

**Northern Ireland  
Animal Disease Surveillance Quarterly Report**

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**Highlights:**

- Nitrite poisoning in dairy cattle
- Bovine mucosal disease
- Ovine parasitic gastroenteritis
- Mulberry heart disease
- Bonamiosis in oysters

**CATTLE**

***Respiratory diseases***

Pneumonia was identified as the cause of death in 26 carcass submissions between July and September. *Dictyocaulus viviparus* was the most frequent respiratory pathogen detected (7 cases). Large numbers of adult lungworms were found in the trachea, bronchi and bronchioles of affected cases. Two 4- to 5-month-old calves in a batch of 29 died from lungworm infection in early July. Post-mortem examination of one of these animals revealed severe pneumonia, involving more than 60% of the lung tissue, with a predominantly caudodorsal distribution. Bovine parainfluenza-3 virus (PI3) antigen was also detected in lung tissue although the clinical significance in this case was unclear.

Faecal and blood samples were received in July from a dairy herd in which several cows had become recumbent. One of seven faecal samples contained *Dictyocaulus viviparus* larvae indicating patent lungworm infection. In addition, five of seven blood samples had elevated glutamate dehydrogenase activity ranging from 35 to 380 U/l (normal range 0 – 30 U/l) suggesting liver damage. However, the respective contributions of the lungworm infection and liver damage to the clinical problem was unclear.

Faecal samples were submitted in August from three 15-month-old heifers from a group that had a history of coughing and deaths. Lungworm larvae were detected in two of the three samples indicating patent lungworm infection.

## **Alimentary diseases**

### ***BVD/mucosal disease***

Five cases of mucosal disease were confirmed by post-mortem examination of submitted carcasses. In one incident, three 15-month-old “home-bred” cohort animals were submitted with a history of weight loss and scour. Gross and histological findings, consistent with mucosal disease, were observed in all three carcasses. Bovine virus diarrhoea (BVD) virus antigen was detected by immunofluorescence in multiple tissues of two of the heifers and by immunohistochemistry in the small intestine of the third.

Blood samples were submitted from a 30-month-old cow (which had been purchased as a calf) and her six-week-old calf. The calf had developed diarrhoea and mouth ulcers and, a few days later, its dam presented with similar signs. The cow died within three days of the onset of clinical signs and the calf several days later. Bovine virus diarrhoea virus was isolated from the blood of both animals. No antibodies to BVD virus were detected in either animal supporting a diagnosis of mucosal disease. This incident highlights the ability of BVD virus to be transmitted vertically from a persistently infected dam to its offspring, and the potential for persistently infected family lines to be established.

Bovine virus diarrhoea virus was also isolated from blood samples submitted from three 18-month-old heifers with a history of diarrhoea and weight loss on another farm. All three animals were negative for antibodies to BVD virus, supporting a clinical diagnosis of mucosal disease.

### ***Neonatal enteritis***

As relatively few dairy cows calve during the summer months in Northern Ireland, relatively few samples were submitted from neonatal calves during this period. However, as in the previous quarter, cryptosporidia and rotavirus were the most frequently identified pathogens (Table 1).

**Table 1: Pathogens identified in bovine faecal samples submitted to VSD, July to September 2005**

Pathogen	Number	
	Tested	Positive (%)
Cryptosporidia	91	19 (21)
Rotavirus	54	14 (26)
Coronavirus	54	2 (4)
<i>Escherichia coli</i> K99	15	0

\* Samples were mainly submitted from neonatal calves, although the age was not always given

### **Postnatal enteritis**

A breakdown of the parasites found in ruminant faecal samples submitted during this period is shown in Table 2. Fluke eggs were detected in approximately 6.6% of bovine and 2.8% of ovine faecal samples. Surprisingly, clinically significant levels of strongyle worm eggs were found in only 4% of bovine faecal samples. This finding suggests relatively good control of bovine parasitic gastroenteritis (PGE) by farmers and veterinary practitioners. Clinically significant worm egg counts were more frequent in ovine faecal samples (13%). Coccidial infection was present in 58% of sheep and 40% of cattle tested.

**Table 2: Endoparasitic infections in ruminants, July to September 2005**

	Total	Number Negative	Number with >800 epg*	Number of parasites				Percentage positive
				+	++	+++	++++	
Liver fluke	350	327		20	3	0	0	6.6
Bovine								
Ovine	218	212		5	1	0	0	2.8
Coccidia								
Bovine	432	254		124	19	15	11	40
Ovine	240	101		120	17	2	0	57.9
Strongyle worm egg count								
Bovine	372		15					4.0
Ovine	220		29					13.2

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

+ Low, ++ moderate, +++ high, ++++ very high

Coccidiosis was identified as the cause of death of four post-mortem submissions, ranging in age from three weeks to seven months. Faecal samples were submitted in July from a batch of 18-month-old grazing heifers with a history of bloody, mucoid diarrhoea and severe rectal inflammation. Very high numbers of coccidial oocysts were recorded in these samples. Although severe clinical coccidiosis is rarely encountered in adult cattle, the majority of the oocysts from this case were speciated as *Eimeria zuerni*, the most pathogenic coccidian species in cattle. Coccidiosis was also identified, by the finding of high levels of faecal oocysts, in a 2-year-old heifer that had acute diarrhoea.

A seven-week-old calf was submitted from a farm that had a persistent problem of diarrhoea in bucket-fed calves since last winter. *Salmonella* Dublin was isolated in moderate to high numbers from multiple organs. Moderate consolidation of the cranioventral lung lobes (20%) and pasty yellow caeco-colonic contents were noted. Histopathological lesions included a suppurative bronchointerstitial pneumonia and a severe focal hepatoparenchymal necrosis, characteristic of salmonellosis.

A very high coccidial oocyst count was recorded in a faecal sample submitted from an adult cow with suspected salmonellosis. No other pathogens were identified and it is not known whether this animal had been treated with antibiotics prior to submission of the sample.

Two nine-month-old heifers were submitted for post-mortem examination in September with a history of diarrhoea and weight loss. A thickened abomasal mucosa with a "Morocco leather" appearance and fluid intestinal contents were seen in both carcasses. The presence of 11,200 and 26,000 strongyle eggs per gram and low levels of *Nematodirus* spp. eggs in faeces from the respective animals were consistent with PGE.

A two-month-old calf submitted in July was found to have an oedematous, haemorrhagic abomasal mucosa. Immunofluorescence for *Clostridium sordellii* antigen was detected in abomasal tissue. Vaccination of cohorts with a multivalent clostridial vaccine offering protection against this organism was recommended.

### ***Johne's disease***

A total of 1132 blood samples, from cattle in 127 herds, were submitted for serological testing for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) during this period. Ninety-three samples (8.2%) were positive by ELISA, while 23 (2%) gave inconclusive results by ELISA.

Microscopic examination for the presence of acid-fast bacteria was carried out on 180 bovine faecal samples submitted from suspect clinical cases. Acid-fast organisms, morphologically consistent with MAP, were detected in 25 samples (13.9%).

A three-year-old cow submitted for post-mortem examination was found to have a granulomatous enterotyphlitis associated with numerous acid-fast organisms, consistent with Johne's disease. A blood sample collected from the carcass was seropositive to MAP. Antibodies to MAP were also detected in blood of a Jersey cow that had been imported from continental Europe and subsequently developed severe diarrhoea and weight loss that were unresponsive to anthelmintic and antibiotic treatment. This case highlights the risks to herd biosecurity of importation. Blood samples from two pedigree Limousin bulls that had chronic diarrhoea on two other farms were also seropositive for MAP.

### **Nutritional and metabolic diseases**

Biochemical testing indicated a moderate prevalence of hypocalcaemia and hypomagnesaemia in samples submitted between July and September (Table 3). Blood non-esterified fatty acid (NEFA) concentrations are a measure of fat mobilisation, and elevated concentrations indicate nutritional stress or negative energy balance. Beta-hydroxybutyrate (BHB) concentrations above the reference range indicate ketosis. Low erythrocyte glutathione peroxidase activity, indicating long-term selenium deficiency, was a common finding. Hypocupraemia was detected in a small number of bovine

blood samples. Although animal details or clinical history were not always available, most of the samples tested for calcium, magnesium, NEFA and BHB are believed to have been submitted from dairy cows. The samples tested for copper and glutathione peroxidase were submitted from animals of different ages and different stages of production (beef and dairy cows and calves).

Analysis of a blood sample submitted from a cow that died one day post-calving after having shown nervous signs and recumbency revealed hypocalcaemia, hypomagnesaemia and hypophosphataemia.

The histological features of the thyroid gland in three submitted stillborn calves were suggestive of thyroid hyperplasia which may have been due to maternal iodine deficiency.

A blood sample submitted in September from a cow with a history of infertility and ill-thrift was found to have a low copper level of 3.7  $\mu\text{mol/l}$  (normal range 8-16  $\mu\text{mol/l}$ ).

**Table 3: Selected tests of mineral status and energy balance in cattle**

Analyte	Number of tests	Reference range	Number (%) above or below reference range
Calcium	174	2.0-2.8 mmol/l	20 (11.5)*
Magnesium	211	0.73-1.31 mmol/l	20 (9.5)*
Non-esterified fatty acids	63	0-0.5 meq/l	24 (38.7)#
Beta-hydroxybutyrate	213	0-1.5 mmol/l	20 (9.4)#
Glutathione peroxidase	423	>160 U/g Hb	44 (12.3)*
Copper	369	8-16 $\mu\text{mol/l}$	8 (2.3)*

\* Below reference range

# Above reference range

Hb Haemoglobin

## Reproductive and mammary diseases

### **Abortion**

Specimens from 103 cattle abortion cases were examined between July and September. Recognised pathogens were detected in 45 (44%) cases. Of these, *Leptospira* Hardjo was the most commonly identified pathogen (40%). *Salmonella* Dublin was isolated from 14 cases (31%). This was a significant increase on the comparable figure of 5% in the previous quarter.

### **Mastitis**

A total of 1064 bacterial isolates were made from milk samples submitted from acute and chronic cases of mastitis. Environmental bacteria including coliforms (20.4%), *Streptococcus uberis* (15.4%) and yeasts (3.8%) accounted for 39.6% of isolates. *Staphylococcus aureus* accounted for 10.2%

of isolates while there were a few cultures of *Streptococcus dysgalactiae* (1.3%) and *S. agalactiae* (0.3%). Less frequently isolated organisms included *Salmonella* Dublin, *Mannheimia haemolytica*, *Pasteurella multocida*, *Pseudomonas aeruginosa*, and *Corynebacterium bovis*. Seventy samples (6.5%) yielded multiple bacterial isolates and were considered to be contaminated.

During the summer months the vast majority of dairy cows in Northern Ireland are outdoors at pasture. It is therefore surprising to note that environmental organisms accounted for such a high proportion of the pathogens isolated during this period. This finding may reflect the relatively longer duration reported for some intramammary infections with environmental organisms or poor environmental conditions when some cows are at pasture e.g. dirty collecting yards or poor pre-milking udder preparation.

## **Nervous diseases**

### ***Botulism***

Samples of gastrointestinal contents from suspect incidents of botulism in 24 herds were tested for the presence of botulinum toxins. Submitted samples included 14 carcasses and a number of faecal samples from cohort animals. A calcium:magnesium ratio of 137 was found in rib bone of one young calf suggesting hypomagnesaemia as the likely cause of death. (A Ca:Mg ratio greater than 90 is considered indicative of magnesium deficiency). Consolidation of approximately 25% of the lung tissue was found on post-mortem examination of two bullocks from another farm, but no significant lesions were seen in any of the other suspect cases.

Type D botulinum toxin was detected in gastrointestinal contents of cattle from three farms. In all three cases, proximity to broiler chickens or poultry litter had been identified as risk factors. At least six calves and two cows were reported to have died on one of these farms. One animal died and two were recumbent approximately 3 to 4 days after broiler litter had arrived on another. Reported clinical signs included muscle weakness and tongue paralysis. As there were no significant findings in any of the samples tested from the other farms, botulism could not be confirmed. This illustrates the difficulty in laboratory confirmation of suspected clinical cases of botulism.

## ***Other diseases***

### ***Nitrite poisoning***

A serious incident of nitrite poisoning occurred in a dairy herd in September. Following evening milking, the cows were offered a "buffer-feed" before returning to pasture. On one evening, several cows became ataxic and recumbent after consuming some of this supplementary feed. Over the next two hours, 36 cows either died or had to be euthanased. The clinical signs included recumbency, tachypnoea and chocolate-brown mucous membranes. Death usually occurred within 30 minutes of recumbency. Examination of the buffer-feed offered to the cows after milking revealed contamination with fertilizer pellets. Meal used in this buffer-feed had been taken from a silo bin

that had been used to store fertilizer during the summer. It is presumed that significant quantities of fertilizer had remained lodged on the sides of the bin and were dislodged when the bin was filled with meal.

Following ingestion by ruminants, fertiliser nitrate is converted to nitrite in the rumen. Nitrite combines with haemoglobin to form methaemoglobin which cannot carry oxygen. Death occurs when approximately 70-80% of haemoglobin is converted to methaemoglobin. The remaining 99 cows in the herd were not affected, suggesting that not all cows had been exposed to significant quantities of the contaminated diet. This case highlights the need for farmers to be aware of the toxic nature of artificial fertilizer and to ensure that it does not find its way into animal feed.

Fifteen cases of blackleg and 6 cases of black disease were identified during this period.

A blood sample was submitted in September from a 10-month-old heifer with suspected bracken fern toxicity. Haematological examination revealed a platelet count of zero and a low total leucocyte count ( $1.4 \times 10^9$ ; normal range  $4.0-12.0 \times 10^9$ ), consistent with bracken toxicity.

Pyelonephritis was found in kidneys submitted from an animal slaughtered in a meat plant. The calyces and medulla of one kidney were filled with liquid pus while the second was pale, swollen and contained large renal calculi up to 5 cm in diameter. *Salmonella* Dublin was isolated from both kidneys and the carcass was condemned as being unfit for human consumption.

The carcass of a six-month-old calf was submitted with a suspicion of having been shot because of the presence of two small skin perforations over the right shoulder. Post-mortem examination revealed a large myocardial abscess in the interventricular septum but no evidence of gunshot wounds or other traumatic damage. *Arcanobacterium pyogenes* was cultured from the abscess. (The skin wounds were due to pecking by scavenging birds). An interventricular abscess was also found on post-mortem examination of a yearling that had been found dead. *Arcanobacterium pyogenes* was also cultured from this case.

A blood sample submitted from an animal with blindness due to bilateral corneal opacity, diarrhoea, anorexia and thickened skin was seropositive for malignant catarrhal fever virus, supporting a diagnosis of malignant catarrhal fever.

## **SHEEP**

### **Nutritional and metabolic diseases**

A three-year-old ewe that was the second to have been found dead was submitted for post-mortem examination. There were multiple haemorrhages in the head, neck, shoulder and axillary regions. Approximately 2 L of sanguineous fluid were found in the thoracic cavity and the lungs were intensely congested and oedematous with fibrin tags on the pleural surface.

Histological examination revealed hepatocellular necrosis while the renal copper concentration was elevated (72.5 µg/g; upper limit 25 µg/g). Although the animal did not appear jaundiced, the liver lesions were suggestive of copper toxicity.

### **Alimentary diseases**

A lamb from a batch that had persistent diarrhoea was euthanased in September and submitted for post-mortem examination. Approximately 1200 *Teladorsagia* spp. nematodes were found in the abomasum and 11,700 *Trichostrongylus* spp. in the small intestine, indicating PGE. *Campylobacter* species were cultured from the large intestinal contents. The flock owner reported that the batch had been treated with an oral avermectin product four weeks previously. He was advised to check the calibration of his dosing equipment and to ensure that the correct amount of anthelmintic was being administered by placing the dose on the back of the tongue. He was also advised to monitor faecal egg counts in order to estimate the extent of pasture contamination and to help determine the need for anthelmintic treatment.

A faecal sample was submitted in August from a 4-month-old diarrhoeic lamb that had been a member of a group that had been dosed one month previously and moved to new pasture. Moderate levels of coccidial oocysts and 300 strongyle eggs per gram were detected in the faeces. Lungworm larvae (*Dictyocaulus filaria*) were also detected.

### **Skin diseases**

Caseous lymphadenitis was confirmed by the isolation of *Corynebacterium pseudotuberculosis* from a swab taken from a jaw abscess in a sheep.

### **Other diseases**

A valuable pedigree Suffolk ram, that had been found dead at grass, was submitted for post-mortem examination. This ram had been in a paddock with another throughout the summer and was in excellent body condition. Post-mortem examination revealed a cervical fracture at the level of the atlanto-occipital joint, characteristic of a ram fight.

## **PIGS**

### **Mulberry heart disease**

Four cases of mulberry heart disease (dietetic microangiopathy) were diagnosed in submissions from four different farms. This condition is characterised by acute heart failure and sudden death, usually in weaned or fattening pigs. Although the exact cause is unknown, alterations in alpha-tocopherol metabolism appear to be involved. The problem had continued on one farm for over 18 months despite the inclusion of very high levels of alpha-tocopherol in the diet (450 mg/kg).

A Saddleback pig that was found dead was submitted found to have severe acute meningitis from which *Streptococcus suis* and a low level of



*Haemophilus parasuis* were cultured. As the *S. suis* isolate was rough, serotyping was not possible.

Porcine circovirus type 2 (PCV2) infection was identified in post-mortem submissions from seven farms. In several cases, it was associated with pneumonia, diarrhoea, wasting and increased mortality in weaned pigs. *Actinobacillus suis* and *Bordetella bronchiseptica* were among the bacteria isolated from PCV2-infected cases.

## **BIRDS**

### ***Poultry***

Two batches of 3- to 4-week-old broiler chickens were submitted with a history of stunting. Coccidiosis, *E. coli* septicaemia and coagulase-negative staphylococcus infection were identified. Coccidiosis was also identified as the cause of mortality in 13-week-old layer-type birds on a 30,000-bird unit. There had been increased mortality and reduced egg production.

Histomoniosis, colisepticaemia and impaction of the gizzard and proventriculus were identified in 24-week-old layers submitted from an 8000-bird free range unit with a history of increased mortality and reduced egg production.

Histopathological lesions of non-suppurative encephalitis were detected on post-mortem examination of a batch of 12-day-old chickens that were “off their legs”. Immunofluorescence to avian encephalomyelitis virus was detected in the brain and intestine. This finding is consistent with the clinical signs and brain lesions seen.

### ***Wild birds***

A large firm fibro-caseous lesion was identified in the wall of the proventriculus of an emaciated black-necked cygnet. Histological examination revealed the presence of severe *Amidostomum* sp. infection in this organ.

### ***Cage and aviary birds***

A sample of a lesion from the dorsal cervical region of a pigeon was received for histopathology. This was one of a number of birds in the coop that had rapidly developed skin lesions. Histological lesions included epidermal necrosis associated with acute inflammation and the presence of large intracytoplasmic eosinophilic inclusion structures, characteristic of Bollinger bodies, in epidermal cells. These features are consistent with pigeon pox infection. Although it is more usual to find pox lesions at muco-cutaneous junctions such as on the eyelids and beak, this virus can enter any region of the skin through minor abrasions. The dermal form of the disease is usually relatively mild with infected birds recovering and developing strong immunity within a few weeks.

## **HORSES**

Swabs were submitted from four horses that had shown respiratory signs after the return of a mare from stud. Clinical signs included enlarged lymph nodes and a temperature of 102-104F. *Streptococcus equi* was isolated, confirming an outbreak of strangles.

A 6-week-old filly foal was submitted with a history of recumbency, dyspnoea and death 48 hours after the onset of signs. Post-mortem examination revealed a pale carcass and groups of white-flecked fibres scattered throughout the limb muscles. The gross and histological appearance of the muscle lesions was suggestive of nutritional myopathy. In addition, there were multiple, 5-10 mm diameter, pale infarcts in the cortex of the left kidney. The foal also had a heavy burden of *Strongyloides westeri*.

## **FISH**

*Bonamia ostreae* is a notifiable protozoan parasite of flat oysters (*Ostrea edulis*) according to Directive 91/67/EC on the health of farmed fish and shellfish. Testing is usually carried out by microscopic examination of tissues or heart impression smears. This parasite was identified for the first time in oysters during a survey of Lough Foyle which lies between Northern Ireland and the Republic of Ireland. Although EU approved zone status with respect to *B. ostreae* has now been withdrawn from Lough Foyle, the remainder of the coast of Northern Ireland retains approved zone status. Follow up samples have been collected for further testing by the Marine Institute in the Republic of Ireland and DARD's Veterinary Sciences Division in Northern Ireland to determine the geographical extent and prevalence of infection in the lough. Additional test methods, including real time polymerase chain reaction and *in situ* hybridization for *B. ostreae* have been introduced for this testing programme. The initial results suggest that infection is not currently widely disseminated in Lough Foyle.