OVERVIEW

- Outbreaks of pneumonia in calves and finishers
- Ovarian tumour in a calf
- Abortion associated with bovine herpesvirus 1 in a suckler herd
- Parasitic gastroenteritis causing ill thrift and death in sheep
- Outbreaks of acute fasciolosis in sheep

GENERAL INTRODUCTION

December in Scotland was mild, wet and windy, which resulted in widespread flooding near the end of the month. It was the fifth warmest December and the wettest since 1910, with 215 per cent of average rainfall. It was also dull with 71 per cent of average sunshine. The Scottish Government advised that pregnant women should avoid close contact with sheep during lambing or other farm animals that are giving birth.

DISEASE ALERTS

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

- Hypomagnesaemia in cows
- Chronic ostertagiosis in cattle
- Pregnancy toxemia in ewes
- Pulpy kidney disease in lambs
- Border disease in lambs

CATTLE

Generalised and systemic conditions

Ayr investigated an outbreak of diarrhoea and pneumonia in a batch of 25 dairy calves, aged less than one month, where five died over a three-week period. One affected ten-day-old animal, which was treated with broad spectrum antibacterial therapy and oral rehydration fluids, was euthanased and submitted for postmortem examination. Faecal soiling of the rear was evident, cranioventral lung lobes were consolidated with microabscessation, while the caudal lobes had a putrid pseudomembrane covered the proximal trachea and the cranial lung lobes were consolidated, with putrid material in the airways. BHV-1 was detected by PCR and a heavy growth of Pasteurella multocida was recovered from lung tissue and P. multocida was recovered on culture.

Respiratory tract diseases

Outbreaks of pneumonia in calves and finishers were investigated across Scotland in December. Of diagnoses made, bacterial pathogens predominated with Mannheimia species the most commonly recovered isolates, followed by Pasteurella multocida, Histophilus somni and M. bovis. The viral causes of pneumonia were typically involved with large outbreaks of clinical disease. Perth diagnosed bovine respiratory syncytial virus (BRSV) in a group of 45 Blonde D’Aquitaine spring-born suckled calves that showed clinical signs of pneumonia five days after weaning. Five deaths occurred over five days and postmortem examinations were carried out on two of these calves. In both cases pulmonary interstitial emphysema and interlobular oedema were evident. No bacteria were recovered, but BRSV was detected by PCR in lung tissue from both calves.

In another outbreak, where 15 deaths occurred in a group of 120 coughing calves, Perth diagnosed pneumonia due to parainfluenza-3 virus(PI3V). The affected group of dairy bulls was sourced from several different farms and was fed barley. At postmortem examination of a three-month-old Holstein calf the cranial lung lobes were dark red and consolidated with microabscessation, while the caudal lobes had interlobular oedema. PI3V was detected by PCR in lung tissue and P. multocida was recovered on culture.

Inverness diagnosed bovine herpesvirus 1 infection (BHV-1) in another herd of approximately 350 fattening animals. The animals were derived from multiple sources, managed in groups of 30 and different ages shared the same airspace. Eleven deaths occurred with a further 30 reported to be showing signs of respiratory disease. At postmortem examination of a submitted pluck a putrid pseudomembrane covered the proximal trachea and the cranial lung lobes were consolidated, with putrid material in the airways. BHV-1 was detected by PCR and a heavy growth of H. somni was recovered from lung lesions. Histopathology was consistent with infectious bovine rhinotracheitis (IBR), with secondary pneumonia due at least in part to aspiration of septic debris.

Reproductive tract conditions

Edinburgh identified an unusual ovarian tumour in a three-week-old dairy calf. The calf was submitted for postmortem examination as part of an investigation into an outbreak of calf diarrhoea. Although this calf experienced diarrhoea, it appeared to respond well to fluid therapy, so its sudden death was unexpected. Postmortem examination confirmed diarrhoea that was blood-tinged and the eyes were very sunken. The abdomen contained a large volume of free and clotted blood, the source of which was a smooth, round, 14 cm diameter mass attached to the right uterine horn by a...
stalk of fibrous tissue (Fig 1). The capsule of the mass was ruptured and clots of blood were attached to the exposed haemorrhagic tissue. Sectioning of the mass revealed it to be multi-loculated, with some cysts containing blood and others clear fluid. The right ovary could not be identified. Histopathology revealed that the mass was composed predominantly of theca and granulosa cells, consistent with a granulosa-theca cell tumour. SAC C VS commented that these benign tumours were previously described in very young calves. SAC C VS considered that rupture of the tumour and associated blood loss caused the death of the calf. The diarrhoea was attributed to the recovery of both S. Dublin and rotavirus from the large intestine.

**Fig 1. Ovarian tumour in a calf**

Dumfries investigated an abortion storm in a 300 cow dairy herd. Thirteen abortions occurred over a period of three weeks and ten foetuses were submitted for examination. The affected farm had a history of two previous abortion storms due to *Neospora caninum* and replacement heifers on this farm were all homebred. Some of the affected dams had retained foetal membranes and a metritis that improved with treatment. *N. caninum* was again confirmed as the cause of abortions based on foetal fluid serology, neuropathology or immunohistochemistry. Dogs were present on the farm and these had access to the cattle shed and feed areas. SAC C VS advised on control measures for *N. caninum*.

Dumfries diagnosed abortion associated with BHV-1 infection in a suckler herd. Three abortions occurred over a period of four months in a group of 90 cows. The second and third abortions occurred within two weeks of each other. At postmortem examination of the third foetus, which was approximately 210 days gestation, a fibrinous pericarditis, peritonitis and hepatitis were evident but no bacteria were recovered on culture. Lung histopathology confirmed a semi-suppurative pneumonia, which suggested a bacterial cause, possibly with underlying viral infection. BHV-1 was detected by PCR screening of liver tissue, which SAC C VS considered significant in light of the histopathology.

Other diagnosed causes of abortion in December were *Campylobacter fetus*, S. Dublin, *Trueperella pyogenes*, *Listeria monocytogenes*, *Aspergillus fumigatus*, *Aspergillus niger* and *Escherichia coli*.

**SMALL RUMINANTS**

**Nutritional and metabolic disorders**

Aberdeen considered that a combination of trace element deficiency and parasitic gastroenteritis was the cause of ill thrift in a group of 70 eight-month-old Suffolk-cross lambs, where six died over a six week period. At postmortem examination of one lamb 3,800 *Trichostrongylus axei* were present in the abomasum and 6,500 *Nematodirus* species in the small intestine. This parasite burden was likely to impact on performance, but insufficient to be the sole cause of death. Liver analysis revealed copper, cobalt and selenium levels to be below their respective reference ranges: copper 312 µmol/kg dry matter (DM), reference range 314 to 7800 µmol/kg DM; cobalt 0.01 mg/kg DM, reference range greater than 0.06 mg/kg DM; and selenium 0.17 mg/kg DM reference range 0.9 to 3.5 mg/kg DM.

Aberdeen reported a β-hydroxybutyrate (BOHB) result of 7.9 mmol/l (reference range less than 1.5 mmol/l) in a blood sample from a recumbent, two-year-old, triplet-bearing Suffolk ewe, which was due to lamb in two weeks. The animal was dull and initial treatments with calcium and glucose gave a temporary improvement. The blood analysis confirmed pregnancy toxaemia, which carries a poor prognosis.

**Parasitic diseases**

Dumfries confirmed parasitic gastroenteritis (PGE) as the cause of ill thrift and death in two flocks. At postmortem examination of one lamb, from a flock where 12 eight-month-old Scottish blackface hoggs died from a group of 200, 13, 300 *T. axei* worms were recovered from the abomasum and uncountable numbers of *Trichostrongylus* species from the small intestines. The strongyle egg count was 2,150 eggs per gram. The group were last drenched with a benzimidazole drench in October, but testing to check treatment efficacy was not carried out. During the past three years SAC C VS recorded more diagnoses of PGE in the October to December period than in June to August. Possible explanations for this could include a lack of farmer awareness that PGE could be an issue in late
autumn/early winter, a tendency to treat rather than collect samples from scouring lambs in the summer months, or not being aware that moxidectin products are not equally persistent against all species of worms.

Sheep deaths due to acute fasciolosis were recorded on 14 occasions during December 2015, reflecting the wetter summer. This compares to one and two diagnoses in 2014 and 2013 respectively following their drier summers, but is less than half the 33 cases recorded in December 2012. In some cases no treatment was given while in others re-infection following early treatment was suspected.

Ayr examined faecal samples from two flocks to investigate suspected triclabendazole resistance. The coproantigen ELISA test was carried out with ten ewes being sampled before treatment and again two weeks later. In both cases positive animals remained positive and individual animals changed from negative to positive in both flocks. The results confirmed treatment failure and, assuming good dosing practice, resistance.

Generalised and systemic conditions
Dumfries diagnosed black disease on two occasions during December. Postmortem findings were similar in both cases with body cavity effusions and a mild peritonitis centred on the liver which contained 1 cm diameter, pale, firm lesions with a dark rim (Fig 2). Small numbers of immature Fasciola hepatica, insufficient to cause death on their own, were detected in the livers. Losses in the first flock were confined to draft Scottish blackface ewes that were purchased in September. Three of 150 died. Homebred ewes in the group were unaffected, probably because they received clostridial vaccine. The second case involved the death of five unvaccinated Romney hoggs from a group of 120. The group were treated with triclabendazole before moving to wintering on a beef farm at the start of October. The size of the flukes suggested that re-infection occurred after the move.

St. Boswells detected developmental abnormalities in a six-month-old South Country Cheviot lamb that had both selenium and cobalt deficiency. The liver had two gall bladders (Fig 3) and a hypoplastic left kidney, approximately half the size of the right kidney. These findings were considered likely to be of congenital origin and unlikely to be of clinical significance. Congenital bilobed gall bladder was reported rarely in cats (Ergin and others, 2013), but we could not find records of the condition in sheep.

Fig 3. Liver with two gall bladders in a lamb

Alimentary tract disorders
Dumfries diagnosed neoplasia in a six-year-old ewe that lost condition for four weeks before death. At postmortem examination ascites and a granular appearance to the omentum were seen. Multiple firm nodules were seen in the liver parenchyma and the rumen wall, at the junction with the reticulum, was very thickened and firm. On histopathological examination the appearance of the two lesions differed, suggesting a diagnosis of both biliary carcinoma and squamous cell carcinoma. The latter are usually one off cases and were associated with excessive ingestion of bracken and/or papillomavirus infection.

Skin diseases
Perth diagnosed two cases of sheep scab during December. The first involved a group of pruritic Scottish blackface lambs with crusty skin lesions, in which Psoroptes ovis mites were detected. In the other case, a two-year-old live Beltex tup was submitted from a group of 11 that were showing dramatic weight loss, lethargy, depression and wool loss and where another animal died a few days earlier. The tup was moribund and very thin with wool loss across the dorsum and very extensive crusting and aggregation of exudate at the base of the fleece. P. ovis mite infection was confirmed by microscopy. P. ovis mites cause an allergic dermatitis.
with serous exudation leading to hypoalbuminaemia and weight loss.

PIGS

Generalised and systemic conditions
Two pigs, from a group with two recent deaths, were submitted to investigate the cause of dullness and lower limb swelling. Both pigs showed polyarthritis with increased synovial fluid that had a yellow tinge and some floccular material in all joints examined. Fibrin tags were present in the abdomen and the meninges were congested. *Streptococcus suis* serotype 14 was isolated from the joint fluid and brain swabs from both pigs. *Mycoplasma* species were not detected in joint fluid from either pig.

Nutritional and metabolic disorders
Salt toxicity / water deprivation was diagnosed in three 12-week-old pigs that died after showing neurological signs. Eleven out of 700 pigs, that arrived onto the continuous throughput grower / fattening site four days before the first deaths, were observed unwell the previous day and were seen shaking, walking backwards and vocalising. These were treated with amoxycillin and five died overnight. Another six new cases were observed and treated on the morning of the submission of carcasses. All pigs came from a single source breeder unit, which is monitored free of S. suis infection. The history, presentation and gross findings were considered to be consistent with salt toxicity / water deprivation, and neuropathology confirmed the diagnosis. Investigation into the water availability was advised as a matter of urgency.

BIRDS

Poultry
Inverness diagnosed septicaemia due to *Staphylococcus aureus* in a group of free range broilers. Several batches were affected with average mortality ranging between 10 and 15 percent, rising to 20 percent in some batches. At clinical examination the birds were apathetic. Excess joint fluid was evident in the stifle of two birds, one of which had fibrinous synovial exudate and cartilage damage. A confluent growth of *S. aureus* was cultured from the joint of one bird and from the liver and spleen of another bird. Dumfries investigated the cause of a four-day duration dyspnoea in a flock of 300 bantam layers, where three deaths occurred at the time of submission. Affected birds were dyspnoeic and some had periorbital swelling. Two live seven-month-old birds, which were dull and mouth breathing were examined. There was some crusting around the nostrils of one bird and slight cyanosis at the edge of the comb. At postmortem examination purulent material was found in the infraorbital sinus of one bird and small numbers of white spots were detected in the pharynx of the other. Histopathology confirmed infectious laryngotracheitis in both cases. There were no recent additions to the flock, so SAC C VS considered that re-shedding of virus from a carrier bird could have triggered the outbreak. Wind transmission from other birds in the vicinity was another possible explanation.

Raptors
Inverness investigated the cause of death of a juvenile buzzard. Gross findings included a large volume of blood within the abdominal cavity. Bromadiolone, an anticoagulant rodenticide which was found in the liver at a level of 0.160 mg/kg, may have predisposed this bird to haemorrhage and death.

MISCELLANEOUS

Cats
Perth diagnosed an unusual torsion of the lung in a ten- and a half-year-old male, neutered, exotic shorthair cat. Clinically the animal had chronic weight loss, anaemia and sudden onset dyspnoea. Radiographs revealed a pleural effusion and a small calcified area in the mediastinum (D’Anjou and others, 2005; Schultz and others, 2009). On thoracocentesis a dark red serosanguinous fluid was obtained. Euthanasia was performed due to the severity of the clinical signs. At postmortem examination a grape-sized pale, firm mass lay dorsal to the heart, consistent with the calcified area seen on radiographs. A 360 degree torsion of the right caudal lung lobe was present (Fig 4). The lobe was engorged, consolidated, deep-reddish black and the bronchus was compressed. The pleural surfaces of the affected lobe and the adjacent thoracic wall were roughened, with fibrin tags present. Both kidneys were small, tough to cut and irregularly shaped. Histologically the mediastinal lesion showed features consistent with pulmonary adenocarcinoma, or possibly carcinosarcoma. The renal pathology was consistent with chronic end-stage renal disease. Lung lobe torsion is rarely reported in dogs and cats and middle or cranial lung lobes are more likely to be affected than caudal lobes. The torsion generally develops secondary to pleural effusions from various causes, although idiopathic cases have been reported (Millard and others, 2008).
Horses
St Boswells cultured *S. aureus* and *Micrococcus* species from a mastitic milk sample from an eight-year-old mare that also had galactorrhea for several months. *S. aureus* was considered a significant finding in this case whilst the significance of the *Micrococcus* species was unclear. This organism occurs in a wide range of environments, including water, dust and soil. However it may also be an opportunistic pathogen and was previously isolated from cases of clinical mastitis in mares (Albrecht, 2007).

Wild animals
Inverness cultured *Yersinia pseudotuberculosis* in systemic distribution from the carcase of a four-month-old Himalayan tahr (*Hemitragus jemlahicus*) that deteriorated and died over a 24-hour period. At postmortem examination the most significant finding was splenomegaly with multiple pale lesions, suspected to be micro-abscesses, scattered throughout the friable parenchyma. The liver was pale and the pericardial and peritoneal fluid notably jaundiced. Histopathology confirmed a bacterial hepatitis and splenitis consistent with *Yersinia* septicaemia.

References

Featured Article - Review of acute bacterial-type pleuropneumonia in adult dairy cows

Feedback from veterinary practitioners indicates that respiratory disease in adult dairy cows is a common clinical presentation with a range of clinical severity, which in the extreme is severe and acute with a poor treatment response.

A retrospective assessment was carried out on 26 cases of acute bacterial-type pleuropneumonia (ABP), submitted from 22 herds between 2005 and 2015 to SAC C VS disease surveillance centres in Scotland (Table 1). Only cases with a diagnosis of ABP and specific information on the herd and clinical case history were included.

In all cases carcases were submitted to SAC C VS by veterinary practitioners for routine postmortem examination. A gross postmortem examination was carried out with associated laboratory and histological examination where it was deemed necessary by the examining veterinary investigation officer. Relevant herd and case histories were collected for each case at the time of carcass submission.

Descriptive findings of note from the case series were as follows:

- 54 per cent of herds were permanently housed.
- There was no seasonal trend in disease occurrence.
- There was no age trend for the cases examined.
- 50 per cent of cases occurred within two months of calving.
- Cases showed severe clinical respiratory disease and either died or were euthanased on welfare grounds.
- Laboratory investigations and histopathology identified evidence of bacterial pneumonia only.
- There were no specific trends in the bacterial isolates. More than one isolate was recovered from several cases.
- Possible risk factors identified by practitioners included stocking density, ventilation (particularly in collecting yards), early lactation metabolic stress and episodes of previous calf pneumonia.

Further detailed studies of these potential risk factors in affected and non-affected herds is required to enable better evidence based control.
Table 1. Significant bacteria isolated from 26 acute bacterial pleuropneumonia cases.

<table>
<thead>
<tr>
<th>Bacterial isolate</th>
<th>Number isolated</th>
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<tbody>
<tr>
<td>Mannheimia haemolytica</td>
<td>7</td>
</tr>
<tr>
<td>Pasteurella multocida</td>
<td>8</td>
</tr>
<tr>
<td>Trueperella pyogenes</td>
<td>7</td>
</tr>
<tr>
<td>Fusiformis necrophorum</td>
<td>5</td>
</tr>
<tr>
<td>Mycoplasma bovis</td>
<td>2</td>
</tr>
<tr>
<td>Salmonella Dublin</td>
<td>1</td>
</tr>
<tr>
<td>No bacteria isolated</td>
<td>6</td>
</tr>
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