



Northern Ireland Disease Surveillance Report, April to June 2019

- Malignant catarrhal fever (MCF) in cattle
- Mycoplasma bovis pneumonia in cattle
- Jejunal haemorrhage syndrome in cattle
- Blackleg and sarcocystosis in sheep
- Cerebrocortical necrosis (CCN) in sheep
- Tick pyaemia in sheep

These are some of the matters discussed in the Northern Ireland animal disease surveillance quarterly report for April to June 2019.

CATTLE:

Respiratory diseases

Respiratory disease was identified in 51 cattle post mortem submissions between April and June 2019. The most common pathogens identified included *Mycoplasma bovis* (twelve cases), *Mannheimia haemolytica* (ten cases), *Pasteurella multocida* (four cases), *Trueperella pyogenes* (four cases), MCF (four cases), *Histophilus somni* (three cases) and respiratory syncytial virus (three cases).

Malignant catarrhal fever

Pneumonia and diphtheritic tracheitis associated with OHV-1 infection were diagnosed in two cases during the reporting period. In both cases it was noted that the clinical presentation and gross post mortem findings were not typical. Histological examination however showed widespread vasculitis consistent with MCF, animals were serologically positive and OHV-1 nucleic acid was detected by RT-PCR in lymphoid tissue. Histopathology was especially marked in the brain and kidney. In the brain there was marked lymphocytic vasculitis with perivascular oedema and occasional perivascular haemorrhage affecting all regions; mild lymphocytic meningitis with meningeal oedema was present. In the kidney there was mild disseminated interstitial nephritis with a poorly-defined perivascular distribution and pale eosinophilic homogenous material was present in the urinary spaces of renal corpuscles.

Atypical interstitial pneumonia

Atypical interstitial pneumonia was diagnosed in two four-month-old calves from the same herd which were presented after showing severe dyspnoea at grass. In each case, histological examination of the lung showed patchy atelectasis with a lobular pattern of distribution; marked congestion; alveolar oedema; haemorrhage into alveoli and minor and major airways; marked emphysema; some thickening of alveolar walls with neutrophils and macrophages but with few inflammatory cells present in the alveoli or in the airways; there was sloughing of pneumocytes. In both these calves, the histological pattern of lesions in the lung tissue was considered to be consistent with atypical interstitial pneumonia. In animals of this age, the likely aetiology was considered to be a secondary insult following pre-existing or healed primary infection, which possibly occurred during the housing period. The latter would have led to sensitization of the lung with pro-inflammatory cytokines resulting in the development of acute respiratory distress on re-exposure to an initiating stimulus. Testing for significant viral and bacterial pathogens was negative and no *Dictyocaulus viviparus* larvae were detected in the faeces.

Acute undifferentiated pneumonia involving *Mycoplasma bovis* infection

Pneumonia due to *Myc. bovis*, *T. pyogenes* and *Pasteurella multocida* was diagnosed in a young bullock being reared indoors on straw and concentrates. On gross examination the lungs showed miliary abscessation with green plastic pus. Histologically there was chronic caseo-necrotic broncho-pneumonia. The lesions were centered on the bronchioles and had a core of ghost cells surrounded by a rim of degenerating leucocytes, there was extensive surrounding fibrosis. The histological appearance was considered to be consistent with mycoplasmal pneumonia and *Myc. bovis* nucleic acid was detected in the lung tissue by RT-PCR. This bullock was also acidotic (rumen pH 4.17) with a large quantity of grain present in the rumen.

Two 18-to-20 – month old heifers from a dairy herd were submitted following reported sudden death outside at grass. On gross examination in both animals there was extensive necrotising and fibrinous pneumonia and fibrinous pleurisy, with necrotising tracheitis in one heifer. Histologically there was

diffuse fibrino-suppurative bronchopneumonia with streaming and degenerating neutrophils and fibrin filling alveoli. Affected tracheal mucosa was replaced by a dense layer of degenerate leucocytes, fibrin and exfoliated epithelial cells. BHV-1 nucleic acid was detected in the trachea by RT-PCR indicating IBR. *M. haemolytica* A 1 was recovered in profuse growth from, and *Myc. bovis* nucleic acid detected in, the lung tissue from both cases.

Aspiration pneumonia

Aspiration pneumonia was diagnosed in a 14-month-old heifer which had been seen dull, stiff and bloated the day before. On gross examination the lungs were reddened, heavy, and oedematous and the anteroventral lung was firm, overall about 70% of the total lung volume was affected. On histological examination the bronchi and bronchioles contained plant debris, bacteria, and neutrophilic infiltrate. In alveoli there were abundant bacteria, macrophages and neutrophils, with alveolar oedema. There were large foci of necrosis and the interlobular spaces were distended by oedema. The changes were considered to be consistent with aspiration pneumonia.

Alimentary diseases

Jejunal haemorrhage syndrome

A jejunal obstruction caused by a two-foot-long-sausage-shaped blood clot in the jejunum was diagnosed in a four-year-old dairy cow which died suddenly following a precipitous drop in milk yield. The small intestine proximal to the blockage was dilated with watery intestinal contents. It was considered likely that this was a case of jejunal haemorrhage syndrome (JHS). The cause of JHS is not known and the putative role of *Clostridium perfringens* type A enterotoxemia is disputed and this case showed no evidence of clostridial involvement.

Alimentary tract torsions

Intestinal torsion involving the abomasum or more commonly the reticulum, omasum and abomasum (FIGURE 1) were diagnosed in adult dairy cows from several different herds during the quarter. In one case there was displacement of the liver.



FIGURE 1: Torsion of the reticulum, omasum and abomasum in a dairy cow

Acidosis

Acidosis and peritonitis were diagnosed in a young bull which had shown abdominal discomfort prior to death. At gross examination, severe fibrinous peritonitis was found which centered on the rumen,

with extensive adhesions to the liver, diaphragm and abomasum. The rumen contained fibre, grain and fluid with a strong acidic smell. The pH of the rumen content was 5.24. Rumen pH rises in the post-mortem period, so the recorded value was likely to reflect acidosis. The rumen wall was congested with marked gelatinous oedema. There was tearing of the muscularis but not full perforation.

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, April to June 2019.

Pathogen	NUMBER	
	Tested	Positive (per cent)
<i>Cryptosporidium</i> species	156	54 (34.6%)
Rotavirus	158	52 (32.9%)
Coronavirus	158	7 (4.4%)
<i>Escherichia coli</i> K99	103	4 (3.9%)

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, April to June 2019.

	TOTAL	NO OF PARASITIC OVA					% POSITIVE
		NEGATIVE	+	++	+++	++++	
Liver fluke							
Bovine	381	333	34	13	0	1	12.6%
Ovine	124	116	7	0	1	0	6.5%
Paramphistome							
Bovine	381	183	24	87	33	54	52.1%
Ovine	124	91	10	13	6	4	26.6%
Coccidia							
Bovine	446	348	80	8	2	8	22.5%
Ovine	178	64	55	16	14	29	64.0%
Strongyle worm egg count	Total	<500 epg	≥500 epg				% Positive
Bovine	445	421	24				5.4%
Ovine	178	148	30				16.8%

≥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 492 bovine faecal samples by PCR. MAP was detected in 69 samples (14.0 per cent). Of 3860 bovine blood samples that were tested for antibodies to MAP, 326 (8.4 per cent) were positive.

Reproductive and mammary diseases

Abortion

Specimens from 74 bovine abortions and stillbirths were examined during the 2nd quarter. Significant pathogens were detected in 30 cases (40.5 per cent). Of these, *Bacillus licheniformis* (9 cases, 12.2 per cent) was the most commonly identified pathogen. Other pathogens identified included *T. pyogenes* (5 cases, 6.8 per cent), *E.coli* (5 cases, 6.8 per cent), *Neospora caninum* (3 cases, 4.1 per cent), leptospiral infection (3 cases, 4.1 per cent), BVD (2 cases, 2.7 per cent) and *Salmonella* Montevideo (one case 1.4%).

Congenital abnormalities

Several cases of congenital abnormalities in calves were recorded during the reporting period, these occurred in different herds.

A three-day-old calf was submitted with severe deformities (FIGURE 2), one of three similarly affected calves from the same herd. On gross examination there was a 'S' shaped deviation of the caudal thoracic and lumbar spine (scoliosis) with associated shortening of the abdomen. There was ventral deviation (lordosis) of the lumbosacral spine and in this region the dorsal vertebral arches of the spinal column were absent. There was widening of the spinal canal creating a meningocele and the spinal canal and meningocele communicated dorsally with the skin. In the cranial cavity there was bilaterally symmetrical caudal elongation of each cerebral occipital lobe. These extensions occurred caudal to an oblique groove in each cerebrum assumed to be the location of the cerebellar tentorium. The gyri of these elongations were oriented parallel to the longitudinal cerebral fissure. There was cerebellar hypoplasia. The foramen magnum was very wide (4-5cm) and the occipital condyles were malformed. There was a slight asymmetry of the head. The pelvis appeared small and the ventral rim of the left acetabulum was shallow and the dorsal rim was deep. The lower limbs were fixed in extension at the fetlocks and flexed hocks. Brain histology showed a severe meningoencephalitis marked by inflammatory infiltrate rich in neutrophils in the meninges and thick perivascular cuffing by neutrophils with fewer lymphocytes present in the brain parenchyma. The central nervous system malformations resembled Arnold-Chiari malformation (ACM) which occurs

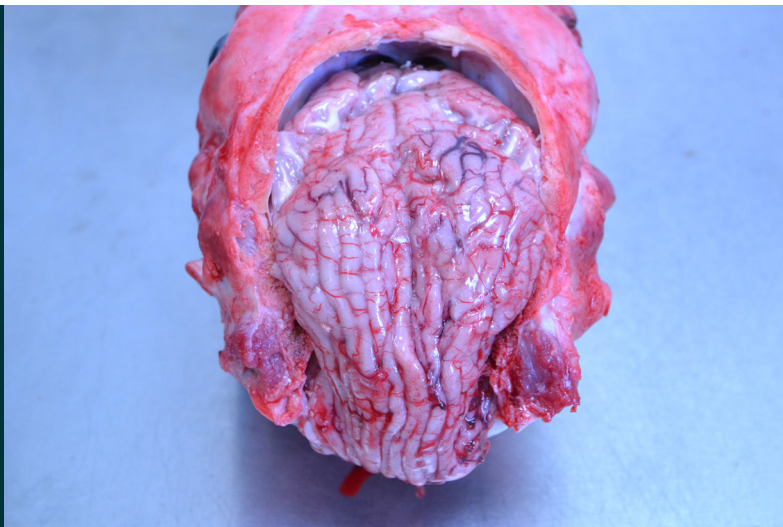


FIGURE 2: Arnold -Chiari malformation (ACM) in a three-day-old calf

sporadically in calves and lambs. The malformation occurs in a variety of breeds and there is no evidence that the condition is hereditary. Testing for Schmallenberg virus by RT-PCR and serology of body fluid was negative. Testing for BVDV by RT-PCT was also negative.

Other congenital abnormalities

Exencephaly was observed on post mortem examination of a 72 cm crown – rump length bovine foetus (FIGURE 3). Neural dysplasia was evident on histopathology with immaturity and dysplasia of the germinal cells. All further diagnostic tests were negative in this case. Jejunal atresia was diagnosed in a four-day-old calf which had shown signs of severe colic. The proximal intestine and abomasum were much distended with fluid and milk clots while the distal intestine, from the jejunum caudally was collapsed with no content.

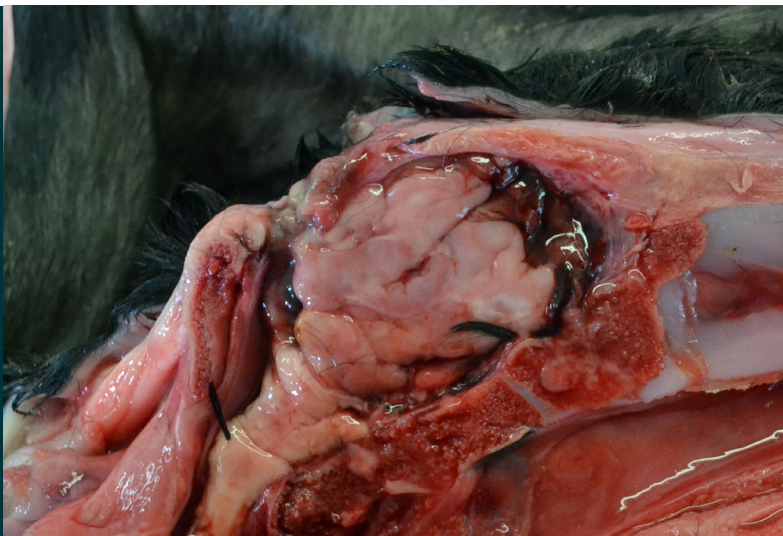


FIGURE 3: Exencephaly in a bovine foetus

Mastitis

A total of 197 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. 13 (6.6 per cent) samples yielded cultures of more than two organisms and were considered to be potentially contaminated. No bacteria were cultured in a further 21 samples. *E. coli* was the most frequently isolated organism and accounted for 28.4 per cent of isolates cultured. Other frequently identified organisms included, *Streptococcus uberis* (20.3 per cent), *Streptococcus dysgalactiae* (7.6 per cent), *Staphylococcus aureus* (5.6 per cent) and *Pseudomonas* species (3.0 per cent).

Neurological diseases

Clostridium botulinum type C/ D toxicosis was diagnosed in one case during the 2nd quarter of 2019.

Pituitary abscess

Pituitary abscessation was diagnosed in a three-year-old cow which presented with staggering. The abscess extended along the base of the brain and brain stem and histologically the meninges were infiltrated with neutrophils, other degenerative inflammatory cells and fibrin. *T. pyogenes* was recovered in profuse growth from the lesion.

Spinal abscess

Osteomyelitis of the body of the sixth cervical vertebra leading to compression of the spinal cord (FIGURE 4) was diagnosed in a three-week-old Limousin calf. The calf presented with paralysis of the hind legs and failed to improve with antimicrobial therapy. *E.coli* and *Pseudomonas aeruginosa* were cultured from purulent fluid discharging from the affected vertebra.



FIGURE 4: Vertebral osteomyelitis and spinal abscessation in a young calf

Cardio-vascular system

Vegetative endocarditis

Vegetative endocarditis (FIGURE 5), usually with associated congestive heart failure (CHF) was a common diagnosis during the reporting period, one typical case involved secondary renal infarction from a left atrio-ventricular (AV) valve lesion from which *S. aureus* was recovered. Similar cases involved renal or pulmonary infarction associated with left or right AV valve endocarditis. Severe endocarditis with lesions on the pulmonary valve which may have developed as a consequence of foot lesions was diagnosed in an adult cow with arthritic lesions affecting multiple joints. There were lesions secondary to the endocarditis in multiple tissues including lungs, left side of the heart and kidneys; there was osteomyelitis of multiple ribs. It was noted that endocarditis is now being presented more commonly than before.

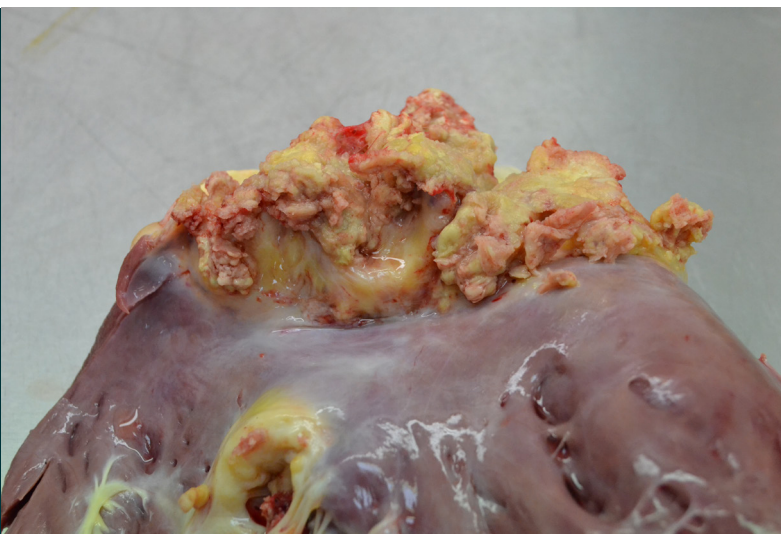


FIGURE 5: Endocarditis in a cow, vegetative lesions on the AV valve can clearly be seen

Thrombosis of the caudal vena cava

Liver abscessation due to *T. pyogenes*, with erosion of the vena caval wall was observed in a twelve-month-old steer, there was histological evidence of associated fatty liver. Spleen, mesenteric lymph node and abomasum were positive for BVDV antigen by IFAT and BVDV nucleic acid was detected

in blood by RT-PCR. It was noted that keeping and attempting to finish BVDV infected animals is prejudicial to eradication of the disease.

Rupture of the left ventricle

Rupture of the left ventricle associated with hardware injury ('wire') was recorded in a heifer. There was traumatic reticulitis with penetration of the cranial wall of the reticulum by a 12 cm long strand of sharp wire, this had tracked cranially to pierce and rupture the left ventricle wall.

Musculo-skeletal system

Swollen hocks, purulent arthritis and swelling of the peri-articular soft tissue were present in a four-year-old dairy cow. *T. pyogenes* (culture) and *Myc. bovis* (RT-PCR) were detected in affected hocks. At necropsy both hocks were swollen and on the lateral aspect of the joints there was focal necrosis of the skin. There was a large area of yellow necrosis in the soft tissues beneath the skin and the inflammation extended down the tendons sheaths. There was thick fibrinopurulent and gelatinous material in both joints with erosion of the articular cartilage. There was a large area of hairless red-black skin over the lateral aspect of the left hock, ulcerated centrally. The herd history indicated both cow and young calf deaths in significant numbers, milk drop and likely presence of *S. Dublin* infection within the herd as a concurrent infection with *Myc. bovis*.

Urinary system

Chemical peritonitis secondary to rupture of the bladder was diagnosed in a three-year-old lactating dairy cow. The bladder wall was necrotic around the site of the rupture and grey fibrinous material filled the bladder lumen.

SMALL RUMINANTS: SHEEP and GOATS

Respiratory diseases

Respiratory disease was identified in 11 ovine post mortem case submissions during this quarter. *M. haemolytica* (six cases) and Jaagsiekte (four cases) were the most common diagnoses.

Jaagsiekte

Jaagsiekte was diagnosed on full post mortem examination of an adult ewe which had been down with fluid coming from the nostrils. Twelve of 700 ewes had died recently with similar clinical signs. Typical gross and histological lesions of Jaagsiekte were detected with a secondary suppurated pneumonia. Chest scanning of the flock was recommended to commence the disease control process.

Pneumonic pasteurellosis

Acute pasteurellosis due to infection with *M. haemolytica* A 8 was diagnosed in a one-month-old lamb with pneumonia and fibrinous pleurisy. It was noted that the lamb also had necrotising omphalitis with peritonitis. It was suggested that pasteurellosis was the cause of death but that the navel ill may have been a predisposing factor. *M. haemolytica* and *E. coli* were recovered in septicaemic distribution.

Alimentary diseases

Diaphragmatic hernia

A twelve-month-old primiparous ewe in late pregnancy with a single lamb was presented for post mortem examination. There was a full thickness defect in the dorsal border of the diaphragm,

confluent with the oesophageal hiatus, with protrusion of a large section of small and large bowel into the thoracic cavity with associated ischaemic change in the gut wall and mesentery. The lungs were collapsed and congested. The edges of the diaphragmatic defect were smooth and healed suggesting chronicity. The defect may have been due to previous trauma, or due to a congenital defect; the increase in intra-abdominal pressure due to pregnancy is likely to have forced the abdominal contents into the thorax.

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out on 16 ovine faecal samples by PCR. No MAP was detected in any of the samples by PCR.

35 ovine bloods samples were tested for antibodies to MAP during this quarter, no samples were positive.

Nutritional and metabolic disease

Copper toxicity was diagnosed in a non-pregnant ewe in fat body condition which had been fed on cattle concentrate feed. The carcass was icteric with haemoglobinuria and gun metal coloured swollen kidneys. The liver copper level was 330 µg/g (normal range 25 to 100 µg/g) and the kidney copper level was 72 µg/g (normal range: 4.0 to 5.5 µg/g).

Azalea poisoning in a goat

Poisoning due to ingestion of azaleas was diagnosed in a goat submitted with a history of recumbence and frothing at the mouth. Azaleas are members of the rhododendron family and contain andromeda toxin in the leaves and sap. Gross post mortem findings were non-specific but a large quantity of azalea leaves were detected in the rumen contents. There was concurrent chronic fasciolosis in this case.

Reproductive diseases

Abortion

Specimens from 17 ovine abortions and stillbirths were examined during the 2nd quarter of 2019. The pathogens identified were *Toxoplasma gondii* (3 cases, 17.6 per cent), *Chlamydia abortus* (1 case, 5.9 per cent) and *Listeria* species (1 case, 5.9 per cent).

Neurological diseases

Cerebrocortical necrosis in ewes and lambs

Cases of cerebrocortical necrosis (CCN) in ewes and growing lambs were recorded during the reporting period. In all cases there were focal areas of pallor of the cerebral cortex particularly affecting gyri. Areas of pallid cortex strongly auto-fluoresced under ultraviolet light. Typical histological lesions were, laminar malacia, activation of cortical blood vessels with swollen endothelial cells and perivascular clear space and cortical oedema.

Musculo-skeletal system

Blackleg (clostridial myositis) lesions were detected in the ventricular septum of an adult ewe and immunofluorescence confirmed the presence of *Clostridium chauvoei* in the lesion. Histological examination supported the diagnosis of blackleg in the myocardium as well as the presence of a large

number of sarcocysts which were considered to be a possible predisposing cause. Interestingly, Perl's Prussian blue- stained sections of the kidney confirmed the presence of iron in the tubule-epithelial cells and glomerular tufts. This finding is likely to be the result of haemolysis induced by clostridial toxin.

Other diseases

Tick pyaemia

Tick pyaemia (*S. aureus* septicaemia) was suspected in a ten- week-old lamb with severe multifocal to coalescing suppurative myocarditis and endocarditis, suppurative foci throughout the lungs, kidneys and skeletal musculature (FIGURE 6). *S. aureus* was recovered in septicaemic distribution.

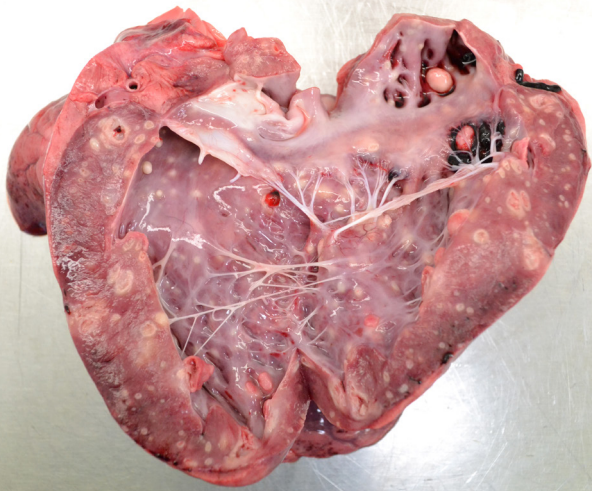


FIGURE 6: Suppurative foci in the heart due to *S. aureus* septicaemia in a lamb, likely to be caused by tick pyaemia

HORSES:

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

A donkey of over 40 years of age was presented following a history of inappetence and suspected hyperlipaemia. The donkey was in fat body condition with large amounts of subcutaneous and visceral fat. The plasma was severely lipaemic and the liver was greasy and friable. Histological examination of the liver revealed widespread hepatocyte vacuolation with total loss of all normal hepatocytes, suggestive of fatty change consistent with hyperlipaemia. Hyperlipaemia is often a secondary condition in overfat animals which are anorexic, even for a short period of time; in this case there was evidence of cyathostomosis which may have been a precipitating factor

BIRDS: Poultry

The main finding from gross post mortem examination of birds from an outdoor flock experiencing loss of production, diarrhoea and birds going off their legs was heavy worm burdens including clinically significant numbers of *Capillaria* as well as *Ascarids*, immature *Ascarids* and *Heterakis*. There was also an *E.coli* septicaemia which may have been secondary to the parasitic infection.