

Northern Ireland Disease Surveillance Report, 1st July to 30th September 2008

These are some of the matters discussed in the Northern Ireland animal disease surveillance quarterly report for 1st July to 30th September 2008:

- **Increased incidence of ostertagiosis in cattle**
- **Copper toxicity in cows**
- **Severe orf associated with facial oedema in lambs**
- **Lordosis and kyphosis in pigs**

CATTLE

Respiratory diseases

Respiratory disease was identified in 31 cattle postmortem submissions between July and September 2008. The most common pathogens identified included *Mycoplasma bovis* (three cases), *Pasteurella multocida* (three cases), *Mannheimia haemolytica* (two cases), *Histophilus somni* (two cases), *Arcanobacterium pyogenes* (two cases) and Infectious Bovine Rhinotracheitis virus (IBRV) (two cases).

An eight-year-old cow was submitted for postmortem examination from a herd with on-going respiratory disease.

The cow had been treated with antibiotics for pneumonia. The herd had been vaccinated for salmonellosis, leptospirosis, IBRV and bovine virus diarrhoea virus (BVDV). The lungs were overinflated, with emphysematous bullae and there was lobular consolidation throughout the caudodorsal and cranioventral lobes, with over 50 per cent consolidation. Marked septal oedema, multifocal cavitation and abscessation were also present. Submucosal oedema and haemorrhage were seen in the trachea, but the epithelium was intact. The histological lesions found in the lung tissue were suggestive of bacterial bronchopneumonia, superimposed on pre-existing chronic damage.

A. pyogenes only was isolated from the lungs, but the bacteriological findings are likely to have been influenced by antibiotic treatment, and other bacterial pathogens may have been involved in the overall clinical picture. No viral pathogens were detected.

Alimentary diseases

BVD / Mucosal disease

A total of 593 blood samples were tested by virus isolation or antigen capture ELISA for bovine viral diarrhoea virus (BVDV), of which 82 (13.8 per cent)

were positive. In addition, 321 submitted tissues and nasal mucus samples were tested by immunofluorescence for BVDV, with 20 (6.2 per cent) being found positive. Seven cases of mucosal disease were confirmed at post mortem examination during the period.

One atypical case involved a seven-month-old bullock that died at grass after a short illness. No other calves in the batch were affected. On postmortem examination large, lateral tongue ulcers, a purulent laryngitis, pneumonia and pleurisy were present. A profuse growth of *H. somni* was recovered from the lung, although the histological changes were of lung collapse, congestion, oedema and haemorrhage with little inflammation

in the abomasum and the liver was bronzed. Histologically lesions in the liver were suggestive of chronic passive congestion. Vasculitis with mononuclear cell inflammatory infiltration was seen in the heart. Foci of myocardial fibre degeneration with mineralisation were also present. BVDV antigen was detected on immunofluorescence of abomasum, spleen and mesenteric lymph node. Immunostaining for BVDV on sections of heart tissue was negative.

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.

Pathogen	Number tested	Positive (per cent)
<i>Cryptosporidium</i> species	116	21 (18%)
Rotavirus	91	18 (20.5%)
Coronavirus	91	0 (0.0%)
<i>Escherichia coli</i> K99	39	7 (17.9%)

TABLE 1: Pathogens identified in neonatal bovine faecal samples in Northern Ireland, July to September 2008.

which are not typical of infection by this organism. BVDV was detected from tongue, lung, spleen, abomasum and mesenteric lymph node.

Another atypical case involved a four-month-old heifer that had diarrhoea prior to death. On postmortem examination the carcass was anaemic, a single pyloric ulcer was present

Three two- to four-day-old calves, that had showed clinical signs of septicaemia died suddenly. On postmortem examination scant, semi-solid to fluid, fawn coloured contents were present in the large intestine. *E.coli* was isolated in a septicaemic pattern from two of these animals and isolates from the intestines tested positive for the K99 antigen.

Sensitivity tests revealed at least an intermediate level of resistance to all antibiotics on the testing panel.

A 15-day-old calf was submitted for postmortem examination. The calf had been bleeding from the gums, an ulcer was seen on the tongue and there was bruising on the roof of the mouth. Blood was also present in the urine and faeces. The calf had been treated with antibiotics.

On postmortem examination the carcase was anaemic. Blood-stained fluid was present in the intestines and digested blood was seen in the faeces. The liver was enlarged and bronze-coloured. Perirenal haemorrhage was present around the left kidney and the bladder mucosa was thickened with haemorrhage into the mucosa and bladder lumen. The urine was blood-stained. Histologically, multifocal

hepatoparenchymal necrosis with an associated acute inflammatory reaction was seen. Extensive tubular necrosis with occasional peri-glomerular haemorrhage was present in the kidneys. There was extensive haemorrhage into the bladder mucosa, sub-mucosa and muscle layers. These postmortem findings are typical of disseminated intravascular coagulation.

Salmonella Dublin was isolated from a faeces sample taken prior to treatment. However, no significant organisms were recovered from the carcase. This case illustrates the importance of submitting samples for culture before commencing antibiotic therapy.

Other enteric conditions

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

Ostertagiosis was commonly reported

	Total	No of parasitic ova					% positive
		Negative	+	++	+++	++++	
Liver fluke							
Bovine	470	377	60	24	4	5	15.6%
Ovine	201	158	37	6	0	0	27.2%
Coccidia							
Bovine	802	528	223	11	18	22	34.2%
Ovine	210	32	137	32	8	1	84.8%
Strongyleworm egg count		<500 epg	≥500 epg				
Bovine	761	638	123				16.2%
Ovine	209	137	72				34.4%

≥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, July to September 2008.

during this quarter, due mainly to the wet summer weather favouring development of the parasite. One case involved a one-year-old heifer that died at pasture.

Two other animals in the cohort had died and three others had diarrhoea. On postmortem examination the abomasum had a morocco leather appearance, consisting of raised nodules with a central orifice and 68,000 *Ostertagia ostertagi* worms were present. Histologically, numerous larvae were observed in the abomasal glands.

A three-year-old cow that had died suddenly was submitted for postmortem examination. The cause of death was severe haemorrhage into the intestines. The point of haemorrhage was in the mid-jejunum, but no cause was evident. This animal also had a moderately heavy infection of paramphistomes (stomach flukes) in the rumen. Reports of these parasitic infections are increasing at present in Northern Ireland, in accordance with similar reports from Great Britain.

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out by microscopic examination, with Ziehl-Neelsen staining, on 234 bovine faecal samples. Eight samples (3.4 per cent) contained acid-fast organisms typical of MAP. A total of 652 bovine blood samples were tested for antibodies to MAP, of

which 139 samples (21.3 per cent) were positive.

A six-year-old cow, with a history of ill-thrift and diarrhoea that was unresponsive to treatment, was submitted for postmortem examination in September. The herdowner reported that six other cows had died within the previous year after showing similar clinical signs. Gross findings of segmental thickening of the mucosa of the distal ileum and proximal large intestine and histology typical of infection with MAP confirmed a diagnosis of Johne's disease.

Reproductive and mammary diseases

Abortion

Specimens from 114 bovine abortions and stillbirths were examined during the quarter. Significant pathogens were detected in 55 cases (48.2 per cent). Of these, *Leptospira* Hardjo was the most commonly identified pathogen, and was detected in 26 cases (22.8 per cent of cases). Other pathogens identified included *Salmonella* Dublin (15 cases, 13.2 per cent), *Neospora caninum* (seven cases, 6.1 per cent), *Arcanobacterium pyogenes* (four cases, 3.5 per cent), *Bacillus licheniformis* (one case, 0.9 per cent), BVDV (one case, 0.9 per cent) and *Listeria monocytogenes* (one case, 1 per cent). Two cases of abortion due to *S. Kottbus* were also diagnosed on one farm during the quarter.

Mastitis

A total of 2009 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. One hundred and forty seven (7.3 per cent) samples yielded cultures of more than two organisms and were considered to be potentially contaminated. No bacteria were cultured from a further 362 samples. *Escherichia coli* was the most frequently isolated organism and accounted for 20.5 per cent of isolates cultured. Other frequently identified organisms included *Corynebacterium bovis* (10.7 per cent), *Streptococcus uberis* (10.4 per cent of isolates), *Enterococcus* species. (5.6 per cent), *Staphylococcus aureus* (11.4 per cent) and other *Staphylococcus* species (10.3 per cent).

A mastitis investigation was carried out in September in a 200-cow herd with a three month rolling bulk milk somatic cell count of 412,000 per ml. *S. aureus* was isolated from 36 cows (18 per cent of the herd) and major faults were observed in parlour routine and parlour maintenance. Record keeping and culling policy was poor. On examination of the udders significant teat-end hyperkeratosis was observed. It was found that the cows were being over milked with automatic cluster remover (ACR) settings at a flow rate of 250 grams of milk per minute. Liners were replaced in the parlour twice per year, but each liner had performed 2,500 milkings after 97 days. Recommendations included batching

S. aureus infected cows separately and milking them last until eventually culled, hot washing of the milking lines twice daily, increasing ACR flow rate cut-off point to 400 grams per minute, changing liners four times per year, wearing of gloves in the parlour and effective teat disinfection post-milking. It was also recommended that a dynamic milking machine test should be carried out.

Neurological diseases

Clostridium botulinum type D toxin was detected in three cases of suspect botulism in the third quarter of 2008.

One case involved two two-month-old calves that were found dead. Botulism was suspected, as a broiler house in the vicinity had been recently cleaned out. No significant abnormalities were detected on postmortem examination. *C. botulinum* 'C/D' toxins were identified in the small intestinal contents of both calves and the abomasal contents of one calf.

A sixteen-month-old Charolais bull was submitted for postmortem examination. One week previously the bull had been noticed lame on the left hind leg, but was able to walk. The following day the bull was recumbent, with posterior paralysis. The tail was completely flaccid with no anal tone and the bull was unable to defaecate. On postmortem examination a comminuted fracture of the terminal lumbar vertebra was

present. The bladder had ruptured with copious amounts of urine present in the abdomen.

Four cases of lead poisoning were diagnosed during the quarter.

Two three- and four-month old heifers from the same farm were found dead over the course of a weekend. There was a history of blackleg on the farm.

Another heifer from this batch had died a short time previously but was not submitted for examination. Toxic lead levels of 164 and 158 µg per g respectively (normal range <25 µg per g) were detected in the kidneys.

Other diseases

Twenty-five cases of blackleg were diagnosed during the quarter.

One case involved a ten-week-old Belgian Blue suckler calf that was found dead. Another calf had died suddenly the previous week, but had not been submitted for examination.

On postmortem examination extensive blackleg lesions in both shoulder muscles and a fibrinous pericarditis were present. Immunofluorescence for *Clostridium chauvoei* was positive. Clostridial vaccination was not undertaken on this farm.

Two four-year-old dairy cows were submitted from the same farm two weeks apart for postmortem

examination. The first cow was euthanized after a short illness. The animal had a subnormal temperature, was inappetant and had a markedly reduced milk yield. On gross postmortem examination the carcass was jaundiced. The liver was enlarged and icteric, and the cut surface of the kidneys were dark brown in colour. Haemoglobinuria was present. Bridging fibrosis with centrilobular hepatocyte degeneration was seen on histological examination of the liver and the kidney glomeruli contained degenerate eosinophilic staining cellular material. Kidney copper levels were 28.8 µg per g (normal range < 25 µg per g).

The second cow had been jaundiced and recumbent and was euthanized after a short illness. On postmortem examination the carcass was jaundiced with the right kidney dark brown in colour. The liver was jaundiced and focal ulceration was seen in the pylorus of the abomasum. Histology of liver tissues showed widespread hepatic disruption. In some areas hepatocyte megalocytosis and vacuolation was seen. Some periportal and centrilobular necrosis and hepatocyte degeneration were also present. Biliary hyperplasia with a degree of interlobular fibrosis was present. Kidney copper levels were 96.6 µg per g (normal range < 25 µg per g). The findings in both animals were consistent with copper poisoning. A five-year-old cow was found dead.

On postmortem examination ascites and hydrothorax were present. Both kidneys were enlarged and grey / light brown in colour. The right kidney was polycystic and there was an infarct in the left kidney.

Lesions typical of renal amyloidosis were seen histologically. Renal tubules were dilated, some containing proteinaceous hyaline casts. An interstitial fibrosis and nephritis, with foci of lymphocytic infiltration was also present. The renal Bowman's capsules were slightly thickened. Amyloid deposits were seen in the kidney medulla.

SMALL RUMINANTS

Respiratory diseases

Respiratory disease was identified in eight ovine postmortem submissions during the quarter. *Mannheimia haemolytica* (three cases), was the most commonly identified pathogen. Laryngeal chondritis (two cases) and Jaagsiekte (one case) were seen at postmortem examination.

A four-month-old lamb that died suddenly was examined postmortem. Twelve other lambs in this batch were also found dead. Due to inclement weather the lambs had been housed 10 days previously. Suppurative bronchopneumonia was present and *Dictyocaulus filaria* lungworms were detected in the airways and observed in histological sections of the lungs.

Mannheimia haemolytica was isolated from the lungs.

Two three-year-old ewes died after a period of ill thrift and wasting. On postmortem examination the ewes were in poor condition. The lungs of both ewes were heavy and contained multifocal to coalescing pale areas. There was copious frothy fluid in the airways. On histological examination there were multiple focal-to-coalescing lesions of pulmonary carcinoma formation throughout the lung lobes. The neoplastic tissue consisted of proliferative foci of cuboidal to columnar cells lining alveolae and forming papillary projections into alveolar lumina. There were large numbers of macrophages in alveolae, but no significant neutrophil accumulations. Ovine pulmonary carcinoma (Jaagsiekte) was diagnosed in both cases.

On-going respiratory disease and ill thrift in kid goats was investigated. Five kids, four of which were euthanized and one found dead, were submitted for postmortem examination. Consolidation of the anterior lung lobes was seen grossly. Histologically, an exudative bronchopneumonia was present.

Mycoplasma ovipneumoniae was isolated from the lungs of four of the five kids examined and *Mannheimia haemolytica* from the lungs of two kids. Immunofluorescence for RSV and PI3 was negative.

Johne's disease

Ten ovine faecal samples were examined microscopically using Ziehl-Neelsen staining for MAP, one sample testing positive. Three ovine blood samples were tested for antibodies to MAP, all samples testing positive.

Reproductive diseases

There was the normal seasonal decrease in the number of ovine abortion and stillbirth submissions during this quarter, with only one case received.

No significant pathogens were isolated from this case.

Neurological diseases

Four cases of listeriosis were confirmed by postmortem examination during the third quarter of 2008.

Listeria monocytogenes type 4 was isolated from the brainstem of a 15-month-old ewe, which had been treated within 24 hours of the onset of neurological signs and salivation. Microabscessation and perivascular cuffing were detected on histology of the brainstem.

A diagnosis of cerebrocortical necrosis was confirmed on histology of the brain of a four-month-old lamb, grazing good upland pasture, which presented in lateral recumbency with opisthotonus. A transketolase test on a blood sample taken prior to euthanasia was positive for cerebrocortical necrosis.

On post-mortem examination the cerebral gyri appeared swollen and autofluorescence was observed in

sections of the cerebrum under a Woods lamp. There had been several similar cases in this flock in the previous few weeks.

Skin diseases

No cases of sheep scab were confirmed during the third quarter of 2008.

Twelve lambs (11 white-faced lambs and one black-faced lamb) in a flock had swollen oedematous heads, ears and eye-lids. The lambs were pruritic and had a nasal discharge. Ulcers were present on the hard palate and lips. There were no tongue lesions. The lambs were from a batch of ten ewes and 20 lambs, which were on rough grazing that included thistles. They were mostly home-reared white-faced lambs, but three black-faced lambs that had been bought-in the previous month were also affected. There was no history of importations. The possibility of bluetongue was investigated, but both serology and RT-PCR tests for the virus were negative.

One severely affected lamb was euthanized on welfare grounds and examined postmortem. Proliferative pustular lesions were observed on the upper and lower lip, the muzzle, the side of the face and the ears. The skin of the head was irregular, moist, weeping and thickened. The scabs were easily displaced leaving underlying haemorrhagic dermis. There was extensive oedema of the head



Fig 1. Severe orf associated with facial oedema in a lamb

(Fig 1). On histology there was marked epidermal proliferation with epidermal abscessation, bacterial colonisation of the keratinised layer and ulceration. Vacuolation and swelling of keratinocytes in the stratum spinosum (hydropic change) and eosinophilic intracytoplasmic inclusions were present. There was oedema fluid separating collagen bundles within the deep dermis. Orf was diagnosed on the basis of gross and histological findings and was confirmed by transmission electron microscopy, which demonstrated the orf virus. Several other lambs in the batch were also euthanized on welfare grounds.

This case demonstrated that orf is a significant differential diagnosis for bluetongue.

PIGS

Alimentary diseases

Salmonella Typhimurium was isolated from pigs on two units during the quarter.

Salmonella Typhimurium was isolated from the small intestine of four pigs, weighting approximately 20kg, that had fibrinonecrotic enteritis with the caecum and colon most severely affected.

Two of the pigs also had enlarged, grey-coloured kidneys. Histologically, lymphoid depletion in the mesenteric lymph nodes and a lymphocytic, plasmacytic interstitial nephritis were present. Porcine circovirus type 2 virus (PCV2) was not detected on immunofluorescence.

Other diseases

A nine-week-old pig was found dead. This was the third recent sudden death in this batch. On postmortem examination mulberry heart disease was diagnosed on the basis of gross and microscopic findings. Grossly there were streaky epicardial and myocardial haemorrhages and hydropericardium (Fig. 2). One 16-week-old and three ten-week-old



Fig 2. Mulberry heart disease in a pig

pigs were examined from a unit where the pigs had poor liveweight gain. The

pigs were derived from Large White cross Landrace sows which had been artificially inseminated with semen from Tempo boars.

Up to 5 per cent of the pigs in the unit had developed humpy backs (Fig 3(a) and 3(b)).

Pigs were first seen affected from



Fig 3(a). Lordosis and kyphosis in a pig



Fig 3(b). Spine of pig with lordosis and kyphosis

six- to eight-weeks of age. More males than females were affected and some of the most severely affected pigs had developed paresis.

Humpy backs with lordosis and kyphosis

were detected in the four pigs examined. All of the pigs had seven cervical vertebra, 15 thoracic vertebrae and seven lumbar vertebrae, but hemivertebrae were not observed. No significant gross or microscopic lesions were seen of the spinal cord in three of the four pigs. A generalised vasculitis, including the spinal cord, was observed in one pig.

Three of the pigs were light and small; however the fourth pig was in good condition. Fibrinous peritonitis was detected grossly in one pig and widespread vasculitis was observed on histology. There were no gross lesions observed in the viscera of the other pigs. Bony exostoses were detected on the ribs of two pigs.

The bony exostoses were present on four ribs in one pig and they were present bilaterally on the first ten pair of ribs in another pig. There was no obvious swelling of the costochondral junctions. Rib bone ash percentages ranged from 18 to 27 per cent (normal range: 58-62 per cent) indicating poor bony mineralisation. The ratio of calcium (37-39.5 per cent) to phosphorus (19.6-20.6 per cent) was normal at approximately 2:1.

Bone magnesium ranged from 0.58-0.83 per cent (normal >0.5 per cent).

Blood magnesium and calcium were within normal limits while blood phosphorus concentrations ranged from 2.58-3.72 mM

(normal limits 1.6-3.4 mM).

Two ten-week-old pigs were euthanized and submitted for postmortem examination from a unit where a number of pigs were showing clinical signs of ill thrift and dullness. Sows on the unit had been vaccinated for PCV2. On gross examination both pigs were thin and hairy and significant levels of bronchointerstitial pneumonia were present.

Histologically, pulmonary fibrosis and abscessation was seen in one pig and marked lymphocytic infiltration of the pulmonary interstitium in the other. Histological changes characteristic of PCV-2 infection were minimal. However, the presence of moderate levels of PCV-2 antigen in the mesenteric lymph nodes of these pigs together with low levels in the lungs and the gross appearance of the carcasses was suggestive of the involvement of circovirus infection in the overall clinical presentation.

HORSES

Ten blood samples were submitted for serology for equine viral arteritis by virus neutralisation test, all of which were negative. All 13 swabs that were examined for the presence of *Tayorella equigenitalis* were negative. Ten swabs were cultured from horses with a history suggestive of strangles,

and *Streptococcus equi* was isolated from one swab.

Fifteen equine postmortem cases were examined during this quarter.

A one-month-old foal was examined postmortem. The foal had a history of pneumonia and scour before becoming ataxic and recumbent. A comminuted fracture of the left femur with extensive haemorrhage into the surrounding gluteal muscles was seen. Large numbers of *Strongyloides* species eggs were also present in the faeces.

A four-month-old foal, which was found dead in a shallow river, had mud, gravel and other debris present in the trachea. The lungs were over inflated and contained gritty material. Histologically, there was a large amount of foreign extraneous material present in the airways. In this case the gross and histological findings were indicative of drowning.

A ten-year-old pony had been observed wobbling from side to side before death. A white calcified vermiform track was present in the epicardium of the right atrium. A possible cardiac conduction problem due to an aberrant ascarid nematode migration was suspected as the cause of death.

BIRDS

On postmortem examination of a one-year-old Maren breed hen, egg peritonitis with several hard masses consisting of inspissated yolk material was present. Attached to the small intestine was a large lipoma-like mass approximately 4-5cm in diameter. Histologically, the mass consisted of cuboidal to low columnar cells forming ducts and acinar structures. There was a moderate mitotic index and abundant fibrous tissue. These histological findings are consistent with an ovarian adenocarcinoma. This is a common tumour seen in laying hens and metastasis frequently occurs.

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.