



Northern Ireland Disease Surveillance Report, July to September 2019

- Lungworm infection in cattle
- Focal symmetrical encephalomalacia (FSE) in cattle
- Unusual Cerebrocortical necrosis (CCN) in cattle
- Cerebrocortical necrosis (CCN) in sheep
- Cellulitis and phlegmon in sheep
- Gastric ulceration in pigs

These are some of the matters discussed in the Northern Ireland animal disease surveillance quarterly report for July to September 2019

CATTLE:

Respiratory diseases

Respiratory disease was identified in 34 cattle post mortem submissions between July and September 2019. The most common pathogens identified included parasitic pneumonia (fourteen cases), *Pasteurella multocida* (seven cases), *Mycoplasma bovis* (six cases), *Mannheimia haemolytica* (four cases), *Trueperella pyogenes* (two cases) and *Histophilus somni* (two cases).

Lungworm infection in cattle

Infection with *Dictyocaulus viviparus* (FIGURE 1) was the most common cause of bovine pneumonia diagnosed during the reporting period. Secondary bacterial infection with one or more of *M. haemolytica*, *P. multocida* and *T. pyogenes* was commonplace.



FIGURE 1: Lungworm infection in an eight-month-old bullock

One case was noteworthy for a more complex aetiology. A four-month-old calf was submitted with a history of sudden death following chronic pneumonia. On gross post mortem examination myocardial and skeletal muscle lesions suggestive of myopathy were found and changes associated with congestive heart failure with thoracic and abdominal transudation were present. There were large numbers of lungworm present in the airways and *D. viviparus* larvae were detected in the faeces. Histological examination of the liver showed marked centri-lobular congestion with associated cloudy swelling of hepatocytes, and scattered haemosiderin loaded macrophages in the sinusoids. There was an acute bronchopneumonia with marked bronchitis and bronchiolitis with many eosinophils present in the bronchiolar pus. Lungworm larval profiles were present. There was evidence of cardiomyopathy in the sections of heart examined with fractional shortening and eosinophilia of the myofibrils, fascicular oedema, focal haemorrhage and the presence of foamy macrophages in the inter-fascicular tissue. It was considered that the chronic dyspnea may have been more the result of myopathy and heart failure with fluid accumulation in the chest and the sudden death more the result of the lungworm infection and acute bronchopneumonia in an already compromised calf.

Alimentary diseases

Abomasal bloat, emphysematous abomasitis and perforation

Abomasal bloat possibly associated with a change of milk replacer powder was the cause of death in several two-week-old dairy calves. On gross examination the abomasum was greatly dilated by gas and contained a large volume of grey fluid and a moderate yellow milk clot. The abomasal mucosa was emphysematous and on histology there were frequent clusters of *Sarcina ventriculi* - like organisms on the mucosal surface (FIGURE 2).

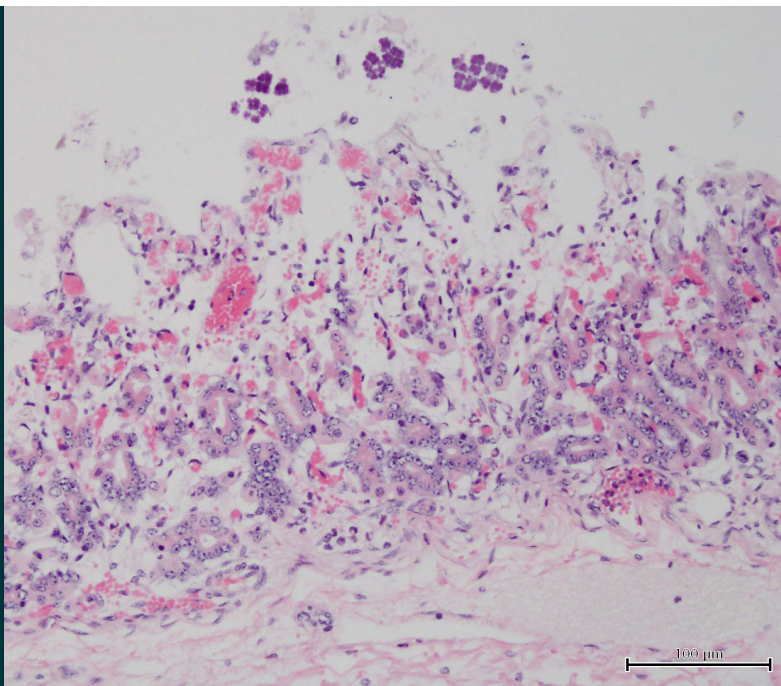


FIGURE 2: Abomasal bloat and emphysematous abomasitis in a young calf, tetrads of *S. ventriculi* were seen on histology in this case

Similar cases in slightly older calves involved perforation of the abomasal wall due to full depth ulceration with leakage of ingesta into the peritoneal cavity.

Cleft palate and aspiration pneumonia

Aspiration pneumonia was diagnosed in a three-day-old Simmental calf with palatoschisis affecting both the hard and soft palate.

Yew tree poisoning

Poisoning with the toxic alkaloid taxine due to ingestion of yew (*Taxus* sp) was diagnosed in three separate incidents in different herds during the reporting period. Gross post mortem findings and histology are unremarkable in such cases and the detection of yew sprigs in the rumen contents is the means of diagnosis

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.

TABLE 1: Pathogens identified in neonatal bovine faecal samples in Northern Ireland, July to September 2019.

Pathogen	NUMBER	
	Tested	Positive (per cent)
<i>Cryptosporidium</i> species	104	28 (26.9%)
Rotavirus	101	17 (16.8%)
Coronavirus	101	3 (2.9%)
<i>Escherichia coli</i> K99	56	2 (3.6%)

Other enteric conditions

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

TABLE 2: Endoparasitic infections in ruminants in Northern Ireland, July to September 2019.

	TOTAL	NO OF PARASITIC OVA					% POSITIVE
		NEGATIVE	+	++	+++	++++	
Liver fluke							
Bovine	490	475	15	0	0	0	3.1%
Ovine	217	209	3	5	0	0	7.7%
Paramphistome							
Bovine	490	291	32	91	30	46	40.6%
Ovine	217	183	12	12	9	1	15.7%
Coccidia							
Bovine	529	384	128	5	4	8	27.4%
Ovine	222	61	122	21	17	1	72.5%
Strongyle worm egg count							
	Total	<500 epg	≥500 epg				% Positive
Bovine	529	499	30				5.7%
Ovine	222	157	65				29.3%

≥500 eggs per gram of faeces (epg) was considered of likely clinical significance
 + Low, ++ Moderate, +++ High, ++++ Very high

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out on 260 bovine faecal samples by PCR. MAP was detected in 40 samples (15.4 per cent). Of 2208 bovine blood samples that were tested for antibodies to MAP, 179 (8.1 per cent) were positive.

Nutritional and metabolic disease

Rickets in a calf

Rickets was diagnosed in a five-month-old presented with bowed legs and lameness whilst at grass and being fed concentrate mix. There was mild enlargement of the costochondral junctions with several old rib fracture calluses present. The long bones were readily sawn and there was a line of

separation in the femoral diaphysis parallel to the growth plate. Histological examination of the femur showed irregular areas of thickening in the hypertrophic layer in the growth plate. There were occasional tongues of hypertrophic chondrocytes extending into the metaphysis, with scattered islands of un-mineralised chondrocytes. The spicules of the spongiosa were covered by a thick layer of osteoid. These changes were considered to be consistent with rickets.

Metabolic osteodystrophy (FIGURE 3) was diagnosed in a six-month-old calf. On gross examination there was a transverse fracture of the right femur at the upper aspect of the shaft. There was a transverse fracture of the lower aspect of the shaft of the left femur. There was haemorrhage and bruising of the thigh muscles associated with the fractures. Cortical bone in both femurs was thinner than in an age-matched control. There was reduction in the extent of cancellous bone in the affected femurs compared to the femur of an age-matched control. The bone marrow contained fatty tissue and clotted blood. There was thickening of costochondral junctions. There was excess fluid in multiple joints.

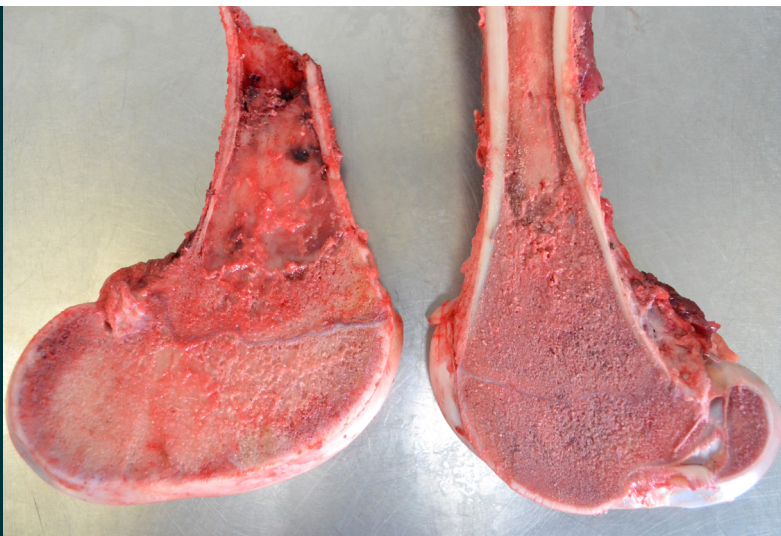


FIGURE 3: Metabolic osteodystrophy in a calf, there is thickening of the physis, loss of cancellous bone in the metaphysis, thinning of the cortices with widening of the marrow cavity. Femur from age matched control is on the right.

Reproductive and mammary diseases

Abortion

Specimens from 83 bovine abortions and stillbirths were examined during the 3rd quarter. Significant pathogens were detected in 28 cases (33.7 per cent). Of these, *Bacillus licheniformis* (5 cases, 6 per cent) and *Salmonella* Dublin (5 cases, 6 per cent) were the most commonly identified pathogens. Other pathogens identified included *Neospora caninum* (4 cases, 4.8 per cent), Leptospirosis (4 cases, 4.8 per cent) and *T. pyogenes* (3 cases, 3.6 per cent).

Mastitis

A total of 290 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. 31 (10.7 per cent) samples yielded cultures of more than two organisms and were considered to be potentially contaminated. No bacteria were cultured in a further 12 samples. *E. coli* was the most frequently isolated organism and accounted for 26.2 per cent of isolates cultured. Other frequently identified organisms included, *Streptococcus uberis* (15.9 per cent), *Staphylococcus aureus* (10.0 per cent), *Streptococcus dysgalactiae* (4.1 per cent).

Neurological diseases

Unusual cases of cerebrocortical necrosis (CCN)

Several cases of CCN with the unusual feature of superficial laminar cortical necrosis predominating rather than the more usual involvement of the deeper grey matter seen in classical thiamine or sulphur associated CCN. The reason for this unusual lesion distribution is unclear.

Focal symmetrical encephalomalacia (FSE) in a calf

An eight-month-old calf presented with nervous signs mainly banging its head and thrashing about, and anorexia for 6 days before death. It had received treatment with thiamine, corticosteroid and antibiotics. Postmortem examination findings were unremarkable barring foci of haemorrhage and congestion in the midbrain and medulla. Autofluorescence of unfixed brain tissue under ultraviolet light was not produced. Significant bacteria were not detected on brain culture including culture for *H. somni*. Histological lesions were suggestive of focal symmetrical encephalomalacia (FSE). There were several bilateral foci of necrosis present in the midbrain and medulla oblongata (FIGURE 4). Necrotic foci were characterised by severe vacuolation of white matter with dilated myelin sheaths, swollen axons (spheroids), neuronal necrosis, microgliosis, haemorrhage and lipid laden macrophages (Gitter cells). Deeply eosinophilic hyaline droplets were present around blood vessels in neuropil near the necrosis. There was clear space around blood vessels in cerebral white matter. FSE has been demonstrated in cattle experimentally infected with *Clostridium perfringens* type D. This calf was the only calf in the group affected.



FIGURE 4: Focal symmetrical encephalomalacia in a calf, this condition is likely to be associated with *Cl. Perfringens* type D infection

Other diseases of cattle

Several instances of tumours in cattle were recorded during the quarter with sporadic bovine lymphoma being recorded on two occasions. The so-called sporadic types of bovine lymphoma are not associated with retrovirus (bovine leukaemia virus / BLV) infection and are classically described as being of the calf or juvenile form, the thymic form, the adult form or the cutaneous form of the disease. Sporadic bovine lymphomas are associated with a T- cell lineage and this is in contrast to B-cell line tumours resulting from BLV infection.

Intestinal adenocarcinoma in a cow

An experienced veterinary pathologist working in general practice submitted tissues from a dairy cow with a history of production drop, expiratory grunt, recumbency and death. At necropsy approximately

30 gallons of clear/yellow fluid was found in the peritoneal cavity. There were miliary firm red/white nodules 3-5mm in diameter on the peritoneal surface of the rumen, omasum, abomasum, reticulum, caecum and small intestine (FIGURE 5). There were miliary white foci in the omentum. There were numerous white nodules 3-5mm in diameter on the pleural surface of the lungs, and there was a heavy paramphistome infection in the rumen

On histopathological examination, the nodules on the pleura and on the serosal surfaces of the caecum and rumen were found to comprise mainly fibrovascular tissue and were often attached by fibrous peduncles to the visceral surfaces. In some areas the fibrovascular tissue bore a superficial covering, one to several cells in thickness, of mesenchymal tissue. In the fibrovascular stroma were enclosed myriad small irregularly-shaped acinar clusters of columnar cells, many of which contained intracytoplasmic vacuoles/mucus. These cells were reasonably monomorphic with round- to- ovoid nuclei featuring coarse chromatin stippling and mild anisokaryosis. Mitotic figures were frequently observed. Evidence of previous haemorrhage (scatterings of haemosiderophages) along with small numbers of various leucocytes (neutrophils, eosinophils) were associated with the serosal projections. A second opinion sought from University College Dublin Veterinary School confirmed the microscopic features of these serosal/pleural lesions were consistent with a diagnosis of adenocarcinoma, likely of intestinal origin given the goblet cell differentiation that had undergone transcoelomic metastasis over visceral serosae and pleural surfaces. Immunodiagnostic testing on a blood sample was negative for EBL.



FIGURE 5: Adenocarcinoma of intestinal origin with transcoelomic metastasis in a dairy cow

(photo: N. Beggs)

SMALL RUMINANTS: SHEEP

Respiratory diseases

Respiratory disease was identified in 14 ovine post mortem case submissions during this quarter. *M. haemolytica* (four cases), Jaagsiekte (three cases), *P. multocida* (two cases) and laryngeal chondritis (two cases) were the most common diagnoses.

Alimentary diseases

Rumen acidosis (pH of contents 4.63) and mesenteric torsion was diagnosed on gross examination of a four-month-old lamb, the third of group of 50 to die over a short period of time. The group were on concentrates at grass and a reduction in the quantity being fed was suggested.

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out on 5 ovine faecal samples by PCR. No MAP was detected in any of the samples by PCR.

4 ovine bloods samples were tested for antibodies to MAP during this quarter, one sample was positive (25.0 per cent).

Nutritional and metabolic disease

Copper toxicity was diagnosed in a pedigree ewe which had died suddenly during a short period of housing pre-showing. On gross examination there was icterus, dark black colouration of the kidneys and haemoglobinuria. These findings were considered to be consistent with copper toxicity and kidney (89 ug/g) and liver (270 ug/g) copper levels supported this diagnosis.

Reproductive diseases

Abortion

Specimens from 2 ovine abortions and stillbirths were examined during the 3rd quarter of 2019. No pathogens were identified in either case.

Neurological diseases

Cases of cerebrocortical necrosis (CCN) in lambs were more common than usual during the reporting period and a number of cases involved intercurrent parasitic gastro-enteritis (PGE) reflecting the season of the year. PGE reduces the intestinal absorption of thiamine thus predisposing to CCN in some cases. Typical cases showed pale yellow patches on the surface of the cerebrum which showed a yellowish-green auto fluorescence under ultraviolet light. Histological examination of the cerebral cortex showed status spongiosus associated with laminar encephalomalacia, perineuronal and perivascular oedema, gliosis and gitter cell presence. The reason for this increased reporting rate is not yet clear.

Other diseases

Cellulitis and phlegmon in lambs

Cases of cellulitis and phlegmon resulting from penetrating wounds (sometimes the result of poor injection technique) were reported in growing lambs during the quarter. In one case there was a partially healed penetrating wound of the right carpal joint, septic arthritis and phlegmon of the thoracic girdle with swelling of the forelimbs, emphysema of the soft tissue of the chest wall on the right side with sheets of plastic, green pus present in the subcutis. There was endocarditis of the pulmonary valve of the heart with septic embolic spread to the lungs. *T. pyogenes* was recovered from joint, heart valve and lung cultures.

Traumatic injury due to fighting in a ram lamb

Mid-body fracture of the atlas vertebra and occipital fracture of the skull with severe associated haemorrhage was seen on gross examination of a four-month-old ram lamb which was being kept in peer group of similar age. Fighting was proposed as the most likely cause of the traumatic injuries.

SMALL RUMINANTS: GOATS

Cl. perfringens type D enterotoxaemia and coccidiosis were diagnosed in a four – month –old goat, one of ten out of a group of forty to die. The goat was in fat body condition and advice was given concerning the level of feeding and appropriate vaccination.

HORSES:

1 swab was examined for the presence of *Tayorella equigenitalis* during this quarter, this swab was negative. 3 swabs were cultured from a horse with a history suggestive of strangles during this quarter, all were negative.

PIGS:

Gastric ulceration with associated fibrinous peritonitis was diagnosed in two fifteen-week-old pigs submitted with a history of poor growth rate.

CAMELIDS:

Parasitic gastro-enteritis and fasciolosis were diagnosed in two alpacas submitted from different farms during the reporting period. One case was especially noteworthy due to the recovery of 5900 *Haemonchus contortus* nematodes from abomasal washings. This parasite is unusual in Northern Ireland and in this case was associated with anaemia and secondary congestive heart failure.

WILDLIFE and EXOTICS:

Stenurus minor infection in a harbour porpoise

Numerous *Stenurus minor* nematodes were detected in the auditory capsules of a stranded harbour porpoise (*Phocoena phocoena*). This parasite is common in the Harbour porpoise populations of the North Sea and Baltic and is considered to compromise the functions of the inner ear including echo-location and orientation leading to stranding. There was also a significant lungworm (*Pseudalius inflexus*) infection. On histology profiles of adult lungworm were present in major airways with occasional foci of necrosis, macrophage activity and mineralisation, the latter likely representing degenerating nematode larvae.

Vena cava rupture with exsanguination was diagnosed as the cause of death in a goose submitted as part of the Statutory Wild Bird Survey.

Pigeon paramyxovirus infection, circovirus infection and fungal bronchopneumonia were diagnosed in a feral pigeon which was part of a die – off in a suburban area. Histological examination of lung tissue showed capillary thrombosis, haemorrhage, fibrinoid necrosis and heterophilic inflammation with fungal hyphae present throughout the parenchyma. In the bursa there was generalised necrosis with the presence of botryoidal clusters of inclusion bodies suggestive of circovirus infection. This diagnosis was confirmed by in situ hybridisation.