

Northern Ireland disease surveillance Quarterly Report

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Northern Ireland Disease Surveillance Report, 1st October to 31st December 2009

These are some of the matters discussed in the Northern Ireland animal disease surveillance quarterly report for 1st October to 31st December 2009

- paramphistomosis in cattle and sheep
- idiopathic haemorrhagic diathesis of calves
- multicentric lymphosarcoma in a ewe
- H1N1 2009 influenza A virus in pigs
- oedema disease in pigs

CATTLE:

Respiratory diseases:

Respiratory disease was identified in 99 cattle postmortem submissions between October and December 2009. The most common pathogens identified included:

Mycoplasma bovis (19 cases),

Mannheimia haemolytica (14 cases), Pasteurella multocida (12 cases), Dictyocaulus viviparus (nine cases), Arcanobacterium pyogenes (eight cases), infectious bovine rhinotracheitis virus (IBRV) (seven cases) and bovine viral diarrhoea virus (BVDV) (four cases).

Lungworm was diagnosed in a two-year-old cow that was housed three days previously. On postmortem examination there was diffusely distributed pulmonary emphysema. The lungs were heavy and oedematous. There was a heavy infestation of lungworm and long slender white worms were visible in bronchioles, bronchi, trachea and on the surface of the tongue.

On postmortem examination four seven-monthold calves had pneumonia affecting 60-70% of the lung. *Mannheimia haemolytica* was isolated from one calf. *Mycoplasma bovis* was demonstrated by antigen capture ELISA in the lungs of all four calves.

Cows that were housed since early October were coughing and showing signs of respiratory disease, with deaths and poor response to treatment with antimicrobials. In January, examination of a pluck showed extensive pneumonia and the presence of adult lungworm in the trachea.

Alimentary diseases: BVD / Mucosal disease

A total of 950 blood samples were tested by virus isolation or antigen capture ELISA for BVDV, of which 104 (10.9 per cent) were positive. In addition, 438 submitted tissues and nasal mucus samples were tested by immunofluorescence for BVDV, with 44 (10 per cent) being found positive. Thirteen cases of mucosal disease were confirmed at postmortem examination during the period.

A two-year-old heifer died after a period of diarrhoea. The heifer was in a group of 35 and one similar death had occurred within the previous month. On postmortem examination small focal areas of mucosal necrosis and fibrin, which were limited to the ileocaecocolic junction, were seen. Mucosal ulceration was absent. BVDV was demonstrated by immunofluorescence in the lesions, spleen and mesenteric lymph nodes.

A seven-month-old heifer was 'dancing' from side to side on the hind legs and passing a trace of mucoid/bloody discharge from the rectum. The heifer was pyrexic. On postmortem examination there was ulceration of the interdigital skin between the hooves. There was also an encrusted conjunctival discharge and ulceration at the nares. BVDV was demonstrated by immunofluorescence in the spleen, mesenteric lymph nodes and the abomasum.

An eighteen-month-old heifer was euthanased as it was unresponsive to treatment. The animal was underweight and had interdigital dermatitis present in all feet. There was significant abomasal ulceration and ulcers were present throughout the length of the oesophagus, on the tongue and in the mouth. BVDV was diagnosed by immunofluorescence and, in addition, the animal was serologically positive for malignant catarrhal fever.

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.

An eight-day-old dairy calf, kept indoors and fed on milk, died after a period of diarrhoea. Two other similar deaths had occurred in this batch of calves. On postmortem examination the calf had a navel infection, arthritis of most limb joints and the atlanto-occipital joint, and severe purulent meningitis.

Table 1: Pathogens identified in neonatal bovine faecal samples in Northern Ireland, October to
December 2009.

	Number					
Pathogen	Tested	Positive (%)				
Cryptosporidium species	536	202 (37.7%)				
Rotavirus	491	156 (31.8%)				
Coronavirus	495	51 (10.3%)				
Escherichia coli K99	210	5 (2.4%)				

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

Table 2: Endoparasitic infections in ruminants in Northern Ireland, October to December 2009.

	No of parasitic ova							
	Total	Negative	+	++	+++	++++	% positive	
Liver fluke								
Bovine	725	638	76	11	0	0	12.0%	
Ovine	889	772	95	18	3	1	13.2%	
Paramphistome								
Bovine	628	419	117	69	13	10	33.3%	
Ovine	751	535	124	69	13	10	28.8%	
Coccidia								
Bovine	929	744	139	23	16	7	19.9%	
Ovine	1097	827	214	31	18	7	24.6%	
Strongyle worm egg count		<500 epg	≥500 epg					
Bovine	761	101	42			5.5%		
Ovine	919	145	77			8.4%		

≥500 eggs per gram of faeces (epg) was considered of likely clinical significance + Low, ++ Moderate, +++ High, ++++ Very high Profuse growths of *Escherichia coli* were recovered in septicaemic distribution. Rotavirus, Coronavirus and *Cryptosporidia* were also detected in the intestinal contents. A zinc sulphate turbidity test result of three (reference range > 20) indicated that insufficient colostrum was absorbed.

Other enteric conditions

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

In the last few years, following unusually wet summer and autumn seasons, VSD has recorded a substantial increase in the incidence of stomach fluke infections in cattle and sheep. This increase has been most evident during postmortem examinations on bovine carcases, but the parasites have also been frequently noted in the rumens of sheep (Figure 1), particularly those seen at VSD, Omagh.



Figure 1. Paramphistomes in the rumen of a sheep

Faecal examinations have also revealed the occurrence of unusually high numbers of stomach fluke eggs in both bovine and ovine samples, and whilst the eggs of these parasites are of a similar size and structure to those of the liver fluke, *Fasciola hepatica*, they can be readily differentiated on the basis of shell colour, and are now recorded separately from liver fluke eggs in the laboratory reports issued to veterinary practitioners. The stomach flukes found in cattle and sheep in Ireland belong to the genus *Paramphistomum*, hence the infection is properly termed paramphistomosis.

The adult worms living in the rumen are believed to cause no clinical problems, but the migrating juvenile worms, which hatch from metacercarial cysts in the upper part of the small intestine, can cause ulceration, haemorrhagic enteritis and severe straining if present in large numbers in young animals.

The life cycle of paramphistomes closely resembles that of *Fasciola hepatica*. Eggs present in the faeces of infected animals hatch in water, and the miracidia larvae seek out and penetrate into aquatic snails, mainly those of the genus *Planorbis*. Following a period of development and asexual multiplication within the snail, cercariae larvae are liberated, and these form metacercarial cysts on vegetation at water margins. The metacercarial cysts are infective for grazing sheep and cattle.

It is believed that flooding of pastures, a predominant environmental feature in recent years, carries the aquatic snails out unto grazing pasture. Here they are exposed to infection by miracidia from cattle and sheep faeces, and here they can also shed metacercariae on vegetation that will be consumed by new hosts when the water recedes.

Paramphistome infections are not removed by those anthelmintics such as triclabendazole that require activation by metabolism in the host's liver. However, if it is considered necessary, oxyclozanide is effective for adult paramphistome infections in the rumen.

Johne's disease

Examination for *Mycobacterium avium* subspecies *paratuberculosis* (MAP) was carried out by microscopic examination, with Ziehl-Neelsen staining, on 271 bovine faecal samples. Sixteen samples (5.9 per cent) contained acid-fast organisms typical of MAP.

A total of 2886 bovine blood samples were tested for antibodies to MAP, of which 206 samples (7.1 per cent) were positive.

Reproductive and mammary diseases: Abortion

Specimens from 95 bovine abortions and stillbirths were examined during the quarter. Significant pathogens were detected in 44 cases (46.3 per cent). Of these, *Leptospira* Hardjo (11 cases, 11.6 per cent) was the most commonly identified pathogen.

Other pathogens identified included Salmonella Dublin (9 cases, 9.5 per cent), Neospora caninum (8 cases, 8.4 per cent), BVDV (6 cases, 6.3 per cent), Arcanobacterium pyogenes (4 cases, 4.2 per cent) and Bacillus licheniformis (4 cases, 4.2 per cent).

The different causes of abortion and stillbirth diagnosed in bovine submissions throughout 2009 are shown in Figure 2.





Overall the most common pathogens identified included *Leptospira* (10%), BVDV (8%), *Bacillus licheniformis* (7%), *Neospora* (6%), *Arcanobacterium pyogenes* (5%) and *Salmonella* Dublin (4%). No significant pathogens were detected in 45 per cent of submissions.

Two aborted foetuses from primiparous heifers were examined. The heifers had not been vaccinated for leptospirosis. Titres to *Leptospira* Hardjo were present in the foetuses (1:1000 and 1:10,000) and immunofluorescence to leptospirosis was present in the lungs, kidney and adrenal of both foetuses. The heifers had not been vaccinated for leptospirosis.

Mastitis

A total of 997 bacterial isolates were cultured from milk samples submitted from acute and chronic mastitis cases. One hundred (10 per cent) samples yielded cultures of more than two organisms and were considered to be potentially contaminated. No bacteria were cultured in a further 106 samples. *Streptococcus uberis* was the most frequently isolated organism and accounted for 18.4 per cent of isolates cultured.

Other frequently identified organisms included: *E. coli* (17.7 per cent of isolates), *Bacillus licheniformis* (8.7 per cent), other *Streptococcus species* (8.3 per cent), *Staphylococcus aureus* (8.1 per cent), *Enterococcus species* (5.7 per cent), other *Staphylococcus species* (5.3 per cent) *Pseudomonas species* (5.1 per cent), Aerococcus species (3.6 per cent), *Corynebacterium bovis* (1.9 per cent) and *Streptococcus dysgalactiae* (1.5 per cent).

Neurological diseases:

An 18-month-old heifer showed neurological signs and was recumbent. There was no response to treatment and the heifer subsequently died. On postmortem examination the heifer was found to be a freemartin. Histologically there was malacia of the molecular, and to a lesser extent, the granular cell layer in many cerebellar folia with gitter cells and vascular endothelial swelling. These changes are consistent with ischaemia/hypoxia. One small fibrin thrombus was detected in an arteriole. No inflammatory changes were evident to indicate a viral or bacterial infection, so the underlying cause of the damage was not determined.

An eight-month-old bullock was dull and appeared to have neck stiffness. The animal was unresponsive to treatment and was euthanased shortly after it became recumbent. On postmortem examination, pus was seen surrounding the cerebellum, and there was cerebellar coning. Histologically there was meningeal congestion, fibrinous oedema and severe sub-acute meningoencephalitis. No potentially causative microorganism was isolated, and the animal was negative for BVDV.

Other diseases

A ten-year-old cow that had been losing weight died suddenly. On postmortem examination both kidneys were significantly enlarged, and, on incision were found to contain numerous pus-filled cavities. The bladder wall was thickened and much pus was present in the lumen. Bilateral ascending pyelonephritis was diagnosed.

A two day old calf that had died suddenly was submitted for examination from a herd that was experiencing problems of increased disease levels and mortality in the calf crop. The dam had been vaccinated for BVDV and leptospirosis at four months gestation. On postmortem examination there were multiple serosal haemorrhages throughout the carcase and petechiae through the subcutaneous muscles, thymus and omentum. E. coli was cultured from the carcase in a septicaemic pattern. Histologically the bone marrow was cellular and all cell lines were well represented. BVDV was detected in the tissues of the calf and antibodies to BVDV were detected in the blood of both the calf and the dam.



mm 10 20 30 40 50



In late October two cases of idiopathic haemorrhagic diathesis of calves were recognised in calves from Northern Ireland and two further cases were recognised in December. Most of the affected calves were around 10 days old and one calf was older at three weeks. The initial case presented as a sudden death, while two of the cases presented with petechiae and haemorrhage (Figure 3). On postmortem examination all cases had serosal and intramuscular haemorrhages, with bone marrow aplasia confirmed by histology.

SHEEP:

Respiratory diseases

Respiratory disease was identified in 20 ovine postmortem submissions during this quarter. *Mannheimia haemolytica* (seven cases) Jaagsiekte (five cases), laryngeal chondritis (two cases) and *Pasteurella multocida* (one case) were the most common diagnoses.

Johne's disease

Ten ovine faecal samples were examined microscopically using Ziehl-Neelsen staining for MAP. One sample (10 per cent) contained acid-fast organisms typical of MAP. Two ovine blood samples were tested for antibodies to MAP, none of which were positive.

Alimentary diseases

A two-year-old ewe died suddenly at grass. On postmortem examination, numerous circular to elongate blackened lesions in the abomasum were considered to be suggestive of braxy. This diagnosis was supported by immunofluorescence results which indicated the presence of *Clostridium septicum* in the carcase, but the additional presence of *Clostridium novyii* and *Clostridium sordellii* in large numbers was suggestive of significant post-mortem bacterial overgrowth. The interpretation of the histological findings in the abomasum was uncertain due to autolytic change, but it is considered likely that the cause of death was clostridial toxaemia. Four hoggets from a batch of 26 died suddenly. Poisoning due to the ingestion of large amounts of ivy was diagnosed in two 18-month-old hoggets that were examined postmortem. Although there was evidence of supplementary feeding and the rumens contained forage the snowy weather may have encouraged the hoggets to eat ivy.

Reproductive diseases

Specimens from 11 ovine abortions and stillbirths were examined during the quarter. Significant pathogens were detected in five cases (45.5 per cent). Of these, *Chlamydophilia* was the most commonly identified pathogen and was detected in 2 cases (18.2 per cent). Other pathogens identified included: Leptospirosis (1 case, 9.1 per cent), *Campylobacter* (1 case, 9.1 per cent) and *Bacillus licheniformis* (1 case, 9.1 per cent).

The different causes of abortion and stillbirth diagnosed in ovine submissions throughout 2009 are shown in Figure 4. Overall the most common causes identified were *Toxoplasma gondii* (20%), *Chlamydophila abortus* (17%) and leptospirosis (11%). No significant pathogens were detected in 20 per cent of cases.



Figure 4. Causes of ovine abortion 2009.

Other diseases

Multicentric lymphosarcoma was diagnosed in a nine-month-old pedigree Suffolk ewe lamb that died suddenly. Most carcase lymph nodes appeared greatly enlarged and diffusely white including the submandibular, retropharyngeal, bronchial, mediastinal, hepatic, inguinal, pelvic and popliteal nodes. The mesenteric lymph nodes were enlarged with individual nodes being golf ball sized. Both kidneys were much enlarged (Figure 5).



Figure 5. Lymphosarcoma in the kidneys of a ewe

The cortex was pale and thickened. The outline of the cortex was frequently indiscrete with the pale grey colour extending into the medulla. The liver appeared enlarged and mottled and the spleen appeared enlarged. Histology was consistent with lymphosarcoma; mitotic figures being frequently seen.

A fracture of the third cervical vertebra was diagnosed in a three-year-old ram. Dorsally the left and right cranial articular process of the third cervical vertebra were fractured. Ventrally, the cranial portion of the left and right transverse process were fractured. There was haemorrhage into adjacent cervical muscle. The ram was in a paddock with another ram and fighting is a likely cause of this injury. Two six-month-old ram lambs were examined postmortem. Several lambs in the flock were showing signs of lameness. One lamb had extensive cellultitis over the right side of its chest and flank, which extended ventrally to the prepuce. The other lamb had a subcutaneous area of pus over the right side of the thorax, with a purulent track extending through the intercostal muscles between ribs eight and nine, with watery pus filling both sides of the thoracic cavity. These lesions were probably due to contaminated injection sites.

Three six-month-old housed lambs from a batch of 200 were found dead. On postmortem examination severe sub-acute fasciolosis was seen in all three lambs. Anaemia, ascites, pleural effusion and enlarged scarred livers were present. In two lambs there was concurrent vegetative endocarditis on all atrio-ventricular valve cusps, and in one of the lambs with endocarditis renal infarcts were present.

A yearling ewe was euthanased as it was showing clinical signs of severe dyspnoea. On postmortem examination a multicentric lymphosarcoma was present affecting the sub-mandibular and retropharyngeal lymph nodes with invasion into the tissues of the right cheek and right upper jaw.

Systemic listeriosis was diagnosed in two four-year-old ewes. One ewe had died suddenly. The other ewe died within one hour of being seen recumbent. *Listeria monocytogenes* was isolated from the viscera of both ewes.

A large dissecting pulmonary aneurysm causing stenosis of the pulmonary arterial lumen was detected on post-mortem examination of a two-year-old ewe which died suddenly.

A ten-month-old lamb died suddenly. On postmortem examination the abomasum was found to have herniated into the chest cavity via a healed tear in the diaphragm. There was oedema and necrosis of the wall of the abomasum within the chest cavity.

PIGS

Respiratory:

In September 2009 four six-week old pigs were submitted for postmortem examination from a birth-to-bacon unit of approximately 5000 animals that were experiencing acute onset of respiratory signs in both the growing and finishing pigs.

On postmortem examination the ventral lung lobes were consolidated and the bronchomediastinal lymph nodes were enlarged. On histological examination of the lungs a bronchiolitis was seen, with bronchiolar epithelial hyperplasia and neutrophils in the bronchiolar lumen. An alveolitis was also present.

Sections of lung tissue were identified as being immunofluorescent positive for the presence of Influenza-A virus. Influenza-A positive lung tissue samples were further tested using PCR and this identified the presence of the H1N1 2009 influenza A virus (previously known as swine flu).

This was subsequently reported to the OIE; INFLUENZA PANDEMIC (H1N1) 2009, ANIMAL HEALTH (09): UK (NORTHERN IRELAND) SWINE, OIE, 18 Sep 2009, OIE WAHID Disease Information 2009; 22(39)

http://www.oie.int/wahis/public. php?page=weekly_report_index&admin=0

Since this initial outbreak the pandemic H1N1 virus has been identified in a number of other farms (four to date). The virus was identified in one of these herds following pre-export health certification testing of samples from pigs that showed no respiratory signs. In the three remaining cases there was a common history of coughing of several weeks duration and some increase in mortality.

Alimentary:

One live and two dead five-week-old pigs were submitted for examination from a herd where mortality in weaned pigs was approximately eight per cent. Other pigs in the herd were dying two-to-four hours after showing neurological signs. There had been no response to in feed antibiotics.

On clinical examination the live pig had swollen eyelids with periorbital oedema. The pig was euthanased and on postmortem examination there was marked serosal oedema between the ascending and descending loops of the colon. There was also subserosal and mucosal oedema of the stomach. There were similar but less marked changes in the other two pigs. On histological examination two of the pigs had focal encephalomalacia of the brainstem. *E. coli* serotype 'O'141 was recovered from the small intestines from two of the pigs and this serotype is associated with oedema disease.

BIRDS: POULTRY

Two 17-week-old turkeys were submitted with a history of dullness in the batch and some birds with torticollis. On gross postmortem examination, there was mild splenomegaly in both birds and excess pericardial fluid in one. Histologically there was myocarditis and mixed inflammatory meningitis, with fibrinoid degeneration in small meningeal blood vessels and a periarteritis. There were several areas of spongiosis and rarefraction in the parenchyma. A profuse culture of haemolytic *E. coli* was recovered from the brains of both birds.

Trachea and trachea swabs were examined from a flock of 100 layers with ongoing respiratory signs and poor egg production. Infectious laryngotracheitis was diagnosed by immunofluorescence on tracheal cryostat sections. Histologically there was a heavy diphtheritic exudate comprising heterophils and fibrin in the lumen, adherent to the epithelium. There was submucosal lymphocytic infiltration and squamous metaplasia of the tracheal epithelium. *Gallibacterium* and *Candida* species were also isolated from the trachea, and probably represent post-viral opportunistic infection.

BIRDS: CAGE AND AVIARY

Proventricular dilatation syndrome was diagnosed in an adult parrot, which died suddenly. On postmortem examination pectoral muscle wasting, with a prominent keelbone was seen. The proventriculus was massively distended with ingested grains.

BIRDS: OTHER

Three collared doves in a rehabilitation centre were found dead. They had recently been moved into a new enclosure. They had died suddenly with no signs of illness and had been found on the ground, but in a normal sitting position. They had all been feeding and had feed in their crops and gizzards. There were signs of limited trauma with some subcutaneous bruising along the leading edges of their wings. No other gross abnormalities were evident. Histological examination revealed only a limited focal interstitial nephritis with mainly lymphocytic infiltrates. Pigeon paramyxovirus 1 was detected by RT-PCR.

Two pale-bellied Brent geese (*Branta bernicla hrota*), were examined postmortem. Brent geese are a familiar sight around the estuaries and sea loughs of Northern Ireland. By far the most important site is Strangford Lough, County Down where they can be seen from September through to April. These birds breed in the Canadian High Arctic and annually undergo migration to Ireland, where virtually the entire population winter.

The cause of death in both these cases was trauma, probably sustained by flying into cables. One goose had subcutaneous contusions in the mid-neck region. There was severe haemorrhage cranial to the heart which was associated with rupture of the right atrium. The liver had also ruptured with haemorrhage in the abdomen. The other goose had severe dissecting haemorrhage in the breast musculature and a ruptured liver. In one of the geese, a trematode parasite containing many embryonated eggs was identified in histological sections of the kidney. The identity of this parasite was probably *Prosthogonimus* species, which usually infects the urogenital ducts and bursa of waterbirds.

HORSES:

Four blood samples were submitted for serology for equine viral arteritis by virus neutralisation test, all of which were negative. All 8 swabs that were examined for the presence of *Tayorella equigenitalis* were negative. Five swabs were cultured from horses with a history suggestive of strangles, none of which were positive.

Equine Unclassified

A two-year-old mare died suddenly. On gross postmortem examination the carcase was found to be congested, and the uterus, while involuted, contained sero-sanguinous fluid heavily populated by *E. coli* and *Streptococcus* species. The count of cyathostomes and strongyle-type eggs in the large intestine indicated the presence of a clinically significant worm burden, and it is likely that disruption of the mucosal epithelium by migrating worms led to septicaemia.

A six-month-old foal was euthanased after showing clinical signs of a severe colic. On post mortem examination there was acute peritonitis with contamination of the abdominal cavity by stomach contents. The stomach was markedly distended by moist compacted silage and porridge-like meal and it had ruptured along the greater curvature. The gastric mucosa was congested and coated in mucus. No gastric ulceration was detected and no physical obstruction to gastric outflow was observed. The most probable cause of the distension was engorgement and possibly swelling of the food material in the stomach after ingestion.

Poisoning due to ingestion of yew was diagnosed on the detection of yew leaves in the stomach of an eight-year-old donkey which was found dead. Two other donkeys died on this same plot of land in the previous year.

OTHER SPECIES

An aged red deer hind died after a short illness. It had stopped eating and had been foaming at the mouth and having difficulty in breathing. A large mass was found extending over most of the serosal surfaces of the abomasum and omasum. The mass was firm, diffuse and white and extended from the submucosa though the abomasal and omasal walls to a depth of approximately three centimetres over the serosa. This was not adherent to other structures. The abomasum was empty. Histopathological examination revealed the mass to be a lymphosarcoma. No tumours were found elsewhere in the carcase.

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.