

Regional Veterinary Laboratories Report

July 2021

Regional Veterinary Laboratories (RVLs) carried out necropsy examinations on 350 carcasses and 27 fetuses during July 2021. Additionally, 1,274 diagnostic samples were tested to assist private veterinary practitioners with the diagnosis and control of disease in food producing animals. This report describes a selection of cases investigated by the Department of Agriculture, Food and the Marine's (DAFM) veterinary laboratories in July 2021.

The objective of this report is to provide feedback to veterinary practitioners on the pattern of disease syndromes at this time of the year by describing common, and highlighting unusual, cases. Moreover, we aim to assist with future diagnoses, encourage thorough investigations of clinical cases, highlight available laboratory diagnostic tools and provide a better context for practitioners when interpreting laboratory reports.

In addition, this month's report contains advice on using laboratory diagnostics to investigate bovine respiratory disease (BRD) and neonatal enteritis.

CATTLE

Pneumonia and enteritis were the most common diagnoses at necropsy in cattle in the RVLs during July 2021.

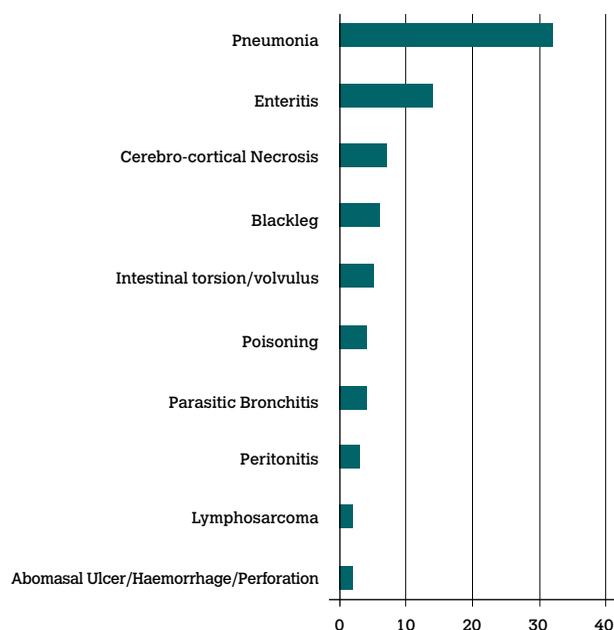


Table 1: The most common diagnoses in cattle submitted for necropsy in July 2021.

GASTROINTESTINAL TRACT

Enteritis

Sligo RVL received the carcass of a two-week-old calf with a history of diarrhoea. The calf was born outside and accommodated in a calf hut. On post-mortem, the carcass was pale and presented with severe dehydration. Its intestinal contents were watery and the intestinal walls were thickened mildly in the jejunum. An infection of *Cryptosporidium parvum* and rotavirus was detected. On histopathology there was diffuse, acute moderate enteritis with mixed inflammatory infiltrate, loss of the epithelial lining with some crypt abscessation; *Cryptosporidium* stages were visible at the

mucosal surface. Enteritis due to cryptosporidial infection was diagnosed as the cause of death.

Bovine papular stomatitis

A five-month-old dairy weanling with a history of weight loss was submitted to Kilkenny RVL; at submission, the farmer indicated this problem occurs on the farm every year. On examination, there were multifocal ulcers on the tongue and a fibrinous oesophagitis with multifocal ulceration. There was mild oedema in the small and large intestinal walls. The intestinal contents were very fluid. The mesenteric lymph nodes were mildly enlarged. Copper and molybdenum concentrations were within normal ranges and agent detection test results for *Salmonella*, bovine viral diarrhoea (BVD) and coccidiosis were negative. Tissue samples tested positive for parapoxvirus using the polymerase chain reaction (PCR). Bovine papular stomatitis (BPS) virus is a member of the Poxviridae family. On histopathology, there was a multifocal ulcerative glossitis and oesophagitis. It is possible that the lingual and oesophageal lesions may be due to BPS as there were some features present to suggest viral infection such as lymphoplasmacytic inflammation and ballooning degeneration. The possibility of concurrent summer scour syndrome could not be ruled out based on the herd history. RVLs are involved in ongoing research and sample collection to better understand this condition. Submission of additional samples/ carcasses, if further cases occurred, was recommended.



Figure 1: Oesophagitis in a calf in which bovine papular stomatitis was detected. Photo: Aideen Kennedy.

SUMMER SCOUR SYNDROME

Summer scour syndrome or 'upper alimentary ulcerative syndrome' presents as weight loss and rapid onset diarrhoea in weaned calves in their first grazing season. Oral and oesophageal ulceration and necrosis can be a feature in some cases. Aetiology is currently unclear. There have been increased reports over the last number of years and an association between inadequate ruminal development prior to weaning and turnout to grass has been suggested as a possible cause; however further research is ongoing. Grazing of lush grass is a common finding.



Figure 3: "Ground glass" emphysema on the pleural surface of the lungs in a case of parasitic bronchitis. Photo: Aideen Kennedy.

A seven-month-old Friesian weanling, one of a group of 16 at grass, was submitted to Limerick RVL with a history of respiratory distress and coughing for one day before death. Other animals were also reported to be affected; they had been treated with anthelmintic seven weeks previously. Necropsy findings were of lobar pneumonia and emphysema; large numbers of lungworm larvae were seen in the airways. *Mannheimia haemolytica* was isolated from the lungs. Large numbers of trichostrongyle eggs and lungworm larvae were detected in the faeces. Anthelmintic treatment of the other animals in the group was recommended urgently.

Chronic pneumonia

A five-month-old calf with a history of respiratory symptoms and weight loss was submitted to Kilkenny RVL. This was the second case that had died and had been unresponsive to antibiotic treatment. The calf appeared to be small in size for its age. On examination, there was severe, chronic pneumonia with multifocal abscessation on the right lung lobes, affecting more than 60 per cent of the right side. The left side had smaller areas of multifocal consolidation. There were adhesions to the pericardium and the bronchial lymph nodes were enlarged. *Trueperella pyogenes* was cultured from the lung and samples tested PCR positive for *Histophilus somni* and *Mycoplasma bovis*. A review of the control of respiratory disease was recommended.



Figure 4: Chronic pneumonia lesions from which multiple pathogens were identified. Photo: Aideen Kennedy.

Jejunal haemorrhagic syndrome

A three-year-old cow with a history of milk drop and a suspected intestinal blockage was submitted to Kilkenny RVL. On examination, there was an approximately 40cm segment of small intestine that was dark red and dilated, with tags of fibrin on the serosal surface. The lumen contained a firm blood clot adherent to the mucosa. There were scant, mucous faeces in the rectum. Based on the gross findings, a diagnosis of jejunal haemorrhagic syndrome was made.



Figure 2: Fibrin tags (arrows) on the serosal surface of a section of jejunum containing a large, firm blood clot. Photo: Aideen Kennedy.

RESPIRATORY TRACT

Parasitic bronchitis

A four-month-old calf with a history of coughing was submitted to Kilkenny RVL. The calf was moderately dehydrated. The lungs did not deflate upon opening the carcass. There was multifocal-to-diffuse "ground glass" emphysema, and there was oedema in the interlobular septae. There were multiple lungworms visible in the airways. In addition, the intestinal contents were very fluid. There was a trichostrongyle count of over 2,000 eggs per gram (EPG). A diagnosis of parasitic bronchitis was made and a review of parasite control was recommended.

NERVOUS SYSTEM

Meningoencephalitis

Sligo RVL received a six-week-old calf with a history of sudden death for necropsy. On gross examination, there was fibrinous meningitis with abscessation at the base of cerebellum. There were multifocal haemorrhages throughout the lungs. *Pasteurella multocida* was detected by PCR in lung tissue. Histopathology of the brain revealed diffuse, chronic, severe, purulent meningoencephalitis. Meningoencephalitis secondary to bacteraemia/septicaemia was diagnosed as cause of death. A causative pathogen was not identified in the brain but bacterial meningitis is a frequent sequel to bacteraemia in young ruminants.

Cerebro-cortical necrosis

Kilkenny RVL examined a five-month-old calf that had been treated for diarrhoea and neurological signs, which were suspected to be due to cerebrocortical necrosis (CCN). It was one of several calves that had lost a lot of condition that were previously thriving. The calves had not received a worm dose. Gross findings were UV fluorescence of the brain under Wood's light examination suggestive of CCN (yellowing of the grey matter of cerebral cortex), gross lesions were limited to the cerebral cortex. There was also a very high worm count and the abomasum was filled with undigested grains; however the rumen pH was normal. Disturbance of gastro-intestinal flora is associated with production of clostridial thiaminases, leading to thiamine deficiency resulting in CCN. The lesions upon histopathology are laminar necrosis of the cerebrocortical neurons. The neurons are shrunken and have homogeneous, eosinophilic cytoplasm; nuclei are pyknotic, faded, or absent.



Figure 5: Autofluorescence of the cerebral cortex under ultraviolet light. The fluorescence can be observed in laminae in cross section (left) but is also visible on the uncut surface of the cerebrum (right). Photo: Brian Toland.

Meningitis and myocarditis

An 18-month-old heifer was submitted to Kilkenny RVL for necropsy. This animal was moribund when seen and died shortly after. This was the second animal to die. On gross examination, there were petechial haemorrhages on the trachea, thymus and myocardium. There were small 1-3mm discrete nodules on the atrio-ventricular (AV) heart valve. The lungs were heavy and congested, with ingesta in the airways. The main histopathological findings were in the brain and heart.

The brain had a severe, diffuse, sub-acute, fibrino-suppurative meningitis with thrombosis. In addition, there was a multifocal severe fibrino-suppurative myocarditis with necrosis and thrombosis. The lesions in the brain and myocardium are suggestive of a bacterial involvement. A role for *H. somni* is suspected.

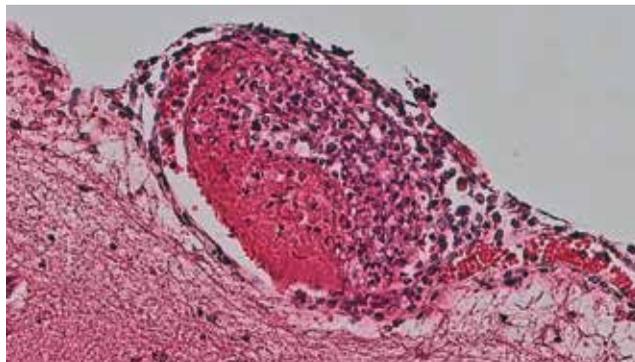


Figure 6: Thrombotic meningitis. Photo: Maresa Sheehan.

MUSCULOSKELETAL

Blackleg

Sligo RVL examined a six-month-old calf which had been found dead. It was the third case of sudden death on the farm within two weeks. Necropsy found a locally extensive gangrenous myositis which exuded a characteristic sickly-sweet smell upon incision ('Blackleg'). *Clostridium chauvoei* and *Clostridium sordellii* were identified in the lesions by Fluorescent Antibody Technique (FAT).

MISCELLANEOUS

Lymphoma

A year-old Friesian heifer was submitted to Limerick RVL for necropsy with a history of euthanasia after repeated bloating over a four-week period. Diffuse enlargement of the lymph nodes and massive enlargement of the thymus were discovered. A blood sample tested negative for enzootic bovine leucosis (EBL) antibodies. A diagnosis of thymic lymphoma was made.



Figure 7: Enlarged thymus which has herniated through the thoracic inlet and can now be seen through an incision in the ventral neck. Photo: Alan Johnson.

Athlone examined a two-year-old bullock with a history of dullness the previous morning; the eyes were pale, and, as the faeces were black (indicating melaena), a bleeding abomasal ulcer was suspected. Carcase preservation and body condition were good. The carcase was pale and lymph nodes throughout the carcase were enlarged and on cross section some were haemorrhagic and others necrotic. Lymph nodes on the serosa of the forestomachs, especially the abomasum, were worst affected. Masses infiltrated into the abomasal wall, there was ulceration of the mucosa and abomasal contents were black. The hepatic lymph nodes were massively enlarged, and the mass was infiltrating into surrounding hepatic parenchyma. Bronchial and mediastinal lymph nodes were significantly enlarged also. Histopathology of lymph nodes confirmed it was a lymphoma. A sample of the tumour was tested for EBL virus by PCR and was negative.



Figure 8: Massively enlarged hepatic lymph nodes expanding into the surrounding hepatic parenchyma. Photo: Denise Murphy.

SHEEP

Bacteraemia/septicaemia and pneumonia were the most common diagnoses from the necropsy of sheep in the RVLs during July 2021.

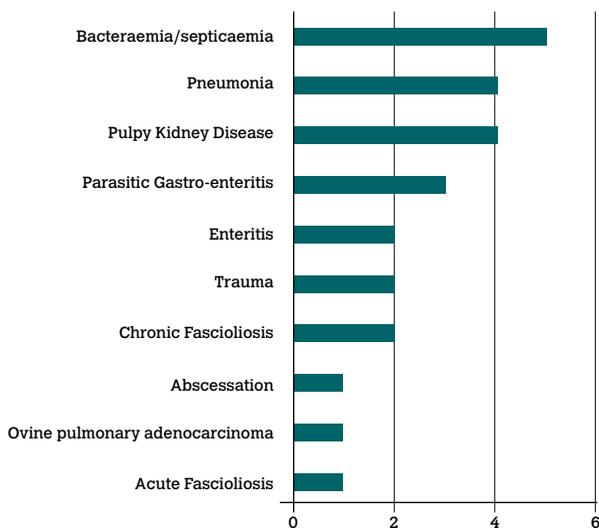


Table 2: The most common diagnoses in sheep submitted for necropsy in July 2021.

GASTROINTESTINAL TRACT

Parasitic Gastro-enteritis

A lamb was submitted to Limerick RVL with a history of diarrhoea and dullness. Necropsy disclosed multiple grossly visible worms on the abomasal mucosa. The larger worms had a "barber's pole" appearance associated with *Haemonchus contortus*. The lungs were very pale, suggesting anaemia, which is consistent with infection with *H. contortus*.

Clostridial enterotoxaemia

A five-month-old ram lamb with a history of sudden death was submitted to Limerick RVL. Necropsy disclosed pneumonia involving consolidation of approximately 60 per cent of the lung parenchyma. *P. multocida* was isolated. A PCR test returned a positive result for *Mycoplasma ovipneumoniae*. There was a fibrin clot in the pericardial sac and a sample of urine tested positive for glucose. These are findings suggestive of enterotoxaemia or pulpy kidney disease. A sample of small intestinal contents tested positive for *Clostridium perfringens* and its alpha and epsilon toxins. This is consistent with pulpy kidney disease caused by *C. perfringens* type D. A review of the vaccination programme for clostridial disease was recommended. It was considered that the pneumonia was possibly a contributory factor to the death in this case, but the main cause of death was pulpy kidney disease.

RESPIRATORY TRACT

Fibrinous pleuritis and pericarditis

A four-month-old lamb was found dead and submitted to Kilkenny RVL. It had been weaned the previous week and this was the third loss in the flock. On necropsy, there was a diffuse fibrinous pleuritis and pericarditis. The lungs were diffusely congested and there were multifocal areas of consolidation in the cranial lung lobes. The liver was rounded, suggesting hepatomegaly. On histopathology, there was a diffuse necrotising pleuritis and multifocal interstitial pneumonia and multifocal bacterial hepatitis. PCR-positive results were recorded on lung swabs for *M. haemolytica* and *M. ovipneumoniae*. *M. haemolytica* was cultured from the liver and lung indicating a bacteraemia.



Figure 9: Fibrinous pleuritis and pericarditis in a lamb. Photo: Aideen Kennedy.

CARDIOVASCULAR SYSTEM

Tick pyaemia/tick-borne fever

A two-year-old hogget which had been noticed dull on the previous day was delivered to Sligo RVL upon death. Necropsy disclosed a vegetative endocarditis in the right ventricle. There was also multifocal pulmonary abscessation. *Staphylococcus aureus* was cultured from multiple organs. *Anaplasma phagocytophilum* (the causative organism of tick-borne fever) was detected in the spleen by PCR. On histopathology of the lung there was multifocal, chronic, severe, interstitial pneumonia and a multifocal, acute, moderate, suppurative bronchopneumonia. In the liver, there was focally extensive, chronic, severe granulomatous hepatitis with bacterial colonies. These findings are indicative of bacteraemia with embolic spread. Endocarditis and bacteraemia was diagnosed as the cause of death. *S. aureus* bacteraemia causing multifocal abscessation is most commonly associated with young lambs. The causative agent of tick-borne fever was detected and is likely to have had an immunosuppressive effect in this animal.

DEER

Ruminal acidosis and abomasal ulceration

A three-year-old deer was submitted to Kilkenny RVL for necropsy. This was the fourth deer to have died with few clinical signs noted. On gross examination, there were large amounts of grain in the forestomachs and undigested grain in the abomasum. There were bloody contents in some sections of jejunum and loose contents in the large intestines. There was severe extensive abomasal ulceration. A pH of 4.6 was detected from the rumen. This pH is very low and is indicative of ruminal acidosis, likely due to a grain overload. A diagnosis of ruminal acidosis and abomasal ulceration was made. A review of diet and feeding practices was recommended.



Figure 10: Ulceration of the abomasal mucosa in a deer.
Photo: Maresa Sheehan.

USING LABORATORY DIAGNOSTICS TO INVESTIGATE BOVINE RESPIRATORY DISEASE (BRD) IN CALVES, WEANLINGS, OR COWS

The RVLs have designed a new Bovine Respiratory Disease (BRD) Package. This may change your approach to investigating group BRD problems. Follow these simple steps for better, more cost-effective diagnoses.

What sample for different age groups?

- Housed calves – nasal swabs only
- Calves at grass – nasal swabs, faecal samples*, Bronchoalveolar lavage (BAL) samples*
- Weanlings > six months – nasal swabs, blood samples, faecal samples*, BAL samples*
- Adult animals – nasal swabs, blood samples, faecal samples*, BAL samples*

** Required where lungworm is a differential diagnosis only*

What to DO?

Nasal samples – Collect plain swabs (moistened using bottled water) from the naso-pharynx of up to six acutely-affected, untreated animals and place all swabs in one universal container. Nylon flocked swabs (Figure A) are the swabs of choice for PCR as they have bristles perpendicular to the shaft which improve the respiratory epithelial cell collection from the animal and also the release/recovery of the cells from the swabs at testing. Swabs with wooden shafts can inhibit the PCR assays. Charcoal swabs cannot be used for PCR testing. As virus shedding only lasts for a few days, suitable animals are those early in the course of infection, i.e., have a high temperature, may not yet look depressed and nasal discharge will be serous rather than purulent. These will be pooled and tested for a range of BRD viruses (IBR, PI3, RSV, BoCo and BVD) by PCR. If needed, **additional swabs MUST** be taken for *Mycoplasma bovis* and *H. somni* PCR.



Figure A: Nylon flocked swab.

Blood samples – Collect serum/red top vacutainers from 10 per cent of weanlings or adult cattle groups only (min. 4-6 animals). These will be tested individually for antibodies to the common BRD viruses. As antibodies are likely to be present, paired samples (four weeks apart) may be recommended to detect rising titres. Where cattle have been vaccinated against IBR, request gE testing and where they have not, request gB testing. If tick-borne fever (TBF) is suspected as the cause of BRD, submit EDTA (purple top) tubes for TBF PCR.

Faecal samples – Where lungworm is a differential diagnosis, collect 30-50 grams of faeces from nine animals in the affected group (first lactation cows should be targeted where adult cows are affected). Remember that clinical signs of hoose can occur in the pre-patent period so a negative Baermann doesn't rule out lungworm. This is particularly important to consider in re-infection syndrome causing

coughing in adult cows.

BAL samples – Where lungworm is a differential diagnosis, collect lung lavage samples from five to six clinically-affected or newly introduced animals (instructions on how to collect BAL samples can be found at: <https://www.vet.cornell.edu/animal-health-diagnostic-center/testing/protocols/bronchoalveolar-lavage-fluid-technique> . These samples will be examined for evidence of lungworm or their eggs only (Figure B). BAL samples may be useful for diagnosing lungworm infection in adult cows or other animals showing clinical signs during the pre-patent period.



Figure B: BAL sample with larvated lungworm egg and a larva emerging from an egg.

What NOT to do?

- Don't collect nasal swabs from less than five cattle (reduces the likelihood of detecting an agent).
- Don't collect swabs from chronically BRD-affected cattle (unlikely to detect primary pathogen).
- Don't collect nasal swabs for 'routine bacteriology (culture or PCR)' from any age of animal (just detects commensals).
- Don't collect bloods from calves less than six months old (maternally-derived antibodies [MDA] still present).
- Don't rely on carcase submissions alone to reveal causes of BRD (these often represent chronic, treated cases where the primary pathogen[s] can no longer be identified).

If in doubt about sample selection, contact the laboratory directly for advice.



Figure C: Suitable screw-top plastic container for neonatal faecal samples.

USING LABORATORY DIAGNOSTICS TO INVESTIGATE NEONATAL ENTERITIS

When performing an investigation of neonatal enteritis on farm, it is advisable to submit samples from a number of affected animals. Animals that have been sick or received treatment for a prolonged period of time are **not** suitable candidates for sampling. Ideally, three to five diarrhoea samples should be collected from early affected, untreated calves. Faecal samples should only be submitted in screw-top plastic containers (Figure C).

In addition, blood samples (serum/red top) should be submitted to check adequate passive transfer of maternal antibodies from colostrum.

Five to ten blood samples should be taken from calves less than ten days of age. Samples should not be collected from sick animals.

If in doubt about sample selection, contact the laboratory directly for advice.