OVERVIEW

- Rumen impaction associated with low protein diets in a suckler cow
- Campylobacteriosis in suckler cows
- Plant toxicity in ewes
- Listerial encephalitis in ewes
- Chorioptes bovis-associated infertility in rams

GENERAL INTRODUCTION

January began unsettled with record-breaking rainfall in the north-east. It was cold during the middle third of the month, but the last third of the month was very mild with wet weather and strong winds. The mean temperature for January was 0.4 °C above the long-term average, with 145 per cent of average rainfall and 63 per cent of average sunshine.

A very mild strain of the H5N1 avian influenza virus was confirmed on a poultry farm near Dunfermline, leading to the cull of almost 40,000 birds.

DISEASE ALERTS

The following conditions were reported by SAC C VS disease surveillance centres in May 2015. Given similar climatic and production conditions, they could also be important this year.

- Coccidiosis in calves and lambs
- Clostridium perfringens enterotoxaemia in cattle
- Tick borne fever in ewe hoggs
- Chronic copper toxicity in sheep
- Nematodirosis in lambs

CATTLE

Generalised and systemic conditions

Ayr investigated neonatal mortalities in dairy calves from two different farms. On the first farm, six calves died over a three week period. At postmortem examination of two 12- to 14-day-old calves, both had consolidation of the cranioventral lung lobes. On the second farm, four calves aged four to seven days had diarrhea in the previous week. At postmortem examination of two of these, both calves were dehydrated and liquid intestinal contents were present. Laboratory testing on the calves from the first farm identified parainfluenza 3 virus (PI3V) by PCR in lung lesions along with Mannheimia haemolytica and Pasteurella multocida. In addition rotavirus, coronavirus and cryptosporidial oocysts were detected in intestinal contents, although there was no diarrhoea in these calves. Rotavirus and coronavirus were also detected in intestinal contents from the calves from the second farm. However, the most significant laboratory findings from all the sampled calves were low zinc sulphate turbidity (ZST) test results. Both calves from the first farm had results of 2 units indicating absolute failure of colostrum absorption. The calves from the second farm had ZST values of 14 and 19 units indicating relative failure of colostrum absorption. However, dehydration in the calves may have falsely elevated these results. SAC C VS advised a comprehensive review of colostrum management, calving pen hygiene and calf husbandry.

Thurso diagnosed malignant catarrhal fever (MCF) in a one-year-old Charolais bull. There was a clinical history of general malaise and the bull was treated for uveitis before it died. At postmortem examination the mucous membranes were cyanotic and there were multiple inflammatory skin lesions with encrustation. Histopathology of the kidney revealed a severe necrotising/fibrinoid and lymphocytic vasculitis, particularly at cortical medullary junction. The skin had severe ulcerative and exudative dermatitis with necrosis and loss of epidermis and superficial dermis with underlying dermal oedema and lymphocytic fibrinoid-proliferative vasculitis. The eye had severe lymphocytic keratitis and uveitis. There was moderate lymphohistiocytic portal hepatitis and examination of the heart revealed occasional perivascular lymphohistiocytic infiltration. SAC C VS considered these findings typical of MCF due to ovine herpesvirus-2 infection.

Respiratory tract diseases

Winter outbreaks of calf pneumonia continued into January. Viral agents were the most commonly diagnosed pathogens with nine outbreaks of pneumonia due to respiratory syncytial virus (RSV), six due to infectious bovine rhinotracheitis virus (IBRV) and three due to PI3V. Mycoplasma bovis, which was associated with eight outbreaks, was the most commonly diagnosed bacterial pathogen followed by Pasteurella multocida and Mannheimia species.

Suckled calves aged three to seven months of age were affected in the outbreaks of pneumonia due to RSV. In one outbreak morbidity was approximately 30 per cent and the diagnosis was reached by detection of RSV by PCR on nasopharyngeal swabs. In RSV cases diagnosed at postmortem examination gross pathology findings included interlobular oedema, interstitial oedema and bullae. While some cases presented as sudden deaths, others had pyrexia and respiratory distress prior to death.
**Alimentary tract disorders**

Dumfries investigated the death of a three-year-old Simmental cow, the second to die from a group of 35. The group were housed with calves at foot two months previously and were fed on silage and minerals. At postmortem examination the most significant finding was a distended rumen, which was impacted with a large volume of dry roughage. Kidney lead value was assessed and found to be within reference range. SAC C VS considered that low protein silage could have predisposed to this condition and advised analysis of the silage. If there is insufficient protein in the silage to supply the rumen microbes, rumen fermentation and the rate of passage of digesta slows leading to impaction. Low protein silages were seen across Scotland this year and a press release was issued to advise producers of this condition.

**Reproductive tract conditions**

Aberdeen diagnosed abortion due to bovine herpes virus 1 (BHV-1) in a dairy herd in which eight out of 90 unvaccinated cows were affected. The dams appeared in good health in all cases. SAC C VS considered the histological features of multifocal, extensive, severe necrotising hepatitis consistent with BHV-1 infection and this was confirmed in foetal liver by PCR.

Dumfries examined a foetus from the fourth cow to abort in a herd 75 suckler cows in a one-month-period. A further 23 from this group were reported barren. The cows were split into two groups for mating, with a different bull used for each group, but the problems occurred in both groups. One bull was used previously on this farm, while the other was bought in and was used on other farms. The submitted foetus was of seven months gestation and a pure, heavy growth of *Campylobacter fetus* was recovered from the stomach contents. SAC C VS considered this isolate significant as the cause of the abortion and advised that it may have been also responsible for the high barren rate.

Abortion outbreaks due to *Aspergillus fumigatus*, *Listeria monocytogenes* and *Bacillus licheniformis* were confirmed across Scotland with spoiled or contaminated silage being considered the likely source of infection.

**Musculoskeletal conditions**

Perth detected *M. bovis* by PCR/DGGE in joint swabs submitted from a group of six-month-old Simmental-cross calves, which were bought in. Several developed pneumonia, while some others showed lameness and joint effusion.

Edinburgh diagnosed clostridial myositis as the cause of death in two dairy cows from the same farm over a 16-day-period. In both cases the cows were lame for two to five days prior to death. The left hind legs of both cows were swollen and firm from the hip to the hock but no skin wounds were detected. Gelatinous, expanded oedematous connective tissue was evident below the skin and between muscle bundles. Many of the muscles of the upper limb were dry with patches of black haemorrhage. Gas bubbled through the oedematous tissue and forced the myofibres apart in areas (Fig 1). *Clostridium sordellii* was recovered from lesions of one animal and *Clostridium septicum* from the other. SAC C VS commented that myositis due to *C. sordellii* and *C. septicum* may be due to wound infection or to reanimation of latent spores. The latter was suspected in these cases.

**Toxic conditions**

Ayr diagnosed plant toxicity in two flocks. In one flock five ewes were found recumbent along a fence line. One animal died soon after and at postmortem examination copious numbers of *Pieris* species leaves were found in the rumen. In the second flock two Scottish blackface lambs were found dead in a field bordered by rhododendron bushes. At postmortem examination significant quantities of heavily masticated dark green leaves typical of rhododendron were found in the rumen content. Perth also reported a case of rhododendron toxicity during January affecting Scottish blackface ewes that broke out of their field following snowfall.

Four Charollais sheep died following the incorrect delivery of feed which proved to be for cattle rather than sheep. Dumfries confirmed chronic copper toxicity in liver and kidney samples with copper levels of 26,100 µmol/kg dry matter (DM) (reference range 314 to 7850 µmol/kg DM).
and 1570 µmol/kg DM (reference range less than 787 µmol/kg DM) respectively.

**Parasitic diseases**
Inverness diagnosed liver disease in a two-year-old pygmy goat that was found dead. The carcase was thin and infested with lice. Internally the hepatic veins were dilated and a yellow, friable, solid but plicate mass, 2 to 3 cm long, was found within the portal and hepatic veins. There were distinct thrombi associated with the main embolus. Histopathology suggested that parasitic migration may have initiated the thrombus. Unfortunately no structure remained within aggregates to confirm this or to provide suggestions as to the species of parasite involved.

Dumfries suspected triclabendazole resistance at postmortem examination of a four-year-old cross ewe from a group of 27 in which four animals died. The flock were treated with triclabendazole six weeks earlier and were reported to be in adequate body condition at that time. At the time of investigation the whole group were described as thin and lacking in energy. They were grazing a wet field but were then housed for feeding due to their poor condition. The carcase was anaemic and the liver was mis-shapen, firm and fibrosed throughout. Very large numbers of adult *Fasciola hepatica* were present confirming treatment failure. For welfare reasons it was considered prudent not to carry out a coproantigen reduction test for triclabendazole efficacy at the time but to treat the remaining animals with an alternative flukicide to prevent further losses. The flock were due to lamb from the beginning of March and good feeding was advised to try and avoid cases of pregnancy toxaemia and ensure adequate lamb birthweights and good yields of Colostrum and milk.

Edinburgh diagnosed coccidiosis at postmortem examination of two typical cases from an outbreak of diarrhoea in four-to-six week old lambs. The farm had a known history of coccidiosis and all 75 lambs were treated with a prophylactic dose of diclazuril. Both lambs died three to four days later and at this stage no illness was reported in the rest of the group. The caecum and proximal colon of one lamb was distended by brown fluid and contained 61,500 coccidial oocysts per gram, of which 24 per cent were the pathogenic species *Eimeria ovina*oidalis. A third lamb died after a further three days and at this time the remaining lambs were diarrhoeic. After further treatment with sulphadimidine injection the diarrhoea resolved and no further deaths occurred. The cause of the apparent treatment failure was not clear.

**Generalised and systemic conditions**
Perth isolated *Listeria monocytogenes* in systemic distribution at postmortem examination of a neonatal lamb, one of triplets that were born to a ewe with only one functional teat. Multiple small, white, miliary lesions were present throughout the liver parenchyma. All three lambs died despite administration of artificial Colostrum and bottle feeding. Colostrum supplements are a good energy source for prevention of starvation/hypothermia but their immunoglobulin content can be variable.

**Reproductive tract conditions**
Ayr identified *Chlamydia* (formerly *Chlamyphila*) *abortus* in a flock which had losses due to enzootic abortion of ewes in 2015. A vaccination programme commenced prior to the mating season in 2015 but it is recognised that, despite vaccination, ewes with latent infection may continue to abort in the subsequent gestation.

Edinburgh diagnosed listeriosis in eight-month-old ewe lambs from two farms where multiple deaths occurred. Typical signs of unilateral facial paralysis were reported from one farm where silage was being fed. Culture of brain stem failed to yield *L. monocytogenes* but histology revealed changes typical of listerial encephalitis following centripetal spread of the bacteria via the trigeminal nerves. The second lamb was submitted alive in lateral recumbency and was from a group of 100 fed on turnips, kale and haylage and. There was no evidence of unilateral facial paralysis in this case. Histological examination of the brain and spinal cord revealed changes consistent with listerial encephalitis and myelitis. The clinical signs and lesion distribution suggested that the initial site of infection was spinal cord, perhaps via motor nerves with rostral spread.

**Skin diseases**
Ayr investigated a problem in a flock after 183 of 195 ewes returned to oestrus following the first 17 days of tupping. Sub-fertile rams were suspected and scrotal mangle due to *Chorioptes bovis* was diagnosed (Figs 2a and 2b). Rhodes (1971) reported that when more than one third of the scrotal skin is affected the testicular temperature can rise resulting in impaired sperm production and quality.

**Nervous system disorders**
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Reproductive tract conditions
Viscera and blood samples were submitted from a number of sows on an indoor farrow to finishing unit, where there had been an increased incidence of returns to service and abortion. The uterine tract and cervical swabs submitted failed to reveal any gross pathology or bacterial organisms of significance. Serology revealed a positive titre for *Leptospira* Bratislava, which was suggestive of natural infection rather than response to vaccination. Since sows were vaccinated against leptospirosis advice was given that the vaccination protocols should be reviewed. There was also evidence of recent exposure to two strains of swine influenza. Further advice was given that these infections can result in small litter sizes due to death and reabsorption of part of the litter. Vaccination is an option for control but operation of an all-in, all-out housing policy is the preferred approach for prevention.

BIRDS

Wild birds
Inverness diagnosed internal haemorrhage in the second of two buzzards that were found dead in an area of farm land. The bird was an adult male in good body condition and with evidence of recent feeding. There was a small amount of blood over the surface of the lungs and detailed examination revealed rupture of the right atrium. There were no wounds or evidence of trauma. Death occurred very rapidly in this apparently fit and healthy bird that was clearly feeding. Atrial rupture is recognised in other species of raptor as a primary event possibly brought on by exertion such as hunting. No underlying pathology was found on histology of the heart. The atrial rupture was considered to be spontaneous in this bird.

MISCELLANEOUS

Perth suspected canine adenovirus-1 infection in a seven-week-old cavalier King Charles spaniel and miniature schnauzer cross which presented with lethargy, anorexia and increased vocalisation before death. Four others showed no clinical signs. Two dogs of unknown vaccination status had visited the premises six days previously. At postmortem examination mottled pulmonary congestion, epicardial petechiation and a small focus of inflammation in the small intestine were present. The surface of the cerebellum was red, but the rest of the brain was grossly unremarkable. Histopathology revealed neuronal necrosis in the brain associated with extensive vasculopathy; a necrotising hepatopathy; and intranuclear inclusion bodies in scattered renal glomeruli. These lesions were typical of CAV-1; however there were also large numbers of endocardial endothelial intranuclear inclusion bodies and
endocardial mononuclear cell infiltration and interstitial cell activation. SAC C VS noted that these endocardial lesions were unusual. PCR for CAV-1 was offered but was declined by the owner.
Featured Article - Coccidiosis in beef and dairy herds

Coccidial oocyst counts may be difficult to interpret as the patent period can be very short and diarrhoea can be present both pre- and post-patency. Analysis of 238 samples with a diagnosis of coccidiosis from 2010 to 2015 revealed differences in the disease presentation between beef and dairy herds.

In beef herds the incidence of coccidiosis peaked at one to two months of age, making it easier to target any required prophylactic treatments (Fig a). The number of cases in the one to four week category was skewed by an increase in diagnoses in 2013. A probable explanation of this increase was the long, cold spring that year that led to poor cow condition and colostrum quality, which were compounded by delayed turn out and grass shortages. There was a slight increase in diagnoses around weaning, but overall it appeared that most calves were immune to coccidiosis by three months of age. Both diagnoses of coccidiosis in animals over one year of age were in 15-month-old bulls.

The picture in dairy herds is not as clear cut. Diagnoses were spread more evenly over a range of ages, which suggested poor or delayed development of immunity (Fig b). In comparison to suckled calves, predisposing factors could include higher environmental challenge and increased stressors, such as diet change, re-grouping, weaning and turn out, which could overcome developing immunity.

It is easier to monitor faecal consistency and collect samples from housed dairy calves, but the detection of coccidial oocysts does not necessarily correlate with diarrhoea as there may be other explanations such as nutritional scours. The inclusion of the coccidiostat decoquinate in concentrates could also delay onset of clinical coccidiosis. The five coccidiosis diagnoses recorded in animals over one year of age were all in adult cows. Clinically three of these animals had blood in the faeces and two had tenesmus. It is presumed that they were exposed to a high coccidial challenge and were concurrently immunosuppressed.
Fig b. Age at Diagnosis: Dairy Herds (n = 140)
In the twelve months to July 2015 SAC (C) VS recorded 422 diagnoses of bovine respiratory disease. There were 72 diagnoses where pneumonia was confirmed at gross examination, but no definitive cause was identified.

Thirty-nine diagnoses of lungworm were recorded. These were all submitted between July and December, with a peak in September. There was a single case of fog fever, which was identified in August. There were two cases where *Bibersteinia trehalosi* was isolated in association with bovine respiratory disease. While this organism is a known and common pathogen in sheep, the role that it plays in bovine respiratory disease is less certain.

There were 308 diagnoses of the various infectious agents associated with bovine respiratory disease complex (Fig 1). As in previous years, these cases predominantly occurred in the winter months.

![Figure 1. Diagnoses of infectious agents associated with bovine respiratory disease complex (BRDC).](image-url)