-year-old cow that was submitted with a history of ill thrift and skin lesions. At postmortem examination there were firm swellings in the skin, mainly around the perineum, udder and ventral abdomen, and subcutaneous oedema that was most prominent around the head. There was also enlargement of the prefemoral, prescapular and retropharyngeal lymph nodes, pale foci in the kidney, and a necrotic tracheitis and pharyngitis. The overall histological appearance was typical of a lymphosarcoma with dense infiltration of large round lymphocytic cells into the dermis of affected areas of skin, the renal interstitium and lymph nodes. Cutaneous lymphosarcoma is a form of bovine lymphosarcoma, which is typically seen in cattle two to three years of age. Initial lesions are described as urticarial-like and then progress into raised, circular, hairless lesions that are mostly concentrated over the neck, shoulders and perineal areas. Lesions can appear and regress for months, before progressing to the multicentric form.

SHEEP

Respiratory diseases

Respiratory disease was identified in 15 ovine submissions for postmortem examination during the quarter. *Mannheimia haemolytica* (eight cases) and *Pasteurella multocida* (two cases) were the most commonly identified pathogens involved.

The majority of cases of *M. haemolytica* infection presented as septicaemia and / or pneumonia in young lambs. One typical case involved a six-week-old lamb that had been found dead. At postmortem examination there was a severe fibrinopurulent pleurisy and pericarditis, with high levels of *M. haemolytica* isolated from the pericardium.

Ovine pulmonary adenocarcinoma (Jaagsiekte) was diagnosed in three cases during the quarter.

One of these involved a four-year-old ewe that was submitted after having been found dead. At postmortem examination, the lung parenchyma was markedly grey in colour, and the cut surface oozed excess fluid. There was also consolidation of the cranio-ventral lung lobes, abscessation and pleurisy. On histological examination the lung alveoli were lined with neoplastic columnar epithelial cells forming acinar structures within the lumen, an appearance that is consistent with ovine pulmonary adenocarcinoma.

Alimentary diseases

Coccidiosis and parasitic gastroenteritis, including nematodirosis, were common causes of death in young lambs during the quarter. Cases of nematodirosis were recorded from the end of April until mid-June, with the majority of cases occurring during May.

One of these cases involved two six- to eight-week-old lambs that were submitted for postmortem examination from a farm that had a further ten lambs ill in the same batch and five other recent deaths. Enteritis was the main postmortem finding in the two lambs submitted with over 426,000 and 390,000 Nematodirus worms and 18,000 and 34,000 *Teladorsagia circumcincta* worms in the small intestine and abomasum respectively.

A high level of coccidial oocysts was detected in a third lamb, which was submitted shortly afterwards from the same farm for postmortem examination.

Two dead and two moribund lambs were submitted from a flock in which there had been 16 recent deaths out of a group of 400. Affected lambs had been dull and frothing at the mouth before becoming recumbent. At postmortem examination all four lambs appeared dehydrated with evidence of enteritis. Large numbers of coccidial oocysts, mainly *Eimeria ashata* and *E. crandallis* were detected on parasitology. There was evidence of nephrosis in two of the lambs with enlarged pale kidneys grossly and lesions typical of nephrosis histologically.

Johne's disease

Thirteen ovine faecal samples were examined microscopically (Ziehl-Neelsen staining) for MAP and four ovine blood samples were tested for antibodies to MAP. All samples tested negative.

Reproductive diseases

There was the normal seasonal decrease in the number of ovine abortion and stillbirth submissions during the quarter, with 20 cases received. Recognised pathogens were detected in 15 cases. Evidence of *Toxoplasma* spp. infection was found in seven cases (35 per cent of submissions), while *Chlamydophila abortus* was detected in four cases (20 per cent) and *Leptospira* spp. in three cases (15 per cent). *Campylobacter fetus fetus* and *Listeria monocytogenes* were isolated from one case (5 per cent) each.

Neurological diseases

Six cases of listeriosis were diagnosed on histological and / or bacteriological

grounds during the quarter. Other neurological cases investigated included a one-month-old lamb that was submitted after having been euthanized on-farm. At postmortem examination the bladder was found to be grossly distended and there was dilation of the renal pelvis of both kidneys. Examination of the spinal cord identified a subdural haemorrhage between thoracic vertebrae T10 and T12, and the vertebral canal of the lumbosacral region was filled with purulent exudate. It was concluded that the spinal abcess, which may have originated from a tail docking wound, had affected innervation of the bladder resulting in dysfunction and a secondary hydronephrosis.

Skin diseases

No cases of sheep scab were confirmed during the quarter.

Other diseases

Streptococcus dysgalactiae infection was diagnosed in a two-month-old lamb that had a stiff gait for a few days before death. At postmortem examination there was a purulent arthritis of the tarsal, carpal and atlanto-occipital joints. Lesions of vegetative endocarditis were also found in the right atrio-ventricular valve and high growths of the organism were cultured on bacteriology.

A two-year-old Texel-cross ewe was submitted in April with a history of sudden-onset ataxia, inappetance, jaundice and haematuria. The farm had five other recent deaths prior to this submission. Postmortem examination revealed a jaundiced carcase and a bronze-coloured liver with tissue copper levels of 284 µg per g detected in the liver and 108 µg per g in the kidney. The recent diet was reported to have included cattle beef nuts. No further cases were reported after this was changed to sheep meal with copper levels of less than 12 µg per g.

A three- to four-year-old ewe that had shown respiratory signs, superficial lymph node enlargement and had a history of failing was submitted following euthanasia. At postmortem examination there was a generalised lymphadenopathy affecting both the superficial and deep lymph nodes, the liver was pale and both kidneys were markedly enlarged, pale, mottled and had thickened renal cortices. Lymphosarcoma was diagnosed on histology of the affected tissues (Fig 2).

Fig 2 Enlarged prescapular lymph node due to lymphosarcoma in a ewe

PIGS

Respiratory diseases

Pneumonia due to *Actinobacillus pleuropneumoniae* serotype 5 was diagnosed in a fattening pig submitted in April. At postmortem examination there were typical lesions including widespread consolidation of the cranioventral and part of the diaphragmatic lung lobes, extensive fibrinous pleurisy and fibrinous pericardial adhesions. *A. pleuropneumoniae* serotype 5 is relatively uncommon in Northern Ireland, with the majority of isolates being serotype 2, or the complex 3, 6, 8'

A series of submissions was received from a herd experiencing a marked increase in mortality in finishing pigs, with affected animals showing signs of weight loss, dyspnoea and pneumonia. Common findings at postmortem examination include marked enlargement of the bronchomediastinal and carcass lymph nodes, and variable lung consolidation. Histological changes observed in lymph nodes included lymphocytic depletion, macrophage infiltration, multinucleate macrophage infiltration, and occasional focal necrosis and oedema. Macrophages were also notably prominent in lung histology. Although the age of animals affected and the clinical picture were unusual, the postmortem and histological changes were indicative PCV-2 infection, with PCV-2 antigen also detected on immunofluorescence and / or immunohistochemistry.

Other diseases

Ringworm was diagnosed in a series of skin scrapings that was received in April from a herd experiencing an outbreak of dermatitis. Small numbers of ovoid, thin-walled macroconidia with a single septum typical of *Microsporum* spp. were observed on microscopy. Although dermatophytosis in pigs is generally regarded as uncommon with limited economic importance, affected animals in this herd were displaying pruritis with some self-mutilation (Fig 3).
Ringworm in pigs is generally self-limiting, but in this case responded to treatment with a topical preparation.
A fifth-litter sow with a history of a bloody discharge from the vulva was received from a herd that had three previous deaths within the previous week. At postmortem examination there was a marked haemorrhagic cystitis and a high level of *Corynebacterium* spp. was isolated from the urine on bacteriology.

Fig 3 Ringworm lesions on a sow

HORSES:

One hundred and seventy-five blood samples were submitted for serology for equine viral arteritis by virus neutralisation test, two of which tested

positive. These two animals have been antibody positive for a few years.
All 240 swabs that were examined for the presence of *Tayorella equigenitalis* were negative. Nineteen swabs were cultured from horses with a history suggestive of strangles, and *Streptococcus equi* was detected in two swabs from horses in separate premises.

Meticillin resistant *Staphylococcus aureus* (MRSA) was isolated from a nasal swab from a horse. The animal had been hospitalised recently and treated for chronic nasal discharge. Further tests indicated that the isolate possessed the staphylococcal cassette chromosome (scc) *mec* type IV genetic element, but was negative for the Panton-Valentine Leukocidin (PLV) toxin gene.

Nineteen equine pathology cases were examined during this quarter. Two of these were aborted foetuses which were received for postmortem examination from separate premises. Profuse growths of *Streptococcus zooepidemicus* were recovered from the foetal stomach contents, lung and placenta of one foetus while no significant pathogens were recovered from the other.

Four neonatal foals were examined *post mortem*. A one-day-old foal had failed to pass meconium and subsequently died. A pure, profuse growth of *Actinobacillus equuli* was recovered from all sites cultured. Serum immunoglobulins were extremely low (2 ZST units), indicating that insufficient colostrum was absorbed.

On postmortem examination a three-day-old foal had a mucoid enteritis with a yellow coloured diarrhoea. *Listeria monocytogenes* type 1 was recovered in septicaemic distribution.
A six-day-old foal was found dead. On postmortem examination there was evidence of trauma, with subcutaneous oedema and haemorrhage over the left side of the chest. An acute, necrotising, purulent pneumonia was also present. *E. coli* was recovered in septicaemic distribution.

There was evidence of a previous neonatal infection in a foal that died at three months of age. On postmortem examination the umbilical vessels were oedematous and contained purulent material. The right hock and right fore fetlock joints were enlarged with excess joint fluid. Pyelonephritis was present in the right kidney. *Streptococcus agalactiae* was cultured from all sites.

A three-month-old foal, which had a history of ill-thrift and hair loss, was submitted for postmortem examination. The foal had ringworm and the epithelium on the dorsum of the tongue was thickened and hyperkeratotic with bacterial clumps within keratin. Pneumonia, with severe caudodorsal consolidation, was also present. No significant organisms were recovered from the lungs.

An eleven-year-old horse died while being exercised. On postmortem examination the laryngeal mucosa was haemorrhagic and multifocal, ecchymotic lung haemorrhages were present. The tracheal mucosa was also haemorrhagic. Lung histology revealed mild alveolar congestion, foci of moderate haemorrhage and mild emphysema.
No cardiac abnormalities were observed grossly or microscopically. These

postmortem findings are consistent with exertion.

Two foals had perforated gastric ulcers at postmortem examination.
A six-week-old foal had a full depth ulcer, approximately 1.5cm in diameter, in the non-glandular stomach. A two-month-old foal had a perforated gastric ulcer and resultant peritonitis. Vascular thrombosis and acute inflammation were seen histologically in the gastric submucosa.

BIRDS

Two birds were received from a small traditional-breed poultry flock. A total of seven birds had died within the previous few days after birds had accidentally gained access to bags of artificial fertiliser. At postmortem examination the carcasses of both birds were markedly congested and the blood was dark in colour. Nitrite poisoning was diagnosed on the basis of the postmortem appearance and biochemical tests for nitrites.

Neurological clinical signs were reported in large batch of imported three- to four- week-old pheasants. The birds were ataxic, either sitting back on their hocks or falling on their sides. Some birds were trembling. No abnormalities were observed on gross postmortem examination, but histologically there was evidence of a marked encephalitis, including perivascular lymphoid cuffing with scattered foci of gliosis. Infectious avian encephalomyelitis virus (Epidemic Tremor) was detected by immunofluorescence, and blood samples from the birds also tested positive on serology.

Birds were also received from a large pheasant-rearing unit, on which 200 three- to four-week-old pheasants had died overnight. At post mortem examination all birds examined were markedly thin, had prominent sternums and yellowish liquid caecal contents. High levels of *Eimeria* spp were observed on parasitology while tests for *Spironucleus* (*Hexamita)*, avian influenza and paramyxovirus 1 (PMV-1) were all negative. Unseasonal weather prior to the incident was also considered to be a possible contributory factor.

Avian tuberculosis was diagnosed in a number of waterfowl and other avian submissions during the quarter. One of these involved an adult East African crowned crane (*Balearica regulorum gibbericeps*) that had multiple pale foci in the liver parenchyma and nodular masses in the lung containing dry gritty material. Histology showed typical granuloma formation with acid-fast bacilli evident on Ziehl-Neelsen stained preparations.

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.