Overall Findings

In March 2013, a total of 691 bovine carcases and 496 ovine carcases were examined in the Veterinary Laboratory Service (VLS). Abortions continued to account for a large number of the submitted materials.

In 140 bovine aborted foetal submissions, an agent was identified in 40 cases, whilst an agent was not identified in 100 submissions. Of the agents identified, the most commonly isolated were *Trueperella pyogenes*, *Bacillus licheniformis*, *Neospora caninum*, Schmallenberg virus and *Listeria monocytogenes*, in descending order (See Table 1).

Table 1: Breakdown of the causative agents seen in bovine abortion cases submitted to the RVLs in March 2013

<table>
<thead>
<tr>
<th>Bovine Abortion</th>
<th>n=140</th>
<th>Agent</th>
<th>No of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No agent identified</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Trueperella pyogenes</em></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Bacillus licheniformis</em></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Neospora caninum</em></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Schmallenberg virus</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Listeria monocytogenes</em></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Miscellaneous</td>
<td>9</td>
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</tbody>
</table>

In 165 ovine foetal submissions made, an agent was identified in 81 cases, with no agent identified in 74 cases. Agents identified most commonly were *Toxoplasma gondii*, *Chlamydophila abortus* and *Bacillus licheniformis* (Table 2).

Table 2. The breakdown of causes of ovine abortion in submitted carcases to the RVLS in March 2013.

<table>
<thead>
<tr>
<th>Ovine Abortion</th>
<th>n=165</th>
<th>Agent</th>
<th>No of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No agent identified</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Toxoplasma gondii</em></td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Chlamydophila abortus</em></td>
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<tr>
<td></td>
<td></td>
<td><em>Bacillus licheniformis</em></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Miscellaneous</td>
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</tbody>
</table>

As calving and lambing were in full flight in many parts of the country, the submissions to the VLS reflected this, with diagnoses recorded increasingly. With 141 submissions diagnosed with neonatal enteritis and septicaemia, this accounts for over 20% of all bovine submissions in March 2013. This serves as a potent reminder of the importance this year, as always, that neonatal management is crucial on Irish farms.

The most commonly identified agents amongst those that cause neonatal enteritis were rotavirus and *Cryptosporidium*. In many cases, these agents were found together and where there was concomitant evidence of hypogammaglobulinaemia. The three of these findings when found together have led to severe losses in a year when many farmers are struggling with other issues like poor availability of feed and or sub-optimal feed quality.

Bovine respiratory disease accounted for 55 submissions to the VLS in March 2013. The most commonly identified agents were *Pasteurella multocida*, *Mannheimia haemolytica*, IBR virus, *Mycoplasma bovis* and RSV virus.
All of these findings serve as reminders that although our industry is largely a seasonal one, ‘seasonal’ diseases can occur in any season.

**SOUTHWEST REGION**

**Calves**

**Bovine Neonatal Pancytopaenia (BNP)**

Bovine neonatal pancytopaenia was diagnosed in a two-week-old calf with characteristic widespread petechial and ecchymotic haemorrhages in the serosal surfaces and spleen and in the abomasal and intestinal lumen.

**Weanlings**

**Bronchopneumonia**

A seven-month-old calf in good body condition that displayed respiratory symptoms for a short time before death showed severe pulmonary consolidation (suppurative bronchopneumonia) affecting approximately 65% of the pulmonary parenchyma. Though *Pasteurella* sp. was isolated in the lungs the microscopic lesions were consistent with *Mycoplasma bovis*, which was later confirmed by PCR. Virology PCR results were unremarkable.

**Older Bovines**

**Listeriosis**

*Listeria monocytogenes* was isolated in the liver of a six-year-old downer cow with diarrhoea, agalactia and very poor body condition. Gross examination revealed clear pericardial effusion (hypoproteinemia) and hepatic fibrosis. Microscopic examination showed marked portal bridging fibrosis caused by repeated injury (fasciolosis) and also subacute hepatitis. Numerous sarcocysts were also noted in the myocardium. Listeriosis is commonly associated with poorly preserved forage as was the case in this farm.

**Lambs**

**Aspergillosis**

A 4-day-old lamb was presented to Cork RVL with a history of dyspnoea and nasal discharge. On gross post mortem examination, there were small grey-white, well-circumscribed nodules surrounded by a narrow hyperaemic border and distributed randomly throughout all the pulmonary lobes. A gross diagnosis of granulomatous pneumonia was made, whilst no additional findings were made on bacteriological culture. The histopathological lesions consisted of multifocal to coalescing granulomas formed by a core of necrosis surrounded by a rim of macrophages and some neutrophils. Within these granulomata, there were well defined intralesional hyphae, with the hyphae displaying the characteristics of *Aspergillus spp* (Fig. 1). A diagnosis of disseminated aspergillosis was made.

Disseminated aspergillosis is often associated with debilitation, immunologic suppression or prolonged antibiotic or corticosteroid administration. In the present case, systemic aspergillosis in a 4-day-old lamb where lesions included well
developed pulmonary and hepatic granulomas with intralesional hyphae, would suggest that a mild local mycotic placentitis may have resulted in congenital/neonatal infection.

**FURTHER OBSERVATIONS**

- Infestations with the biting lice *Damalinia bovis (Bovicola bovis)* were diagnosed in several bovine skin scraping submitted to Cork RVL (Fig 2).

- The ‘tail’ of the distribution of Schmallenberg virus infection in the calving season was observed with some classical Schmallenberg presentations and weak calves showing evidence of congenital lesions with concurrent antibodies to the virus.

**Other Species**

**Fowl cholera (avian pasteurellosis)**

Two backyard hens submitted as Avian Influenza ‘suspects’ and showing mild conjunctivitis and caseous periorbital sinusitis produced a bacterial growth of *Mannheimia haemolytica* in routine cultures. This organism is rarely pathogenic for poultry; however the significant intestinal parasitic burden detected in these birds may have had a debilitating effect on them. Virology test for Avian Influenza, Paramyxovirus (Newcastles Disease) and for *Mycoplasma gallisepticum* results were negative.

**SOUTH EAST REGION**

**Calves**
Salmonellosis

Two two-week-old calves were presented to Kilkenny regional lab with a history of having stopped suckling and fading away.

The first carcass was dehydrated and mucous membranes were pale. There was a poor milk clot in the abomasum and ulceration of the abomasum. There were sticky grey contents in the small and large intestines and petechial haemorrhages in the liver. The kidneys were pale. The second carcass examined was very dehydrated and in poor body condition. The mucous membranes were pale. There was a severe haemorrhagic abomasitis evident. The liver was dark in colour. The kidneys were pale. The bile was thick. *Salmonella Dublin* was isolated from the lungs, liver and faeces in one calf. This bacterium was not isolated from the second calf examined. *Cryptosporidium* oocysts were also detected. Histopathological examination revealed a necrotising enteritis (Fig 3) with areas of inflammation and necrosis also seen in the liver. These changes are suggestive of a septicaemia caused by a gram-negative bacteria.

This case demonstrates the challenges of isolating causative bacteria from treated animals treated prior to submission to the laboratory.

Figure 3. Photomicrograph of haemorrhagic and necrotic enteritis seen in a calf diagnosed with *Salmonella* enteritis (Photo Maresa Sheehan)

Older bovines

Avulsion of the tuber calcaneus

A one-year-old Belgian Blue heifer which had been found recumbent in a stressed state by herdowner and subsequently euthanased by the attending veterinary practitioner on humane grounds was submitted to Kilkenny RVL. Gross findings revealed that the heifer was in very good physical condition, with very well developed muscles in the hindquarters.

Both of the *tuber calcanei* had been avulsed from the tarsal bone (Fig 4). The herdowner was concerned with malicious injury but there appeared no evidence to support this. The mechanics of the rupture would appear very difficult to replicate. No additional findings were made upon examination by bacteriological, biochemical and parasitology. A diagnosis of bilateral rupture of the *tuber calcaneus* was made. Rupture of the *tuber calcaneus* has been reported uncommonly in
literature. Tarongi et al., 2004 reported lesions observed in two affected animals in a group of 20 yearling steers being reared on a diet of *ad libitum* silage with supplementary concentrates. Affected animals presented with concurrent *osteochondrosis dessicans* and subchondral bone cysts. High planes of nutrition in growing animals, unbalanced mineral supplementation, trauma and hard flooring are some of the risk factors associated with osteochondrosis.

Bacteriological culture was negative for *Salmonella spp.* and anaerobic culture was negative for *Clostridium spp.* Gram stains were also negative. *Bacillus licheniformis* was isolated from a number of organs in one animal. Two additional animals were examined alive prior to post mortem. This examination revealed a flaccid paralysis and inability to rise. One animal was in lateral recumbence but the other was alert. Rumen fluid samples were taken for *Clostridium botulinum* toxin detection. Two of the samples submitted were culture positive for *Clostridium botulinum* and these produced Type C and D toxins. These findings supported a diagnosis of botulism. A farm visit carried out in conjunction with the attending vet could not identify the source of this toxin. There was no identified link to poultry manure spreading. The farmer did report coming across a “bad vein” in the silage, and while a silage sample tested was negative for toxin but this result would be influenced by the delay in testing since exposure.

Botulism outbreaks in cattle are primarily forage associated or carrion associated. Forage botulism occurs when pH, moisture and anaerobic conditions in the feeding stuffs favour the growth of the organism. Carrion contamination is almost always the cause of botulism in animals on pasture, and is also a common cause in animals on conserved feed. Outbreaks of botulism have occurred in cattle and sheep grazing pastures that have been fertilized with poultry manure and litter.

**Other Species**

**Fascioliosis**
A six-month-old alpaca was presented with a clinical history of weakness and inability to stand upright. The animal was very thin. On post mortem, the gross findings included a large volume of fluid in the abdomen. No visible lesions were observed in the heart and lungs but the liver was enlarged, fibrosed and had multiple adhesions attached to the surface. The bile ducts were completely blocked due to the presence of large amounts of adult liver fluke. A diagnosis of chronic fasciolosis was made.

Parasitology findings revealed high trichostrongyle eggs counts and the presence of liver fluke and rumen fluke eggs. Whilst fasciolosis is not uncommon in alpacas, there is no clear basis to determine the correct dose rate to be administered in this species. It must also be remembered that younger alpacas (crias) are potentially more prone to albendazole toxicity so extreme caution should be exercised when devising an anthelmintic programme for alpaca herds.

**NORTH EAST REGION**

**Bovine**

*Trueperella Abortion*

*Trueperella pyogenes* (formerly *Arcanobacter pyogenes*) was isolated from the stomach contents of an aborted foetus which had evidence of bacterial bronchopneumonia. *Trueperella pyogenes* causes sporadic abortion at any stage of pregnancy. Rarely, the incidence in a herd may reach epizootic levels. The bacterium is present in the nasopharynx of many normal cows and in abscesses. It is not normally present, even as a contaminant, in fetuses or fetal membranes, and isolation is almost always significant. It gains entry to the bloodstream and causes an endometritis and placentitis.

**Calves**

*Fungal rumenitis*

A three-week-old calf with a history of chronic diarrhoea was submitted in poor condition. Post mortem examination revealed the rumen to contain sour hypogammaglobulinaemia, omphalo-phlebitis and sequelae to these events.

- Rotavirus and *Cryptosporidium* were identified as common causes of neonatal enteritis in March. In many cases, these pathogenic agents were found together.

**FURTHER OBSERVATIONS**

- During March, aborted ovine continued to be submitted to Kilkenny RVL. Commonly identified abortifacients were *Toxplasma gondii* and *Chlamydophila abortus*
- Increasing numbers of calves and lambs were submitted with evidence of
smelling fermented milk while colon contents were yellow and watery. Testing of faeces for pathogens associated with diarrhoea in calves yielded a negative result, and histopathological examination of rumen wall revealed a severe fungal rumenitis. The findings of the post mortem revealed evidence of ruminal drinking which can lead to mal-digestion of milk and diarrhoea, furthermore, fermentation of milk in the rumen can lead to lactic acidosis resulting in depression and weakness.

**Vertebral osteomyelitis**

Necrotising suppurative osteomyelitis of a lumbar vertebra with overlying compression of the spinal cord (Fig 5) was diagnosed in a seven-week-old calf that presented with posterior paresis for the previous 10 days. There was a small focal abscess in the umbilicus. The osteomyelitis was probably due to a prior episode of bacteraemia, with an umbilical portal of entry most likely. No bacteria were isolated (but remember that the animal had been on antibiotic therapy for over a week).

![Figure 5](image.png)

**Other Species**

**Egg peritonitis**

Egg peritonitis was diagnosed in a three-year-old chicken with a history of loss of condition for one year. A variety of stressors may precipitate egg peritonitis ranging from parasitism, systemic infectious disease (e.g. pasteurellosis), viral infections disrupting oviduct activity to physical effects such as adverse weather or contact with foxes.

**Malabsorption syndrome**

Malabsorption syndrome (MAS) was suspected in runted and stunted 15-day-old broiler chicks. This transmissible disease is thought to be multifactorial in origin involving viruses. Poor cleaning and
disinfection or short down-time periods between batches have been shown to increase the severity of MAS in subsequent flocks. Severity is also related to feed quality with high nutrient density feed and mycotoxins increasing damage.

**Plasmacytic tenosynovitis**

Chronic plasmacytic tenosynovitis suggestive of reoviral infection was diagnosed in 25-day-old broilers with hemiparesis, valgus and splaying. This condition is usually seen in meat-producing birds between four and eight weeks but has been recorded in younger birds and in broiler-breeders at peak of lay. The signs and lesions of reovirus arthritis/tenosynovitis are not pathognomonic and may resemble those caused by *Staphylococcus aureus* and *Mycoplasma synoviae*, both of which can sometimes be detected, with reovirus, in affected joints. Cleaning and disinfection of the house and equipment was recommended after clear out to prevent problems in the next crop of broilers.

Infectious laryngotracheitis (ILT) was diagnosed in a hen from a small backyard flock (11 birds). The birds presented with mucoid nasal discharge and some were dyspnoeic. On post mortem examination of one hen there was tracheitis, sinusitis and conjunctivitis with syncytia formation and herpes-type intranuclear inclusion bodies. ILT is a highly contagious, notifiable respiratory disease of chickens due to herpesvirus.

**FURTHER OBSERVATIONS**

- Dublin saw a three-day-old calf with a history of depression since shortly after birth. Post mortem examination revealed a swollen umbilicus, thickened round ligament connecting umbilicus and liver and fibrinous peritonitis. *Trueperella pyogenes* was isolated.

- One five-week-old suckler calf submitted with a fibrinosuppurative bronchopneumonia, *Mannheimia haemolytica* was isolated.

- A five-week-old bucket fed Friesian calf was submitted with widespread severe fibrinous peritonitis due to a perforating abomasal ulcer. Abomasal ulceration is reported to be most common in young milk fed calves.

**NORTH WEST REGION**

**Calves**

**Abomasal ulcers**

Abomasal ulcers were diagnosed in two calves submitted together from the one the farm. The calves were three and four weeks old respectively. Both had histories of scour. There was multi-focal ulceration of the abomasums and melena.
Older Cattle

A two-year-old bull was submitted to Sligo RVL with a history of very poor thrift. Hepatic carcinoma was diagnosed by histopathology.

FURTHER OBSERVATIONS

- Several calves were presented to Sligo showed evidence of hypogammaglobulinaemia. Enteritis, omphalophlebitis, septic arthritis, peritonitis and pneumonia were common findings in these calves.

- Several large full-term neonatal calves were submitted to Sligo with evidence of dehydration. Some had evidence of dystocia, such as fractured ribs, scleral haemorrhages and bruising particularly around the hind quarters.

- Toxoplasmosis and enzootic abortion of ewes were the two most common causes of abortion. Many stillborn lambs were submitted and foetal oversize, with signs of dystocia such as meconium staining a common feature among such cases

- Fasciolosis was diagnosed in several sheep submitted to Sligo during March. There was hepatic fibrosis in many of these. Concurrent burdens of trichostrongyle eggs were found in many of these. Rumen fluke also continued to be detected in ewes, although it was difficult to determine if it was always significant

- Clostridial enterotoxaemia was diagnosed in several lambs submitted to Sligo RVL in March. In many cases there was a pericardial effusion, with a chicken fat clot in some cases. Pulmonary oedema was a common finding, as was an incomplete vaccination history.

MID WEST REGION

Bovine

Calves

Nephritis

A two-week old Friesian calf with a history of diarrhoea for a few days before
death was found by Limerick RVL to have lesions of bilateral suppurative nephritis. The bladder also contained some purulent material. There was an umbilical infection and localised lesions of peritonitis. *Escherichia coli* was isolated from a kidney. In a similar case on another farm, where the calf had been depressed and inappetent for 24 hours before death, both kidneys were pale and enlarged, the bladder was haemorrhagic and the urine was port wine in colour. *E. coli* was also isolated in that case.

**Meningitis**

A seven-week-old calf was presented to Limerick RVL for PM following a short history of severe pain, frothing from the mouth and staggering. The calf had been disbudded one week before death. On gross examination there appeared to be evidence of overly aggressive disbudding, and on removing the skull over the brain there was evidence of meningitis, with significant damage to the brain under the debudding sites (Fig 6).

![Figure 6. Photograph illustrating brain damage and meningitis associated with overly-aggressive disbudding of a seven-week old calf. Photo Alan Johnson](image)

**Older bovines**

**Pneumonia**

A Limousin-cross yearling heifer with a history of dyspnoea, fever and inappetence for two weeks before death was found on post mortem examination by Limerick RVL to have diffuse lesions of pneumonia and emphysema, particularly over the middle lung lobes. The trachea also appeared to be inflamed. PCR testing carried out on a sample of lung was negative for IBR, PI3 and RSV, but positive for BVD virus.

**Intestinal impaction**

A four-year-old dry Charolais suckler cow with a history of sudden death was presented to Limerick where a post-mortem examination revealed an area of inflammation of the small intestine. There was an associated constriction of the intestinal lumen which had lead to impaction of intestinal contents anterior to the lesion. The inflammation was deemed to be idiopathic.

**Other Species**

The head and neck of a domestic hen from a backyard flock of 30 laying hens was submitted to Dublin with a history of birds developing swellings around the eyes and some deteriorating to blindness. On gross examination there was a purulent ocular discharge and the sinuses were full of purulent material. Histopathological examination showed the presence of a severe lymphocytic sinusitis associated with intranuclear inclusion bodies. Severe
lymphocytic tracheitis was also present. The findings were strongly suggestive of infectious laryngotracheitis caused by gallid herpesvirus 1. The bird was also positive for *Mycoplasma gallisepticum* on PCR. Both of these organisms are difficult to eradicate from a flock so the owner was advised to consider destocking, disinfecting and resting the environment before restocking with disease-free birds.

**FURTHER OBSERVATIONS**

- A number of aborted bovine foetuses were submitted to Limerick RVL in March. Amongst the diagnosed causes of abortion there were Schmallenberg virus and *Listeria monocytogenes*.

- Rotavirus and *Cryptosporidium* were the most commonly detected enteric pathogens detected by Limerick from calf faecal samples during the month.

- Limerick diagnosed abomasal torsion in a five-week-old Charolais-cross suckler calf with a history of sudden death.

- A twelve-day old suckler calf at grass was found dead and submitted to Limerick for PM examination where a diagnosis of *Salmonella* Dublin-associated septicaemia was made.

- Weanlings submitted to Limerick following a 24-hour period of subnormal body temperature and poor form, were found to have lesions in the subscapular musculature consistent with blackleg.

**MIDLANDS REGION**

**Bovine**

**Congenital Defects**

There were a number of submissions of calves born with dwarfism/chondrodysplasia syndrome. The underlying cause of this condition has not been determined. Previous research work carried out in Scotland did not determine an exact cause, but the researchers suggested that the replacement of 25% of the silage in the winter diet with a non-silage feed (straw, hay, concentrates) resulted in a marked reduction in the incidence of the condition on farms in subsequent years. [Gunn & Caldow, Veterinary Record Aug 12th 2000 p199].

An aborted foetus with torticollis, scoliosis and sickle-shaped limbs, typical of Schmallenberg virus was tested both for the virus and antibodies and both were negative. This does not rule out an SBV aetiology.

**Septal defects**

Congenital ventricular septal defect was diagnosed in a two-week-old calf with a history of sudden death. The heart was enlarged and the liver had a reticulated appearance. Congenital atrial septal defect was diagnosed in a one-week-old calf with a history of sudden death.
Calves

Salmonellosis

*Salmonella* Dublin enteritis was diagnosed in a 7-day-old calf with a history of scouring and no response to treatment. *Salmonella* Dublin was isolated from the lung, liver & kidney. Zinc Sulphate turbidity levels indicated good colostral immunity.

Torsion

Abomasal torsion was diagnosed in a one-month-old calf with a history of “found dead”. The abdomen was distended arising from distension of the abomasum with brown haemorrhagic content. Mucosal and serosal surfaces were inflamed and there was a complete twist at the oesophageal end.

Weanlings/Yearlings

Malignant Catarrhal Fever

Malignant catarrhal fever was diagnosed in a ten-month-old weanling with a history of neurological symptoms and ulcers in mouth. Circular ulcers occurred on the tongue and oral mucosa, multiple raised circular ulcers on ruminal pillars and epithelial lining and on the abomasal mucosa. Sections of jejunal and caecal mucosa were necrotic, haemorrhagic and inflamed. Well scattered necrotic lesions in the lungs and multiple pale yellow 1cm lesions with red rim in the renal cortices bilaterally. No significant bacteria were isolated and BVD PCR was negative. Histology showed necrosis, vasculitis, arteritis and thrombosis in several tissues which is consistent with Malignant Catarrhal Fever (Fig 7).

![Figure 7. Photograph of renal thrombosis and infarction as seen in a cow diagnosed with Malignant Catarrhal Fever (Photo Denise Murphy)](image)

Older Bovines

Peritonitis

Peritonitis secondary to metritis was diagnosed in a ten-year-old cow 10 days post partum with a history of, retained placenta, slight temperature despite antibiotic treatment, decline and death. There was putrid haemorrhagic fluid free in the abdomen and inflamed serosal surfaces on the intestines and omentum. The uterus was very distended and contained foul brown putrid material and fluid and there was suppuration and necrosis of the endometrial lining.

OVINES

Lambs

Salmonellosis caused by *Salmonella* Dublin was diagnosed in a 4-day-old lamb with a history of weakness for 3-4 days. *Salmonella* Dublin was isolated from liver, kidney, lung and faeces. ZST levels were
extremely low indicating poor colostral immunity.

**Older sheep**

Caseous lymphadenitis (CLA) was diagnosed in a three-year-old ewe with a history of pining for two months. There was a very large abscess in a medinastinum, approx size of the heart with light green content and thick fibrous capsule. *Corynebacterium pseudotuberculosis* was isolated.

**Further Observations**

- Umbilical infections were seen frequently in calves indicating the importance of this route as an entry for infection into the body. The increase in occurrence of this condition probably reflects calf overcrowding due to the poor weather conditions experienced during the month. This highlights the need for good umbilical hygiene after birth and for a clean dry bed for the calf to lie on.

- The effects of the outbreak of fascioliosis in the autumn/winter were still being seen. The need for proper on farm control of fascioliosis was never more apparent than during the past autumn and winter.

- Serum magnesium values were examined from 110 animals and 36 (32.7%) were below the normal range. These figures should serve as a reminder for the upcoming grazing season and the potential for grass tetany.

- *Aspergillus* spp, *Trueperella pyogenes*, *Bacillus licheniformis* and *Listeria* spp were isolated from bovine foetuses. There was one case in which *Neospora caninum* antibodies were detected in the pleural fluid of an aborted foetus.

- There were several cases of hypogammaglobulinaemia and septicaemia in neonatal calves

- Peritonitis secondary to perforation of abomasal ulcers was diagnosed in a number of cases submitted to Athlone RVL.

- There were 39 ovine foetuses examined during the month and the most frequently diagnosed causes were *Toxoplasma gondii*, Enzootic abortion of ewes, *Bacillus licheniformis*, and *Trueperella pyogenes*. 