Regional Veterinary Laboratories Report

March 2023

Regional Veterinary Laboratories (RVLs) carried out necropsy examinations on 720 carcases and 316 foetuses during March 2023. Additionally, 2,104 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 March 2023.
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.

CATTLE

Pneumonia and enteritis were the most common diagnoses at necropsy in cattle in the RVLs during March 2023.

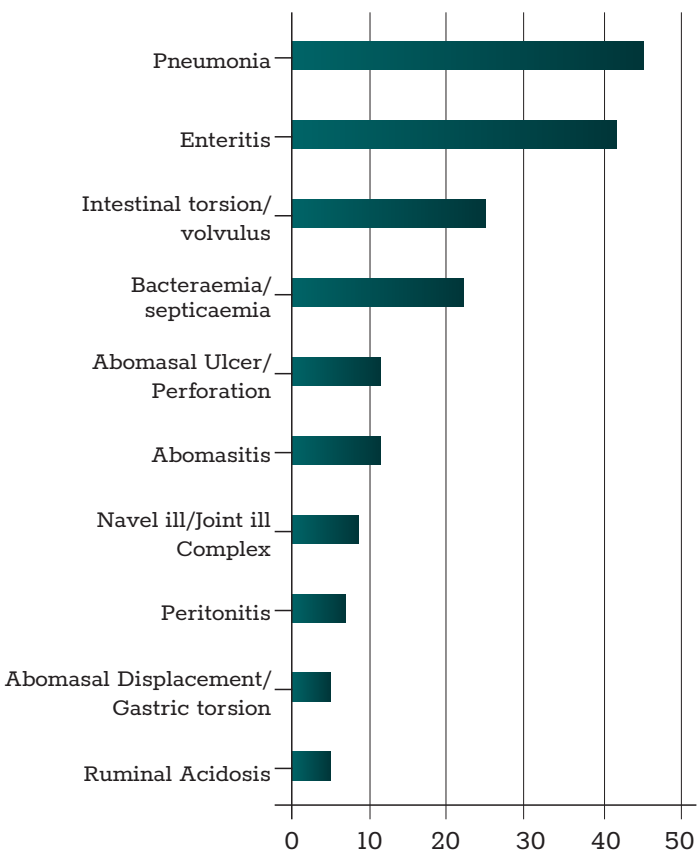

Table 1: The most common diagnoses in cattle submitted for necropsy in March 2023.

GASTROINTESTINAL TRACT

Abomasitis

Athlone RVL examined a two-week-old calf that had been found bloated the previous evening; the calf was kicking at herself and seemed to be in pain. She was treated with vegetable oil and bread soda and no antibiotics were given. 15 other calves had shown signs of diarrhoea, a touch of bloat, and some had a high temperature. On gross post-mortem examination, the abomasum was distended with gas and sour-smelling fluid. Histopathology of the abomasum showed the abomasal mucosa was expanded by focally extensive areas of congestion, haemorrhage and oedema. Within the sloughed superficial mucosa and in the submucosa, there were multifocal aggregates of bacteria forming packets/ tetrameres consistent with the appearance of *Sarcina* species. These are gram-positive anaerobic bacteria that occur in cuboidal packets of eight or more cells. *Sarcina* sp. have been associated with abomasal bloat in young lambs and calves, particularly artificially fed animals.

Abomasal ulcer

Limerick RVL examined a one-month-old Friesian heifer calf that did not respond to treatment for a watery diarrhoea that had returned negative results on a neonatal enteropathogen screening test. Post-mortem examination revealed a non-perforating ulcer with a large quantity of dark brown watery liquid in the abomasum. *Sarcina* sp. were identified on histopathology. These bacteria proliferate when there is an excess of fermentable carbohydrate within the abomasum. Until more is known of the specific risk factors for the involvement and proliferation of *Sarcina* species, the practical advice is limited to maintaining good hygiene when preparing and handling milk/replacer feeds for young ruminants and preventing the contamination of all feeds with soil.

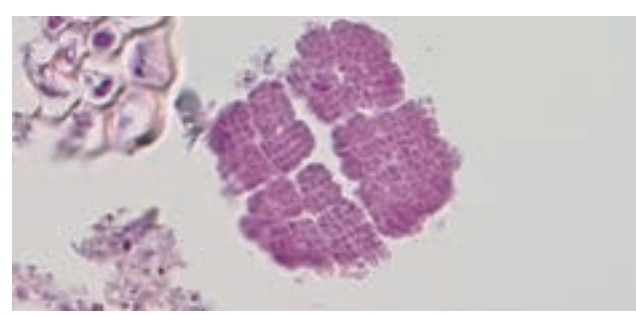

Figure 1: Colonies of *Sarcina* sp. in the characteristic cuboidal tetrameres. Photo: Brian Toland.

Perforated abomasal ulcer

A two-month-old calf with a suspected intestinal torsion was submitted to Kilkenny RVL. There was a perforated abomasal ulcer with an associated severe peritonitis discovered at necropsy, in addition there were another three or four ulcers. There were fluid contents in the small and large intestines. There was a focal area of chronic bronchopneumonia affecting the left cranial lobe and affecting <5 per cent of the entire lungs. The area of pneumonia was not considered a direct cause of the death of this animal, however chronic illness is cited as a possible cause of abomasal ulceration. Long term antibiotic treatment is also considered a possible contributory factor in the development of ulcers.

Figure 2: A perforated abomasal ulcer seen from the serosal side. Photo: Maresa Sheehan.

Gastrointestinal torsion/volvulus

Torsion or volvulus of the intestines or, less frequently, the stomach compartments, was a common finding at necropsy in Limerick RVL during March 2023. Examples of these cases include a five-week-old calf with a history of sudden onset abdominal bloating; necropsy disclosed an intestinal volvulus, or torsion around the mesentery. In a six-week-old calf with a history of agonal signs followed by death, necropsy disclosed an abomasal torsion. A five-week-old calf was found to have suffered volvulus of the jejunum, caecum and proximal colon. The large intestinal loops had become distended, and the involved section of jejunum was strangulated, with bloody contents. A seven-day-old calf with a history of overnight death was at necropsy found to have suffered a volvulus of the jejunum, caecum and proximal colon. The involved loops of large intestine were severely distended with gas, while the jejunal loops were strangulated with bloody contents. As can be seen from these examples, this condition occurs over a wide age range, and may present as a sudden death or with signs of abdominal pain or bloating.

Peritonitis

Limerick RVL carried out a necropsy on a one-week-old calf with a history of scour. The carcase was observed to have suffered hair loss on the tail (evidence of diarrhoea). Signs of purulent infection were disclosed in the umbilicus. There was a large volume of fluid and fibrin tags in the abdominal cavity, fibrin tags adhered to the serosal surface of the abdominal viscera. There were thickened small intestinal mucosae and fluid large intestinal contents. A diagnosis of peritonitis was made. This may be a sequel to either the umbilical infection or the enteritis, both of which were present.

Abdominal fibropapilloma

A two-year-old bullock was submitted to Kilkenny RVL with a history of weight loss in spite of good appetite; the animal was euthanised as it had become recumbent. On gross examination, there was a large nodular/cystic, ulcerated, pedunculated growth in the abomasum, with some of the mass appearing to originate from the rumen. The mass weighed approximately 1.5kg. Histopathology of the growth showed moderate epidermal acanthosis with thickened epidermis forming rete ridges, overlying a fibrovascular subepidermal mass comprised of bundles and streams of spindle-shaped cells with large vesicular nuclei; borders were poorly defined, and cytoplasm was reticulated. Mitotic figures were rare, less than one per high powered field (HPF). There were moderate numbers of inflammatory cells, mainly lymphocytes and plasma cells with smaller numbers of neutrophils within the mass. The stroma contained large numbers of mainly small-bore blood vessels and the mass was suspected to be a fibropapilloma. It seems likely this pedunculated mass may have constricted viscera or impeded the passage of digesta, or that its weight impeded ruminal function and motility.

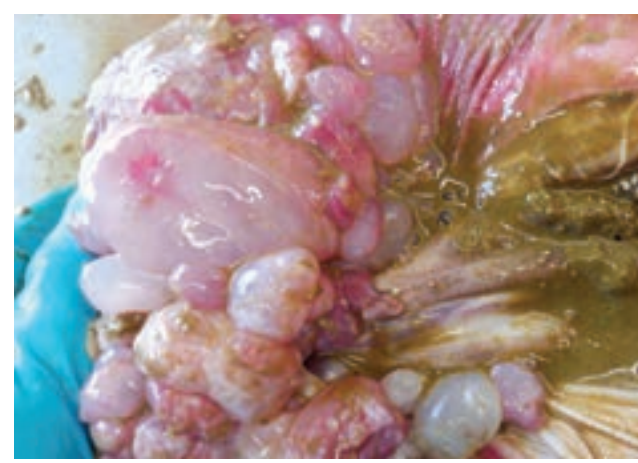

Figure 3: A neoplastic mass in the abdomen of a two-year-old bullock. Photo: Aideen Kennedy.

BVD outbreak

Limerick RVL examined three Friesian cows from a high-yielding dairy herd where there was a history of diarrhoea, fever, milk drop, respiratory distress and death. Freshly calved cows were mostly but not exclusively affected and new cases were emerging on a daily basis. The herd had not been vaccinating for BVD, but one new-born calf had recently tested positive on the tissue tag test. The first cow submitted was a five-year-old with a history of bloody scour. Necropsy disclosed thickened abomasal mucosa, some adult rumen fluke in the reticulum. Intestinal walls were pale with petechial

haemorrhages on the serosal surface. Intestinal contents were completely liquid; bloody in one short section, yellow/brown elsewhere. The mucosal surface was thickened and corrugated. Lungs were extremely pale. There was a pestivirus positive result on PCR, likely due to bovine viral diarrhoea (BVD) virus infection. Intestinal contents were positive on mycobacterium culture for *Mycobacterium avium* subspecies *paratuberculosis* (MAP), the causative organism of Johne's disease. This finding is consistent with the thickening seen in the intestinal mucosa.

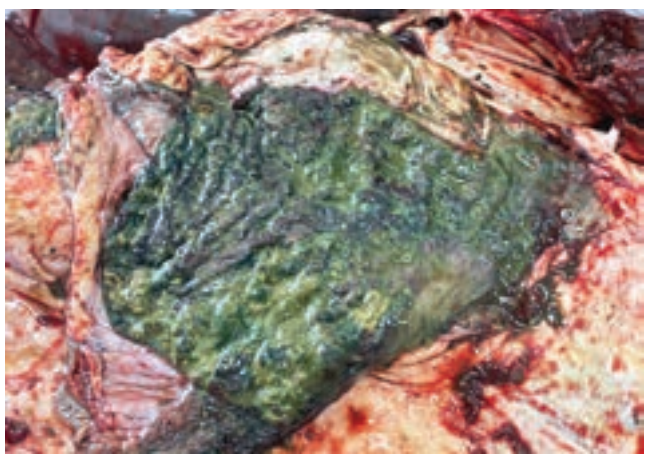

Figure 4: Haemorrhagic ulcerative typhlitis. Photo: Alan Johnson.

The follow-up submission was of two cows, both had gross lesions of enteritis. The lesions were particularly severe in one of the cows where there was a haemorrhagic ulcerative typhlitis (see Figure 4). BVD virus was detected in both cows. A follow-up investigation concluded that a transient BVD infection had passed through the herd following recent exposure to BVD virus. Up to fifteen cows died during the outbreak, highlighting the risks associated with the entry of BVD virus into an immunologically naïve herd (no exposure, no vaccination). The involvement of other agents whose impact may be exacerbated by BVD virus infection, such as *Salmonella* sp. is being examined; the potential role of mycotoxins is also being investigated.

BVD Bio Security

- During the high-risk breeding season, susceptible pregnant cattle can generate persistently infected (PI) calves.
- Whilst great progress has been made, epidemiological analysis has identified the emergence of a small number of local clusters of infection with clinically ill animals.
- The movement of animals, machinery and people is suspected of facilitating the spread of infection between these herds.
- Due to reduced vaccine usage, there is reduced population resistance to BVD, increasing susceptibility to infection.
- Herd level bio-security (including vaccination) has assumed a greater importance in positive herds and those herds neighbouring positive herds.
- We are asking you to raise the importance of bio-security with your clients – to protect those herds currently free of BVD, particularly in the vicinity of positive herds.
- Asking that you consider BVD in the differential diagnosis of any conditions involving immunosuppression, respiratory disease, early embryonic death and infertility in particular.
- Asking that you review you own bio-security practices to minimise the risk of transferring BVD between herds.

Calf enteritis

Rotavirus and *Cryptosporidium parvum* were the most commonly found pathogens in the faeces or intestinal contents of younger calves in March 2023. Rotavirus was over twice as commonly identified when compared to *C. parvum*. In older calves, coccidial oocysts were identified. These findings were broadly similar to those in March 2022, although the percentage positive results for both pathogens had decreased. Failure to isolate recognised enteric pathogens does not preclude their involvement, especially if detection is attempted in the post-acute stages of infection or following treatment. Fresh rectal faecal samples (c.15 grams) from untreated clinical cases are recommended. The tests applied to calf faecal samples are determined by the age of the calf.

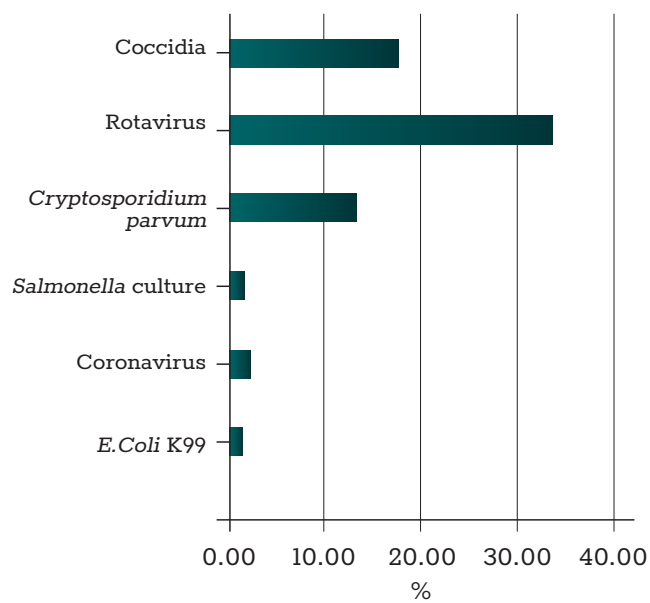

Table 2: The most commonly detected enteritis-causing pathogens in faeces or intestinal contents of calves in March 2023.

Rotavirus

Calves are most susceptible to rotavirus enteritis between one and three weeks of age. Adult animals are the primary source of rotavirus infection for neonatal calves. The severity of clinical signs depends on several factors including the age of the animal and

the immune status of the calf which depends on the absorption of colostral antibodies immediately after birth. Rotavirus targets the villi in the upper small intestine causing shortening and fusion of these villi, which results in malabsorption, leading to diarrhoea. Death may ensue due to acidosis, dehydration and starvation.

Cryptosporidium parvum

This agent is difficult to control. Reducing the number of oocysts ingested may reduce the severity of infection and allow immunity to develop. Calves should be born in a clean environment, and adequate amounts of colostrum should be fed at an early age. Calves should be kept separate without calf-to-calf contact for at least the first two weeks of life, with strict hygiene at feeding. Diarrhoeic calves should be isolated from healthy calves during the course of the diarrhoea and for several days after recovery. Great care must be taken to avoid mechanical transmission of infection. Calf-rearing houses should be vacated and cleaned out on a regular basis; an all-in/all-out management system, with thorough cleaning and several weeks of drying between batches of calves, should be used. Rats, mice, and flies should be controlled when possible, and rodents and pets should not have access to calf grain and milk feed storage areas. Chemoprophylaxis may also be used in the face of an outbreak.

RESPIRATORY TRACT

Pneumonia

A 10-week-old calf was submitted to Kilkenny RVL with a history of sudden death, and it was stated that other calves on the farm were displaying respiratory signs. Upon necropsy there was a severe, subacute bronchopneumonia affecting approximately 65 per cent of the lungs, there was marked septal oedema. *Mannheimia haemolytica* and *Haemophilus somni* were detected by polymerase chain reaction (PCR) and culture. *M. haemolytica* is an opportunistic pathogen, gaining access to the lungs when the host defences are compromised by stress or infection. Animals of all ages can be infected with *H. somni*, but cattle six months to two years of age tend to be most frequently affected. The respiratory syndrome occurs most often in feedlot calves, where a high stocking rate of animals and potentially stressful conditions exist. Clinical signs include high fever, depression, dyspnoea, nasal and ocular discharge, stiffness. A review of respiratory control was recommended in this herd.

Figure 5: Subacute bronchopneumonia in a calf with a history of sudden death. Photo: Maresa Sheehan.

A three-week-old Limousin suckler calf was submitted to Limerick RVL from a 50-cow suckler herd. One other similar death had been recorded. The calf appeared to be normal for the first two weeks of life, and then acute and severe respiratory distress developed. It was treated and appeared to improve but was found dead unexpectedly. Gross post-mortem examination revealed pulmonary congestion and consolidation of the cranial lung lobes. PCR testing returned a positive result for bovine herpesvirus 1 (BHV1), the causative organism of infectious bovine rhinotracheitis (IBR).

Embolic pneumonia/haemorrhagic abomasal ulcers

Athlone RVL examined a four-year-old dairy cow that had been sick for one week with pyrexia and respiratory signs and had been treated for pneumonia. Five to six others had been treated similarly and were responding slowly. There was a large blood clot in the abomasum and around 15 variably sized abomasal ulcers, the largest of which was 8cm x 3cm, were observed. Intestinal contents and faeces were black. Multifocally throughout the lungs, but mainly on the right side, were small 0.5-2cm necrotic pulmonary lesions, which were suspected to be the result of septic emboli. *M. haemolytica* was isolated from lung and detected by PCR. Viral PCR results were negative. Histopathology of the lung lesions showed a focally extensive area of necrosis surrounded by a zone of viable and degenerate neutrophils with fibrin and neutrophils in distended interlobular septae and streaming 'oat' cells. The lesions were typical of *Mannheimia/Pasteurella* infection. A conclusion of a bleeding abomasal ulcers and septic pulmonary lesions associated with *M. haemolytica* infection was made. Acute pleuropneumonia associated with *M. haemolytica* infection affecting dairy cows has been reported in both the Netherlands and Scotland and we have seen cases in dairy cows in the Department's laboratory service here also, both pre- and post-calving. Stress is suspected as a predisposing cause.

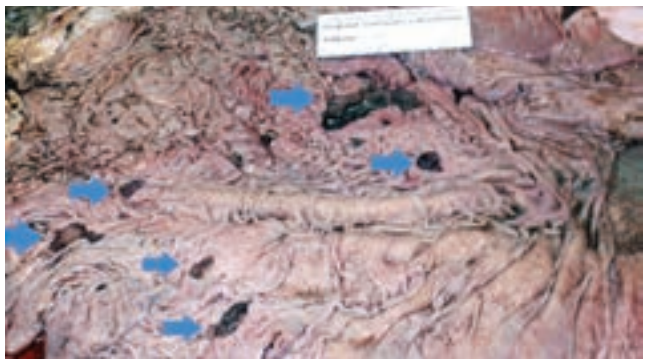

Figure 6: Multifocal abomasal ulceration in a case where haemorrhage into the abdomen and subsequent embolic pneumonia were seen. Photo: Denise Murphy.

SYSTEMIC

Omphalitis/hepatic abscessation

Athlone RVL examined a three-week-old calf with a history of sudden death. There was moderate to severe bilateral enophthalmia and a faecally soiled tail. The umbilicus was enlarged and there was an abscess visible on cross section, and a thick fibrous tract extending to the liver, which was enlarged, and contained multifocal abscesses. The left cranial lung lobe was consolidated, and the joints were unremarkable. *Escherichia* coli was isolated from the abscesses and other organs. A conclusion of liver abscessation secondary to navel ill was made.

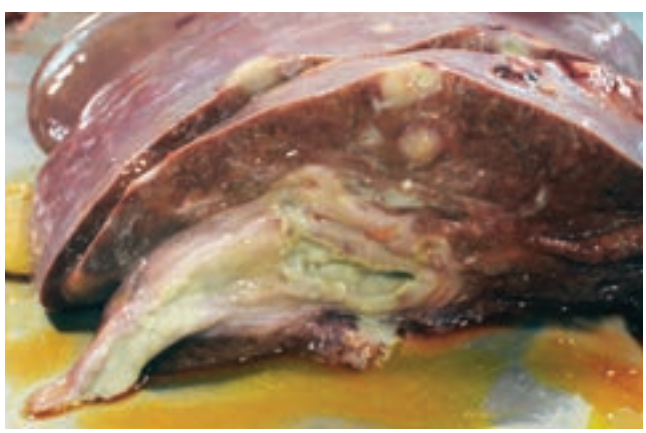

Figure 7: Cross-section of a liver abscess, with other foci of abscessation visible (above). Photo: Denise Murphy.

Navel ill/joint ill complex

Athlone RVL examined a two-week-old suckler calf with a history of having swollen back legs, it was treated but there was no improvement. The swelling started in one hindlimb and spread to the other and the calf was euthanised. The hindlimbs and joints of the forelimbs were swollen and there was suppurative arthritis in hock, stifle and carpal joints bilaterally. There was a suppurative cellulitis bilaterally in the hindlimbs. The umbilicus was infected and there was a thick fibrous tract from there to the liver, and abscessation in the liver, which was enlarged. Bilateral, anteroventral pulmonary consolidation with small abscesses was observed. *E. coli* was isolated from several tissues. A diagnosis of navel ill/joint ill was made with liver abscesses and pneumonia as sequelae.

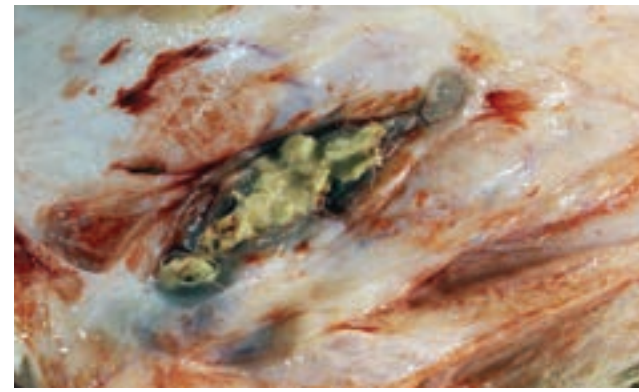

Figure 8: Purulent infection in the umbilicus of a calf. Photo: Denise Murphy.

URINARY/REPRODUCTIVE TRACT

Bovine abortion

Sligo RVL received submissions from bovine abortions which were found to be associated with *Trueperella pyogenes*, BHV4, and *E. coli*.

CARDIOVASCULAR SYSTEM

Vegetative endocarditis

A nine-month-old weanling was submitted to Kilkenny RVL, it had been unresponsive to antimicrobial treatment. A large vegetative mass was found on the tricuspid valve. In cross section, the cut surface of the mass revealed purulent material. A diagnosis of bacterial endocarditis was made. In cattle the disease predominantly affects the tricuspid valve, perhaps due to bacteria arising in the gastrointestinal tract and liver. Common underlying causes include hepatic abscessation, traumatic reticulitis, metritis, mastitis, navel abscesses and infectious polyarthritis ('joint ill'). Congestive right-sided heart failure is manifested as ascites and embolisation to the lungs. No obvious source of infection was found in this case.

Figure 9: A vegetative mass on the tricuspid valve in a case of bovine endocarditis. Photo: Lisa Buckley.

Septal defect

A three-day-old calf with respiratory symptoms failed to respond to treatment and was submitted to Kilkenny RVL for examination. The heart was enlarged and there was a septal defect. Other signs on post-mortem examination relating to the circulatory defect included the lungs being very heavy, diffusely congested and oedematous. There was ascites in the abdominal cavity and there was a 'nutmeg' pattern of congestion in the liver.

Figure 10: Ascites (bottom left) and pulmonary congestion, both sequelae to a septal defect.

SYSTEMIC

Malignant Catarrhal Fever

Sligo diagnosed Malignant Catarrhal Fever in a pair of 14-month-old heifers from the same herd that presented with the 'head and eye form' of the condition, three weeks apart. The common findings were bilateral iridocyclitis, lymphadenopathy, muzzle erosions, sinusitis, encephalitis and generalised vasculitis. DNA sequences specific to Ovine Herpes Virus 2 (OHV2) were detected systemically in both heifers by PCR technique. The herdowner had sheep lambing on the same holding in the period before the heifers presented with clinical signs.

SHEEP

Bacteraemia/septicaemia and pneumonia were the most common diagnoses at necropsy in sheep in the RVLs during March 2023.

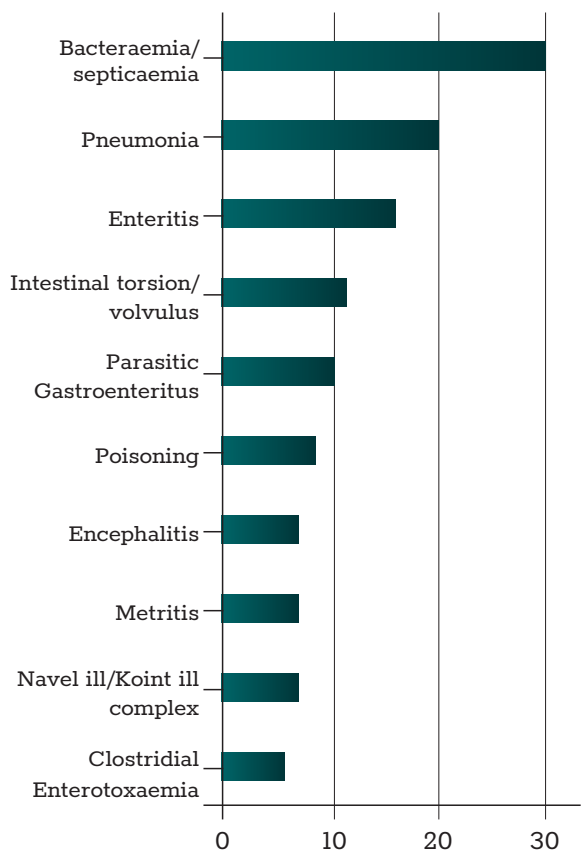

Table 3: The most common diagnoses in sheep submitted for necropsy in March 2023.

GASTROINTESTINAL TRACT

Omphalitis/hepatic abscessation

A two-week-old lamb was submitted to Limerick RVL with difficulty walking, from a flock where swayback was suspected. Post-mortem examination revealed an omphalitis (swollen navel) with secondary liver abscessation and infection of the right knee joint, other joint surfaces appeared normal. The lamb had been treated with antibiotics and no agent was identified. There was no evidence of demyelination on slides examined by histopathology. The source of infection was via the umbilicus, therefore hygiene around lambing and dressing of the navel is critical, as is successful transfer of passive immunity. Multifocal abscessation subsequent to bacteraemia commonly presents as a locomotor defect in young lambs especially if there is involvement of joints, spinal cord and brain.

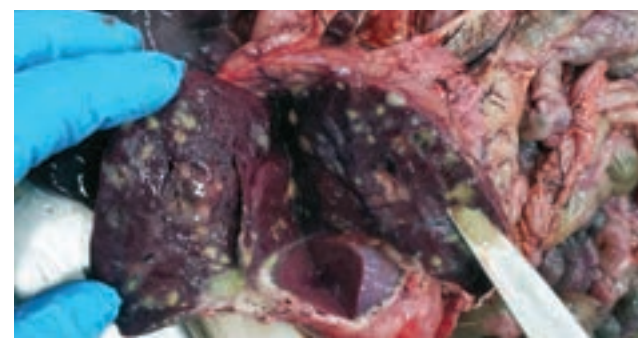

Figure 11: Multifocal hepatic abscessation, secondary to omphalitis. Photo: Brian Toland.

RESPIRATORY TRACT

Pneumonia

A two-week-old lamb was found dead with no previously noticed signs and was submitted to Kilkenny RVL. There was a severe pneumonia with approximately 50-60 per cent of the lung tissue consolidated. There were suspect necrotic foci within the consolidated lobes. There was a fibrinous pleuritis. There was very little ingested milk in the abomasum. *M. haemolytica* was cultured from multiple organs suggesting a bacteraemia. *E. coli* was also cultured from multiple organs.

URINARY/REPRODUCTIVE TRACT

Urolithiasis

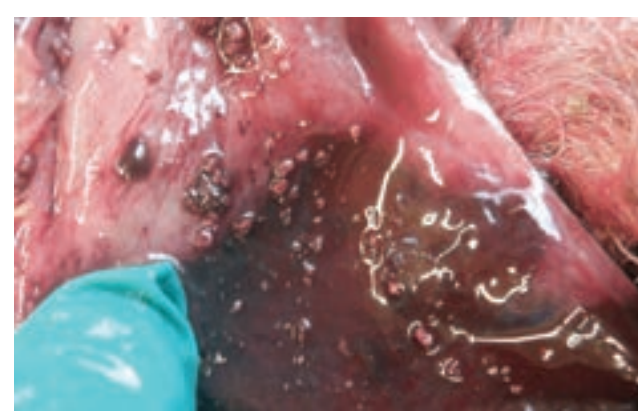

Figure 12: Uroliths resting on the inner surface of the bladder of a lamb. Photo: Aideen Kennedy.

Two ten-month-old lambs were submitted to Kilkenny RVL. They had stopped eating and were showing tenesmus (forcing). Seven more cases were reported in the flock. Upon examining the first lamb, there were blood clots and haemorrhage at the pole of the bladder, but the bladder wall was intact. The urine was bloody and had a gritty texture due to suspected uroliths. The kidneys were in an advanced state of autolysis, impairing examination. In the second lamb, the medulla of the right kidney was dilated and small nephroliths were observed. The urine was concentrated, and the bladder mucosa was hyperaemic. Urinalysis revealed the majority of the crystals to be struvite. Risk factors for urolithiasis can include high concentrate, such that low forage rations will predispose to urolithiasis; other risk factors include inadequate access to clean water and diets that are high in magnesium and/or phosphorus. A review of the mineral content of the diet was advised.

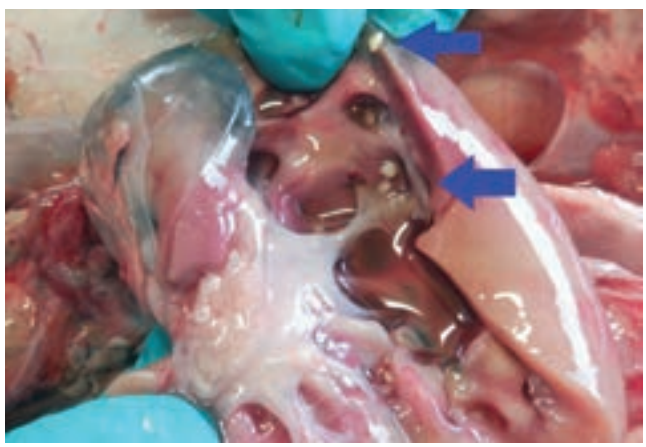

Figure 13: A dilated kidney (hydronephrosis) with nephroliths (arrows). Photo: Aideen Kennedy.

Uroperitoneum

Sligo diagnosed uroperitoneum, resulting from a ruptured bladder, in a three-month-old ram lamb that had a mixed stroma calculus including cellular material obstructing the vermiform plexus as it emerged from the penis.

Enzootic abortion of ewes

An ovine foetus of four months gestation was submitted to Kilkenny RVL. There had been a number of abortions in the flock. The ewes were vaccinated for toxoplasmosis. On examination of the foetus, there were no visible lesions. There was a marked placentitis with a marked exudate, predominantly in the intercotyledonry area, but it did extend over some cotyledons. The placenta was tested via PCR and results for *Chlamydia abortus*, the causative organism of enzootic abortion of ewes (EAE) were positive. Clune *et al* (2020) in a study of ovine abortion found that "Investigations that included placental tissue samples were more than twice as likely to have a diagnosis compared to investigations without placenta", and it is always advisable to submit placental tissue when investigating an abortion outbreak.

Figure 14: Lesions of placentitis from which *Chlamydia abortus* was detected by PCR. Photo: Aideen Kennedy.

Ovine abortion

Sligo received submissions from ovine abortions associated with *Toxoplasma gondii*, *C. abortus*, *Corynebacterium pseudotuberculosis*, *E. coli* and *Enterococcus faecalis*.