

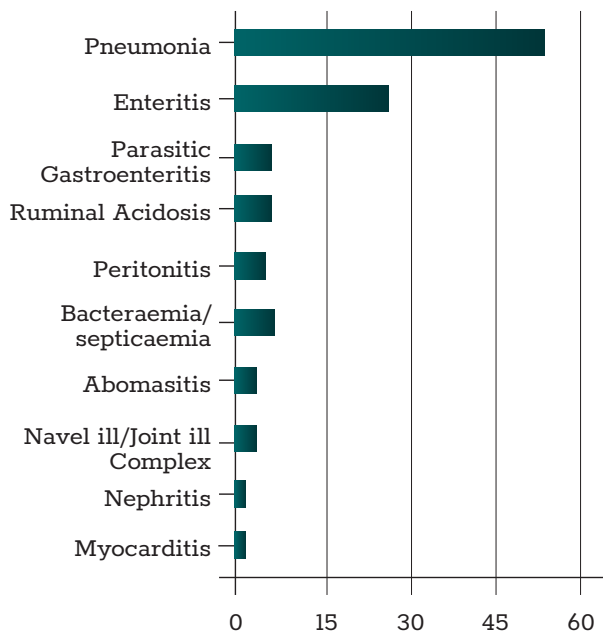
# Regional Veterinary Laboratories Report

December 2022

Regional Veterinary Laboratories (RVLs) carried out necropsy examinations on 507 carcasses and 279 fetuses during December 2022. Additionally, 1,958 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 December 2022. 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 December 2022.



**Table 1: The most common diagnoses in cattle submitted for necropsy in December 2022.**

## GASTROINTESTINAL TRACT

### Johne's disease

A seven-year-old cow with history of severe diarrhoea, that pined away in spite of a good appetite, was euthanised and submitted to Kilkenny RVL. On necropsy, the cow was in poor body condition. There was oedema in the intestinal walls with marked thickening and corrugation of the mucosa, mainly affecting the ileum. The intestinal contents were very liquid. On histopathology, there was a chronic, granulomatous enteritis with multifocal giant cells visible. Sections stained positive on ziehl-neelsen (ZN) stain. Culture results were positive for *Mycobacterium avium* subspecies *paratuberculosis* (MAP), the aetiological agent of paratuberculosis or Johne's Disease. Information on Johne's disease, and on Animal Health Ireland's

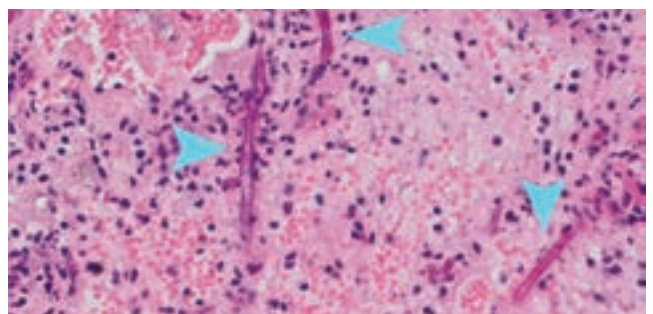
Johne's disease control programme can be found on <https://animalhealthireland.ie/programmes/Johnes-disease/>



**Figure 1: Corrugated intestinal mucosa near the ileo-caecal junction in a case of Johne's disease. Photo: Aideen Kennedy.**

### Mycotic omasitis

Mycotic infection of the omasum was detected in a cow submitted to Kilkenny RVL. This cow had a co-existing mastitis and bacteraemia/septicaemia; the mycotic omasitis may have been secondary to these other conditions. Mycotic omasitis and rumenitis may be sequelae of sepsis, with reflux of abomasal fluid into the forestomach and broad-spectrum antimicrobial therapy as possible predisposing factors for mycotic infections.



**Figure 2: Intralésional fungal hyphae in the mucosa of the omasum. Photo: Maresa Sheehan.**

### Perforated abomasal ulcer

A heifer was found recumbent and in pain; she deteriorated rapidly, was cold, and had pale mucous membranes. She

didn't respond to treatment and was submitted to Kilkenny RVL. On necropsy, there was a diffuse, fibrinous peritonitis with approximately 20 litres of fluid in the abdomen. The source was a ruptured, approximately 2cm in diameter, abomasal ulcer. There were other multifocal, non-perforated, moderate-depth ulcers on the abomasum mucosa. The intestinal content was dark-to-black. The hepatic edges were rounded and the liver's serosal surface was covered in fibrin. There was congestion in the lungs and multifocal haemorrhages on the heart. On histopathology, there was fibrinosuppurative abomasitis, while rare fungal hyphae were also visible around the lesion.

### Mycotic oesophagitis

A three-week-old calf was examined by Sligo RVL with a history of repeated episodes of diarrhoea that had initially responded to antibiotic and supportive treatment. The animal was described as having gradually become weaker before its eventual death. Post-mortem examination revealed severely thickened pharyngeal, laryngeal and oesophageal mucosa. Histopathology confirmed mycotic infection. This was considered as a likely result of the antibiotic treatment and mucosal trauma following repeated stomach tubing of the calf.



**Figure 3: Thickened oesophageal and pharyngeal mucosa at the level of the epiglottis in a calf due to a mycotic infection. Photo: Shane McGettrick.**

### Ruminal acidosis

Limerick RVL examined two fattening culled cows in a pen of ten that had been found dead. They were introduced to heavy feeding of crimped wheat, concentrates and silage in the previous week. Necropsy of both disclosed rumenitis with a large quantity of grain present and transmural haemorrhages. The abomasum of both animals contained undigested grain, and the intestines of both were segmentally hyperaemic with bloody contents. Two other cows had also died, and samples were taken for clinical pathology: ruminal fluid was taken for pH, and renal cortex was sampled for lead analysis, aqueous humour for Calcium, Magnesium, Nitrates and Beta-hydroxy butyrate (BHB) and intestinal contents for toxins of *Clostridium perfringens*. pH testing of ruminal contents returned results of 4.3, 4.1, 4.0 and 5.7 in the four cows. Normal ruminal pH is 5.5-7.0 but, after death, the pH of the rumen contents begins to increase (Radostits *et al*, 2007) and this should be considered when interpreting results. A diagnosis of acute rumen acidosis due to grain overload was made.

## RESPIRATORY TRACT

### Pneumonia

Two ten-month-old Friesian heifers were submitted to Limerick RVL for necropsy. They had been housed on a silage diet for the previous three weeks in a group of 43. Both animals were found dead within a few days of each other. Some other animals in the pen were frothing from the mouth; these had been treated for pneumonia and subsequently improved. Necropsy disclosed focal lesions of pneumonia in both animals and watery intestinal contents. No significant bacterial pathogens were isolated on routine culture. Polymerase chain reaction testing (PCR) of lung tissue was positive for bovine respiratory syncytial virus (BRSV), *Mannheimia haemolytica* and *Pasteurella multocida*. Histopathology of the lung disclosed a moderate alveolar emphysema. Focally-to-extensively, there was oedema and a moderate neutrophilic bronchopneumonia with interstitial fibrosis, type two pneumocyte hyperplasia, and thickening of the vascular tunica media and adventitia. Multifocally, there was a mild hyperplasia of bronchiole-associated lymphoid tissue. The lesions were consistent with a chronic ongoing bacterial bronchopneumonia.



**Figure 4: Acute fibrinous bronchopneumonia caused by *Mannheimia haemolytica* in a two-year-old Friesian heifer. Photo: Denise Murphy.**

Athlone RVL examined a two-year-old, in-calf Friesian heifer with a history of respiratory distress, receiving treatment and dying. Two other cows were being treated for similar signs. There was severe, cranioventrally distributed, fibrino-haemorrhagic, necrotic pulmonary consolidation with dark red/purple parenchyma and marked interlobular fibrin and oedema; these lesions were bilateral but more severe on the right side than the left. The pulmonary consolidation extended into caudal lobes and there were petechial haemorrhages on the pleural surface. The liver was mildly jaundiced. *M. haemolytica* was isolated from the lung by culture and was detected by PCR. No respiratory viruses were detected in the lungs. Histopathology of the lungs showed a severe, diffuse, fibrinosuppurative bronchopneumonia with streaming macrophages ('oat cells'), congestion and haemorrhage, and marked distension of interlobular septae with fibrin and inflammatory cells. A conclusion of acute, fibrinous bronchopneumonia caused by *M. haemolytica* was made. There have been similar reports of acute bacterial pneumonia involving *M. haemolytica* infection in adult dairy cows in the Netherlands and Scotland.



**Figure 5: Cross-section of pneumonic lungs showing the pulmonary consolidation with dark red/purple parenchyma and marked interlobular fibrin and oedema. Photo: Denise Murphy.**

**Pneumonia/parasitic bronchitis**

A nine-month-old Angus-cross weanling was submitted to Limerick RVL for necropsy with a history of respiratory distress and coughing. There had been two other deaths in the group of 21. The animals had been dosed two weeks previously with levamisole and oxytetracycline. Necropsy disclosed bronchopneumonia and consolidation of the cranial lung lobes. Localised lesions of emphysema were seen. Lungworm larvae were visible in the airways. *Bibersteinia trehalosi* was isolated from the lung. PCR testing was positive for *Mycoplasma bovis*, *Histophilus somni* and *M. haemolytica*. A very high strongyle egg count was detected in a faecal sample in addition to the presence of lungworm larvae in the airways. A diagnosis of pneumonia with a mixed parasitic and bacterial aetiology was made.

**URINARY/REPRODUCTIVE TRACT**

**Pyelonephritis and renal encephalopathy**

Athlone examined a ten-year-old cow with a history of forelimb lameness 10 days previously; the animal was taken off slats and put on a straw bed. She then developed neurological signs, rubbing her head off the walls and occasionally drooling from her mouth, eventually becoming recumbent. On gross post-mortem examination, severe bilateral enophthalmia was noted. There was a severe suppurative necrotic pyelonephritis in the right kidney with marked fibrosis, and fibrosis of the right ureter with multifocal haemorrhages on the ureteral mucosal lining. The other kidney appeared normal. There was shallow ulceration of the abomasal mucosa and terminal emphysema in the lungs. Urea concentration in vitreous humour (VH) was 29mmol/L. VH is sufficiently stable in cattle for up to 36 hours after death to provide a useful indicator of probable serum urea status. Mean post-mortem VH urea values have been found to be lower than antemortem serum values but correlate closely.

The normal range of serum urea values in cattle is 2.65-6.89 mmol/L, therefore VH values > 7mmol/L are regarded as elevated. Histopathology of the brain showed multifocal vacuolation of the neuropil at the grey/white matter junctional zones in the cerebrum and also in basal ganglia and midbrain, consistent with a metabolic encephalopathy. A conclusion of a chronic suppurative pyelonephritis and renal encephalopathy (encephalopathy secondary to renal failure) was made.

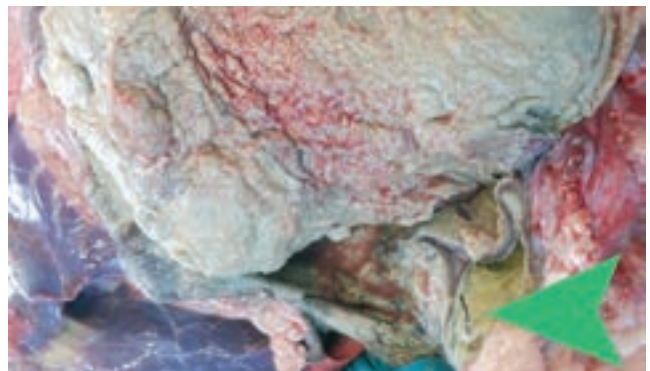


**Figure 6: Pyelonephritis in a cow that subsequently caused a renal encephalopathy. Photo: Denise Murphy.**

**CARDIOVASCULAR SYSTEM**

**Traumatic reticulo-pericarditis**

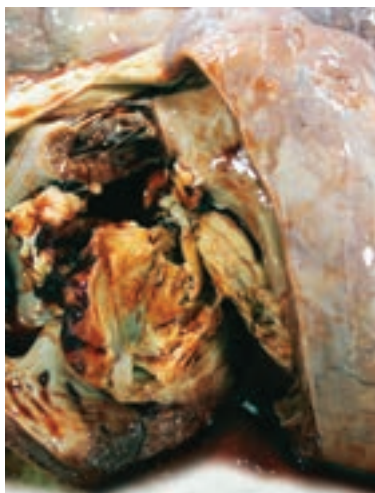
A four-year-old cow was found dead and submitted to Kilkenny RVL. On examination, there was a 'bread-and-butter' pericarditis. There was a small sharp wire, approximately 5cm in length, lodged in the pericardial sac. There was ascites in the abdominal cavity with approximately 20 litres of fluid. The reticulum was adhered to the diaphragm and contained a second small wire. A diagnosis of traumatic reticulo-pericarditis was made.



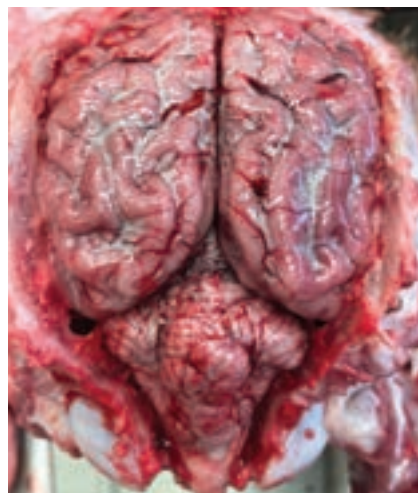
**Figure 7: 'Bread and butter' pericarditis caused by a wire penetrating through from the reticulum (arrow). Photo: Aideen Kennedy.**

**Vegetative endocarditis**

Athlone RVL examined an eight-month-old Limousin cross weanling with a history of ill thrift and dullness over a ten-day period. It was treated for pneumonia as respiratory signs were present. There was marked subcutaneous submandibular oedema extending to the ventral neck and sternum. There was a large vegetative endocarditis lesion and abscess on the right atrioventricular valve (tricuspid valve) and marked volumes of excess fibrinous pleural fluid. There was diffuse pulmonary oedema and well-scattered, multifocal, septic emboli throughout the lung lobes. There was ascites and an enlarged liver with a 'nutmeg' pattern indicative of passive venous congestion subsequent to congestive cardiac failure. *M. haemolytica* was isolated from the heart lesion. A conclusion of right sided vegetative endocarditis was made. It is thought that the formation of these vegetative lesions is most commonly preceded by recurring bacteraemia due to chronic septic conditions.



**Figure 8: Vegetative endocarditis on the tricuspid valve. Photo: Denise Murphy.**



**Figure 9: Meningitis and cerebellar coning in a three-day old calf. Photo: Sara Salgado.**

### Cardiac abscessation

A nine-month-old weanling was submitted to Limerick RVL having been found dead, it had appeared normal the evening before. Examination of the heart disclosed a fist-sized walled abscess on the left atrium (myocardium and endocardium involved) but there was no evidence of a foreign body and pericarditis was not observed. Pulmonary consolidation of approximately 10 percent of cranioventral lobes was observed. The rumen was filled with forage and meal, with a diffusely hyperaemic mucosa which led to a suspicion of subacute ruminal acidosis (SARA). The reticulum had hyperaemic mucosa and there was no evidence of foreign bodies or hardware in the rumen/reticulum.

Cardiac abscessation, similar to other abscesses, develops either by dissemination from a distant source subsequent to a bacteraemia, or by direct extension of a pre-existing cardiac or adjacent infective focus. *H. somni* may cause a necrotising bacterial myocarditis in cattle but the abscess in this case was not considered typical of that seen in this disease. Cranioventral distribution of lung lesions were however suggestive of a concurrent bacterial pneumonia but was not considered the primary lesion. Cardiac failure due to abscessation was determined as cause of death. Ruminal acidosis was consistent with the post-mortem findings and may have provided an initial source for bacteria to enter the blood stream; a review of diet was advised.

## NERVOUS SYSTEM

### Meningitis

A three-day-old calf was submitted to Dublin RVL from a suckler herd, which had been sick for one day with neurological signs. Despite receiving anti-inflammatories, antibiotics, and vitamin B1, it had died. On gross post-mortem examination, the main findings were sunken eyes, enlarged congested liver, and periarticular oedema and excess gelatinous yellow material present on dislocation of the atlantooccipital joint. There was diffuse congestion of the meningeal blood vessels, with purulent material in the sulci (meningitis) and cerebellar coning indicating brain swelling.

On histopathology, a severe, diffuse, fibrinosuppurative meningitis and a multifocal-to-coalescing, severe, necro-suppurative encephalitis with haemorrhage, suppurative perivascular cuffing, vasculitis, fibrinoid vascular necrosis and intralesional gram-positive bacteria were detected. Examination of the liver detected multifocal, random, acute, areas of hepatic necrosis with occasional neutrophil infiltration. In the lung, a marked, diffuse, interstitial infiltrate of macrophages, lymphocytes and some neutrophils was detected, along with severe, lobular, suppurative bronchopneumonia, with occasional inhaled squamous cells and meconium present. Bacterial meningoencephalitis, hepatitis, and pneumonia indicate a bacteraemia. Although *Escherichia coli*, a gram-negative bacterium, was isolated from the lesions, gram staining of lesions did not support a causative role for it where intralesional gram-positive bacteria were observed. Bacterial culture at time of post-mortem may have been affected by history of antibiotic treatment. Perinatal animals with their immature and naive immune systems are highly susceptible to bacteraemia. Most often, this occurs secondary to omphalophlebitis or enteritis. Omphalophlebitis or enteritis were not detected in this case as comorbidities.



**Figure 10: Periarticular oedema and gelatinous yellow material at the atlantooccipital joint. Photo: Sara Salgado.**

**MUSCULOSKELETAL**

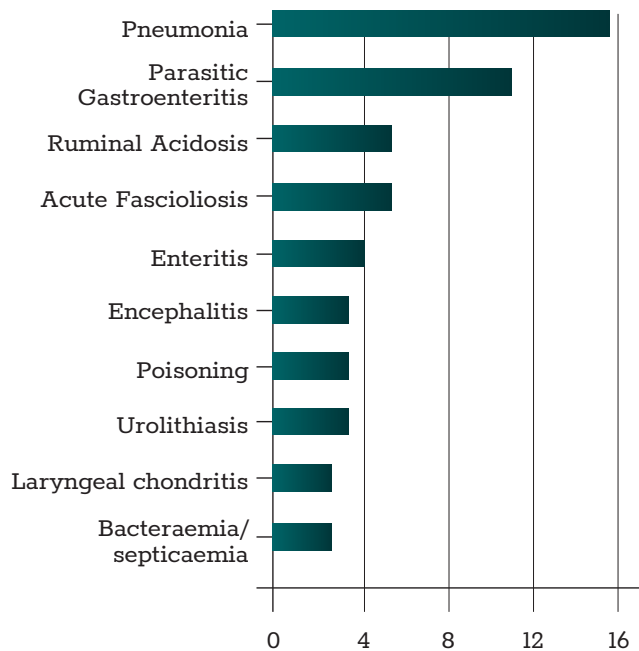
**Blackleg**

A pedigree Aberdeen Angus bull was found dead and submitted to Limerick RVL. It had been on rough ground with two heifers. A black and crepitus lesion in the musculature of the shoulder was sampled and was tested for *Clostridium chauvoei* using a fluorescent antibody technique (FAT). The FAT result was positive. A diagnosis of blackleg was made.

**SHEEP**

Pneumonia and parasitic gastroenteritis were the most common diagnoses at necropsy in sheep in the RVLs during December 2022.

**GASTROINTESTINAL TRACT**



**Table 2: The most common diagnoses in sheep submitted for necropsy in December 2022.**

**Rumen acidosis**

Two lambs were submitted to Kilkenny RVL with a history of sudden death. The history also included a recent move from a bare winter crop to a new field of winter crop and concentrates. Large volumes of concentrates were seen in the rumen, the ruminal mucosa was still attached despite autolysis of other organs. Ruminal fluid of the lambs returned pH of 4.5 and 3.6 respectively. A diagnosis of ruminal acidosis was made. The normal rumen pH range is 5.5-7 and, as pH rises after death, the levels found here indicate a very severe acidosis. It is this acidity and resultant rumenitis that causes the mucosal lining to remain adhered. The history of a recent dietary change is common in these cases, typically the strongest lambs are affected as they will get preferential access to meal over smaller lambs.



**Figure 11: Large quantity of concentrates in the rumen contents of a lamb with acidosis. Photo: Maresa Sheehan.**

**Parasitism in sheep**

Sligo RVL diagnosed parasitism as the cause of death in sheep in numerous cases during December 2022. The typical presentation was sudden death or acute diarrhoea in batches of ewes or lambs. Both liver fluke and stomach worms were found at post-mortem. In cases of fasciolosis, the severity of hepatic damage, caused by migrating immature liver fluke (*Fasciola hepatica*), was remarkable in many cases. Parasitic



**Figure 12: Ovine liver with multifocal haemorrhagic migratory tracts in the parenchyma, and adult liver fluke spilling out of opened gall bladder. Photo: Shane McGettrick.**

gastroenteritis was a common finding with high faecal egg counts being recorded in many sheep throughout December 2022.

The high parasite burdens identified in sheep in the north-west of Ireland this year are likely due to a multifactorial combination of wet summer weather, followed by a mild autumn, combined with high stocking densities throughout the year, resulting in sheep being exposed to a heavy infective parasite challenge later in the year. It is possible that normal control measures used by farmers to manage parasites were not optimally timed and therefore less effective, resulting in an increased incidence of the disease during December.



**Figure 13: Proliferative abomasitis in a sheep due to Ostertagiasis. Photo: Shane McGettrick.**

**Acute fasciolosis**

Sligo RVL examined a three-year-old ewe that had died suddenly. The carcass was severely anaemic. There were large numbers of haemorrhagic tracts throughout the liver, typical of migrating *F. hepatica*. The liver was grey, pale and partially fibrosed. No normal liver parenchyma could be identified grossly. There was severe ascites and pulmonary oedema. Acute fasciolosis was diagnosed.



**Figure 14.** Pale lung from a ewe with anaemia following severe acute fasciolosis. Photo: Shane McGettrick.

**Enterotoxaemia**

A three-week-old lamb was submitted to Sligo RVL with a history of sudden death. There had been increased mortality of lambs in the early lambing flock. At necropsy, there was acute fibrinous pericarditis. Clostridial enterotoxaemia was confirmed by detection of *C. perfringens* epsilon toxin in the intestinal contents. The early lambing sheep in the flock had not been vaccinated for clostridial disease.



**Figure 15:** Acute fibrinous pericarditis in a lamb with clostridial enterotoxaemia. Photo: Shane McGettrick.

**RESPIRATORY TRACT****Ovine pulmonary adenocarcinoma**

A ewe examined in Kilkenny as part of the RVL Thin Ewe Study had consolidation affecting approximately 60 per cent of the lungs. The consolidated region was grey in colour and there was a fluid exudate when squeezed. Changes on histopathology were consistent with a diagnosis of ovine pulmonary adenocarcinoma (OPA) and PCR samples were positive for Jaagsiekte sheep retrovirus. OPA, or Jaagsiekte, is

a contagious lung neoplasia of sheep resulting from infection with Jaagsiekte sheep retrovirus (JSRV), a betaretrovirus. Tumour growth replaces the normal lung and consequently impairs lung function. In addition, the tumour cells may secrete large volumes of fluid, also impairing lung function. Transmission of JSRV occurs mostly through the aerosol route but also via colostrum and milk. As part of the RVL Thin Ewe Study, where we are investigating 'iceberg diseases' (Maedi-Visna Disease, Caseous Lymphadenitis, Ovine Pulmonary Adenomatosis (OPA) 'Jaagsiekte', John's Disease and Border Disease), we accept up to three ewes with a history of chronic ill thrift as part of the survey. Please contact your local RVL, if you think you have suitable flocks.



**Figure 16:** Grey, consolidated volume of lung affected with ovine pulmonary adenocarcinoma. Photo: Aideen Kennedy.

**Parasitic bronchitis**

Lungworm larvae, presumably *Dictyocaulus filaria*, were detected in the airways of some sheep with concurrent parasitic gastroenteritis during December 2022. This is considered an unusual finding as large burdens of lungworm are not typically considered to be a clinical problem in sheep.



**Figure 17:** Nematode larvae in the airways of a ewe. Photo: Shane McGettrick.

**URINARY/REPRODUCTIVE TRACT****Abortion in embryo transfer sheep**

Sligo RVL investigated an abortion storm in an early lambing, embryo-transfer flock. Abortions were occurring in late pregnancy. The recipient dams had been vaccinated against enzootic abortion and toxoplasma abortion. *Chlamydophila abortus* was identified in some of the foetuses examined. Treatment of remaining pregnant ewes with a specific antibiotic resulted in no further abortions. A farm investigation of the flock and fertility records indicated that there had been a reduced pregnancy rate to embryo transfer in the flock this year. There was an increase of 30 per cent in the non-pregnancy rate following embryo transfer in 2022

compared to previous years. Vaccination had been carried out immediately prior to embryo transfer. There had been an outbreak of enzootic abortion in the conventionally managed part of the flock the previous year and, although the embryo transfer flock were managed separately from pregnancy onwards, mainly to facilitate nutrition in earlier lambing ewes, there were some shared pens and housing throughout the year. Serology from ewes indicated antibodies for tick-borne fever indicating exposure at some point to *Anaplasma phagocytophilum*. It was concluded that there was likely to have been a vaccination failure in some of the embryo transfer recipient flock, likely due to a subclinical concurrent immunosuppressive disease at time of vaccination; this may also have explained the unusually low embryo transfer success rate. The subsequent abortion storm was likely due to spread from the previous year's outbreak. Tick-borne fever was considered a possible cause of the disease at time of vaccination, but this could not be proven retrospectively.

**POISONINGS**

**Copper poisoning**

An eight-month-old ram lamb was submitted to Kilkenny RVL. The carcass, including the liver was icteric (jaundiced). Both kidneys were enlarged and black in colour, and the urine was a port-wine colour. Both liver and kidney copper results were very high. A diagnosis of copper toxicity was made, and a review of supplementation was recommended.



**Figure 18: Icteric (jaundiced) carcass and liver from a lamb with copper poisoning. Photo: Aideen Kennedy.**

**MISCELLANEOUS**

**Infectious keratoconjunctivitis ('pink eye')**

Limerick RVL received submissions from a case where 20 ewes, out of a group of 40, had developed eye lesions (see Figure 19). All of the ewes were at pasture with no silage or concentrate supplementation. It was a well-fenced field with clean pasture and few weeds. A ram was introduced two weeks prior. The ewes were dosed with a benzimidazole on the same day. 10 ewes from the father's flock in south Kerry had also been introduced two weeks previously. None of the introduced ewes or ram had clinical signs. Culture of swabs from the affected eyes yielded no growth and were PCR negative for *Chlamydia psittaci*. PCR results were positive for *Mycoplasma conjunctivae*. *M. conjunctivae* is the cause of infectious keratoconjunctivitis (IKC) in sheep and goats, but other agents can also be implicated; *C. psittaci* and *Moraxella ovis* also have primary pathogenic roles. Medication does not always eliminate *M. conjunctivae* and repeat treatments are often necessary; outbreaks may last four to six weeks

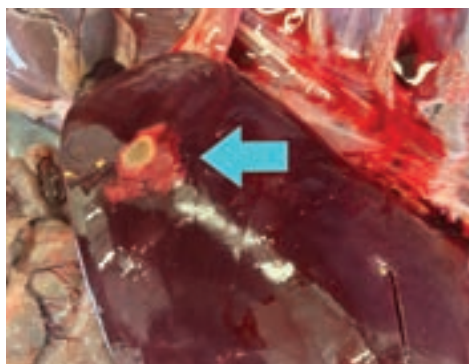
before complete clinical resolution is seen. Carriage of *M. conjunctivae* for up to 23 weeks has been reported in experimental infections. Subclinically infected carrier animals often appear to be the means whereby *M. conjunctivae* is introduced into previously uninfected flocks, and they act as a source of reinfection in previously affected flocks; hence, after an initial outbreak, flocks may succumb to further outbreaks of disease in subsequent years. The susceptibility to disease and the severity of the clinical signs often appear to be greater in adult sheep than young lambs. Outbreaks of Ovine IKC may be triggered by tight stocking and close head-to-head and eye-to-eye contact between sheep at troughs and feeders, so flock outbreaks may occur more frequently during the winter months.



**Figure 19: Lesions of infectious keratoconjunctivitis in the eye of a ewe. Photo: Cornelius Doherty.**

**Infectious necrotic hepatitis ('black disease')**

A four-year-old ewe was submitted to Sligo RVL having been found dead. At necropsy, there was a well-circumscribed, pale area of liver necrosis surrounded by a hyperaemic rim and covered on the serosal surface by a fibrin raft. There were multifocal haemorrhages on the serosal surfaces of other organs. *Clostridium novyi* was identified by FAT, confirming infectious necrotising hepatitis ('black disease'). There was a concurrent *F. hepatica* infection. Black disease is a relatively rarely-identified disease in sheep and is more commonly found in cattle. Migration of fluke larvae through the liver parenchyma creating tissue necrosis and anaerobic conditions suitable for clostridial spores to germinate and proliferate, releasing a potent toxin, is the recognised pathogenesis.



**Figure 20: Focal area of hepatic necrosis due to *Clostridium novyi* infection in a ewe (arrow). Photo: Shane McGettrick.**

**Book Reference:**

Veterinary Medicine: A textbook of the diseases of cattle, horses, sheep, pigs and goats (2007) by Radostits, OM, et al, Published by Saunders Ltd. ISBN: 978-0-7020-3991-1