Outbreaks of blackleg in Scottish cattle

- Outbreaks of blackleg in cattle in southern Scotland
- Johne’s disease, ovine pulmonary adenocarcinoma and maedi-visna cause illthrift and mortality in a hill flock
- Dilated cardiomyopathy confirmed in a 30-month-old Holstein heifer
- Prevotella melaninogenica associated with scald and footrot in four-month-old lambs
- Swine influenza diagnosed in 10-week-old pigs

These are among matters discussed in the disease surveillance report for July from SAC Consulting: Veterinary Services (SAC C VS)

THIS was the coolest July since 1998, with eastern and southern Scotland experiencing twice the normal amount of rainfall, making it one of the wettest Julys on record in these areas. In contrast, the Western Isles, Northern Isles and the far north were drier than normal.

The unseasonal weather prompted the SAC to issue guidance to animal keepers on managing their stock to reduce the potential impact on animal health. Advice included recommendations on the management of breeding and finishing cattle, and reminders about the risks of parasitic gastroenteritis and hypomagnesaemia.

Cattle
Parasitic diseases
The 24 cases of coccidiosis diagnosed in July was comparable to the 22 cases recorded in the same month last year. Thurso found coccidiosis to be the cause of sudden death in a six-week-old Aberdeen Angus heifer calf. The mucosa of the small intestine was hyperaemic and the colonic contents haemorrhagic. No coccidial oocysts were detected in caecal contents; however, histopathological examination of the intestine confirmed the diagnosis.

Generalised and systemic conditions
Five outbreaks of Clostridium chauvoei disease (blackleg) were diagnosed across the four SAC C VS disease surveillance centres serving the southern half of Scotland. Two cases of the cardiac form were diagnosed by Ayr in suckled calves from different farms. One of these farms had experienced three sudden deaths over a four-day period in a batch of nine-month-old calves. The third calf to die, a Charolais-cross heifer, was submitted for postmortem examination. Despite advanced autolysis, a fibrinous pericarditis was identified. Both C. chauvoei and Clostridium novyi were detected by fluorescent antibody testing of the cardiac lesions. Histopathology confirmed active pericarditis consistent with acute C. chauvoei infection and its toxæmic sequelae. C. novyi was considered a postmortem invader. There had been digging in the calves’ field recently for drainage purposes and SAC C VS suggested that this may have exposed the cattle to clostridial spores.

Dumfries diagnosed dilated cardiomyopathy in a 30-month-old Holstein heifer that was euthanased five months after calving. This progressive degenerative heart condition leads to circulatory failure and is inherited in Holsteins on an autosomal recessive basis. Over a period of two weeks the heifer had shown milk drop with loss of condition and development of oedema in the submandibular, brisket and udder regions. At postmortem examination extensive subcutaneous oedema was confirmed and straw-coloured serous effusions were noted in the thorax and abdomen. The heart was firm and pale but not noticeably enlarged. Histopathology showed loss of myocytes with fibrous replacement consistent with the diagnosis of dilated cardiomyopathy.

Alimentary tract disorders
Perth made an unusual diagnosis of intestinal thrombosis and infarction in a four-year-old Simmental cross cow, which was found recumbent with foul smelling diarrhoea. Postmortem findings included generalised pulmonary congestion, pinpoint black lesions scattered over the abomasal mucosa and congested, distended sections of small intestine with green fluid contents. Histopathology found evidence of severe, focal intestinal damage with necrosis in the mesentery, lesions considered consistent with thrombosis and infarction. No aetiological agent was identified for the changes seen, and SAC C VS advised that causes of thrombosis and infarction could include intestinal torsion or entrapment, seeding of thrombi from another source or, less likely, intestinal damage due to an agent such as clostridial bacteria.

Jejunal haemorrhage syndrome was diagnosed by Dumfries in a dairy cow that developed acute milk drop, sunken eyes and a low temperature before death. At postmortem examination the proximal intestine was distended due to the obstruction of 1 to 2 metres of the distal jejunum with a large blood clot (Fig 1). SAC C VS occasionally diagnoses jejunal haemorrhage syndrome as the cause of sudden death in dairy cows but the aetiology remains unclear.

Reproductive tract conditions
Salmonella Muenster var 15+ was recovered from the stomach contents of a fetus submitted to Dumfries. The affected dairy herd had experienced five abortions from a batch of 20 animals. The dam of the submitted fetus was a second calf that had been imported from the Netherlands as a heifer. The Scottish Salmonella Reference
Laboratory reported that this is the only animal isolate of this strain of *Salmonella* in the past 10 years. Two human isolates were identified in this period from travellers to Tunisia.

Aberdeen examined a spherical haired mass of approximately 15 cm diameter (Fig 2). It was delivered by a cow per vaginum in a short time before a healthy full-term calf. The mass had the remnant of an umbilical cord attached. A small region of pink fleshy tissue with a hair tuft, which resembled a vulva, was also visible on the external surface. Internally there were no recognisable organs, only fibrous oedematous tissue and a small section of cartilaginous bone. SAC C VS considered the findings typical of a developmental abnormality known as amorphous globusus, thought to be the remnant of an abnormally developed twin.

**Mammary diseases**

Lymph node biopsy tissue was submitted to Ayr from a 14-year-old, high-value Holstein cow. The affected cow had an enlarged precrural lymph node, mild pyrexia and had not responded to antibiotic therapy. Histopathological findings were consistent with a highly malignant, anaplastic carcinoma of the mammary gland. SAC C VS commented that mammary tumours are considered very rare in cattle and a poor prognosis was warranted. The cow was euthanased on welfare grounds shortly after the biopsy was taken.

**Nervous system disorders**

Inverness suspected infectious thrombotic meningoencephalitis caused the death of a three-day-old Aberdeen Angus-cross calf. The calf was bright at birth but became recumbent at two days of age. It failed to respond to fluid therapy and died. Postmortem examination findings included a thickened navel, fibrin adhesions to the heart, focal haemorrhages in the renal cortex, purulent material in both hock joints and congested cerebral blood vessels with thick, clear, yellow material surrounding the brain. Bacterial culture of several tissues did not yield any significant organisms and the result of a zinc sulphate turbidity test indicated adequate absorption of maternal antibodies. Histopathology findings were consistent with a systemic infectious process, bacterial in nature and centred on the brain, with the most likely aetiology being *Histophilus somni*. The lesions seen in the brain were widespread and vasculotropic in nature with haemorrhages. These findings were considered unlike those seen in meningitis secondary to navel ill, when lesions tend to remain confined to the meninges.

**Small ruminants**

**Nutritional and metabolic disorders**

Delayed swayback was diagnosed by Inverness in a three-month-old lamb with a six-week history of abnormal locomotion. The lamb had been seen ‘bunny-hopping’ and knuckling over on its hindlimbs, particularly the left leg. Initially, trauma was suspected, but it failed to improve prompting treatment with corticosteroids and a multivitamin supplement two weeks after clinical signs began. There was no response to treatment and the lamb was euthanased. Postmortem examination revealed muscle wasting of the left hindlimb and the brain appeared slightly oedematous. Tissue biochemistry confirmed liver copper levels of 156 µmol/l (reference range >314 µmol/l), and neurohistopathology revealed chromatolytic neurones in the vestibular nuclei in the pons and spinal cord consistent with swayback.

**Parasitic diseases**

Aberdeen confirmed coccidiosis as the cause of death of a 12-week-old, female Boer goat. Four kids had been bought-in two weeks previously. They were thin with some evidence of scour and two died within a three-day period. The coccidial oocyst count in a faecal sample was 7,950,000 per gram and comprised *Eimeria nana*, *Eimeria suspensa*, *Eimeria ovina* and *Eimeria chisumota* All three species are considered to be pathogenic in goats.

**Generalised and systemic conditions**

The carcase of a five-month-old texel tup was submitted to Edinburgh following a two-week history of pyrexia, dyspnoea and swollen, painful testicles. It had lost condition and died despite antibiotic treatment. At postmortem examination the left testis and epididymis was markedly larger than the right with fibrin within the tunica vaginalis. All carcase lymph nodes were enlarged and a purulent arthritis affected the right elbow and both stifle joints. The right ventricle was dilated secondary to an endocarditis lesion on the pulmonary valve and there was consolidation of the right anteroverentral lung. The right kidney was enlarged and mottled. *Staphylococcus aureus* was isolated from the left testis, left epididymis, heart valve and the lung. A mixed growth from which no significant organism could be identified was isolated from the joints. No *Brucella* species or *Actinobacillus seminis* were isolated. SAC C VS concluded that bacteraemia had left the lamb with orchitis/epididymitis, nephritis, pneumonia, endocarditis and arthritis, despite the failure to isolate the *S. aureus* from the joints. There was no evidence of right-sided heart failure, so thromboembolism from the valvular lesion was proposed as the cause of death.

**Respiratory tract conditions**

**Review of pasteurellosis cases in 2011**

The diseases caused by *Mannheimia* (formerly *Pasteurella*) *haemolytica* and *Bibersteinia* (formerly *Pasteurella*) *trehalosi* remain highly significant for the sheep industry. The Scottish data from VIDA recorded during 2011 (Fig 3) show two main peaks in disease associated with these bacteria. The first peak is the springtime rise in cases of pneumonic pasteurellosis due to *M. haemolytica*; the second is an autumn peak of systemic pasteurellosis due to *B. trehalosi* and to a lesser extent *M. haemolytica*. Pneumonia due to *Pasturella multocida* continues to be of relatively minor importance, with only low numbers of outbreaks recorded in Scotland during a typical year, and no outbreaks.
recorded in 2011. Although \( M \) haemolytica is recognised as one of the two principal causes of mastitis in sheep (the other being \( S \) aureus), the diagnosis is made infrequently by SAC C VS. This reflects the relatively small number of mastitis investigations instigated in sheep flocks.

Perth investigated chronic illthrift and increased mortality in a Scottish blackface hill flock that had lost 142 hoggs, gimmers and ewes from the flock of 860 over a 12-month period. Some animals showed respiratory signs before death. A hogg, a gimmer and a ewe were submitted for postmortem examination. The hogg was found to have extensive areas of pale, firm, consolidated lung tissue. Ovine pulmonary adenocarcinoma (OPA) was confirmed on histopathology. Significant findings in the gimmer were restricted to mild thickening and corrugation of the ileal mucosa, and lungs which were slightly rubbery in consistency. A chronic enteropathy of unknown origin was noted on histopathology; however, maedi-visna (MV) serology proved positive in this animal. Examination of the ewe revealed marked thickening and corrugation of the ileal mucosa. No acid/alcohol-fast bacteria were detected on a smear prepared from the ileum, but histopathology confirmed a severe granulomatous enteritis consistent with Johne’s disease. The nature of the inflammatory reaction suggested the paucibacillary form of Johne’s disease, which explained the absence of mycobacteria in the direct smears. SAC C VS noted that all three of these conditions can cause wasting and death and it is known that concurrent infection with MV and OPA can increase losses. The flock was closed other than for the purchase of tupps.

Nervous system disorders

Aberdeen diagnosed listeriosis in a five-month-old Suffolk ewe lamb that presented with pyrexia, horizontal nystagmus and a leftward head tilt. It progressed to lateral recumbency and subsequently died despite treatment with marbofloxacin, dexamethasone and vitamin B1. Postmortem examination findings were non-specific and included evidence of osteochondritis dissecans in the right shoulder joint. This was considered incidental and due to rapid growth of the lamb, which weighed 74 kg. Neuropathology revealed a very severe semi-suppurative meningoencephalitis characterised by microabscesses chiefly in the brain stem. These changes are consistent with a diagnosis of listeriosis.

Skin diseases

Perth suspected the involvement of \( P \)revotella \( m \)elanogenica in a group of four-month-old lambs that presented with lesions of scald and footrot, but which had failed to respond to treatment with topical and parenteral oxytetracycline. The interdigital lesions of three animals were swabbed and \( P \) melanogenica was isolated from all three. A \( F \)usobacterium species was also recovered from one lamb, but \( D \)ichelobacter species were not found in any of the samples. \( P \) melanogenica (along with \( F \) necrophorum), is normally associated with interdigital necrobacillosis in cattle, but has also been suspected in virulent outbreaks of lameness in sheep (Sargison and Scott 2011). In both the documented outbreaks and in this incident, cattle had access to the same areas as the affected sheep.

Pigs

Nutritional and metabolic disorders

Mulberry heart disease was suspected as the cause of sudden death of two, five- to six-week-old pigs in a 400-sow indoor unit. Four pigs had died in the previous batch within a week of weaning. Postmortem examination found massive distension of the pericardium with clear fluid and fibrin in both pigs. There were streaking haemorrhages over the ventricles that penetrated through to the endocardium (Fig 4). Cardiac histopathology revealed extensive multifocal haemorrhages throughout the epicardium, myocardium and endocardium, with myocyte degeneration and microthrombi in capillaries. Unexpectedly, liver vitamin E levels were 11.19 and 10.71 µmol/kg fresh tissue (FT) in the two submitted animals, while liver selenium levels were 2.11 and 1.46 mg/kg dry matter (DM), which were within the reference ranges of >6.5 µmol/kg FT for vitamin E and 1 to 5 mg/kg DM for selenium. Mulberry heart disease has been recorded in pigs that were not deficient in vitamin E and selenium; however, another possible explanation was that the pigs were vitamin E deficient before weaning and had already sustained tissue damage. Once creep feeding commenced, vitamin E levels increased and liver levels were normal at the time of postmortem sampling. SAC C VS advised assessing vitamin E and selenium levels in blood samples from preweaned piglets and offering creep feed before weaning.

Sudden deaths in four-week-old pigs at weaning in a recently established high health herd, on a new 300-sow indoor pig unit, were found to be due to anaemia. Iron injections were administered after birth but some piglets had appeared pale at 10 days old and a second iron injection was given. At weaning some pigs were again noted to be pale, so a third iron injection was given to affected animals along with a PCV-2 vaccination. Within about 10 minutes of vaccination, 11 piglets died. Postmortem examination of the affected piglets revealed pale carcases with very enlarged and flabby hearts and watery blood. The spleens were also enlarged. These signs were considered consistent with severe anaemia. Histopathology demonstrated myocardial oedema and hypoxic-type changes in the liver and kidney, combined with splenic extramedullary haemopoiesis. Examination of bone marrow confirmed that other cell lines were generated as normal. The findings further supported the anaemic changes seen grossly. There was no evidence of any disease processes and the cause of anaemia remained undetermined.

Generalised and systemic conditions

Rectal prolapses were present in two 10- to 12-week-old gilts that were submitted to follow up an ongoing investigation into rectal prolapses on the unit. Elevated zearalenone levels were detected previously. Since then the feed bins were cleaned and the pigs received tetracycline and a
mycotoxin binder in the feed. Of the 120 to 140 gilts in the batch, 10 to 12 fresh cases developed each week. Litter mates on another unit were not affected. A pig with an umbilical hernia that did not have a prolapse was also submitted for postmortem examination. Zearalenone testing of bile from the two pigs with prolapses found levels of 15.0 ppb and 14.0 ppb, whereas the third pig with the umbilical hernia had a level of 4.0 ppb. Values greater than 5.0 ppb indicate significant exposure to zearalenone and could be of clinical significance. Further investigations are required to understand the possible association between zearalenone exposure and rectal prolapses, and the value of mycotoxin binders for its prevention and control.

Respiratory tract conditions
Swine influenza was diagnosed in 10-week-old pigs from a batch of 450 housed pigs on a rearing unit. The animals had been on the unit for a week and were receiving amoxicillin in feed. Pigs were coughing and losing condition but none died. Three pigs submitted alive for postmortem examination were bright and alert. Two were coughing, hyperpnoeic and tachypnoeic. There was fawn-pink consolidation in the cranial and middle lung lobes and in one pig there were a few localised groups of fawn coloured, consolidated lobules in both diaphragmatic lung lobes. Bacterial culture yielded *Haemophilus parasuis* from the lung of one pig indicating a diagnosis of Glässer’s disease. Histopathology demonstrated pneumonic changes in the lungs, the most striking of which was bronchiolar inflammation and attenuation. This suggested a recent viral challenge to the bronchial tree probably by swine influenza. Influenza A RNA was detected by real time RTFPCR.

Pneumonia due to *Actinobacillus pleuropneumoniae* was diagnosed in a nine-week-old female Landrace/Large White cross submitted to monitor causes of sudden death on a breeding stock production unit. The animals were vaccinated for PCV-2 and the unit had a history of postweaning multisystemic wasting syndrome. Significant postmortem findings included pulmonary abcessation and consolidation of the right caudal lung lobe. A *pleuropneumoniae* was isolated from the lung and heart blood.

Reproductive tract conditions
An *Actinobacillus* species was isolated from the fetal stomach contents and placenta from a litter that was aborted three weeks before term. The affected, fourth parity sow on the outdoor breeding unit of 250 sows was healthy. Five sows had farrowed prematurely in the previous two months. They were vaccinated against parvovirus, swine flu, porcine reproductive and respiratory syndrome, erysipelas and *Escherichia coli*. The same organism was isolated from another recent case of porcine abortion isolated from another unit.

Birds
Poultry
Five deaths from a batch of 50 layer replacements aged four to five weeks were reported. Severe haemorrhagic typhlitis was found on postmortem examination and microscopy demonstrated many coccidial oocysts and schizonts typical of *Eimeria tenella*. Similar findings were reached from a three-week-old chick from a different farm, on which three birds from a group of 12 had died. In addition to caecal coccidiosis, *Listeria monocytogenes* was isolated from the liver.

Gamebirds
Rotavirus infection was diagnosed in a batch of pheasant chicks aged 17 days. Mortality in the first five days was attributed to transport stress and yolk sac infection, after which losses stopped. Mortality increased again 10 days later in one shed and birds were submitted for postmortem examination. All four birds examined had frothy yellow to light brown caecal contents. No motile protozoa or coccidial oocysts were detected, but rotavirus was demonstrated in caecal contents by polyacrylamide gel electrophoresis. Spinorucleosis was the most frequent diagnosis in pheasants this month. The disease was seen in multiple batches of pheasants aged four to 12 weeks and presented with a range of clinical signs. Some batches had a history of weight loss and lethargy. Other birds were described as unsteady on their legs and some batches were reported to have a sudden rise in mortality. Mustard yellow diarrhoea was described in some but not all batches. Some birds had concurrent coccidiosis.

Pigeons
Large numbers of the motile protozoan *Hexaninia* species were found in the small intestine of a current year racing pigeon with diarrhoea. The small intestine was distended with watery contents. Yellowish plaques of caseous material, from which *Candida albicans* was isolated, were also found in the oropharynx and on the crop mucosa. A young pigeon aged 16 days, from a different loft, also had watery intestinal contents associated with large numbers of *Hexaninia*. The bursa of Fabricius in both birds was small, and an underlying immunosuppressive condition such as pigeon circovirus infection was suspected.

Miscellaneous species
Deer
A two-week-old red deer calf was submitted to Edinburgh from a farm where 16 calves had died and two were ill with 120 hinds still to calve. Although the weather was thought to have played a part in the losses, the most recently affected calves had shown signs of diarrhoea. The hinds were in good bodily condition with access to mineral blocks. At postmortem examination the abomasum contained partially clotted milk and the intestinal content was extremely fluid. Routine screening of the colonic content revealed numerous cryptosporidial oocysts but no other definitive pathogens. No bovine viral diarrhoea virus was detected in the spleen and a presumptive diagnosis of cryptosporidiosis was made.

Wild animals
Inverness reached a presumptive diagnosis of endogenous lipid pneumonia with concurrent hepatopathy in an otter. The otter was found dead. It was thin and weighed 3.7 kg. Postmortem examination found very little perirenal fat. Two-thirds of the lung parenchyma was of a dense consistency and did not float when placed in water; the remaining lung tissue was excessively inflated. The histological appearance of the lung was dominated by infiltrates of foamy alveolar macrophages and endogenous lipid pneumonia was suspected. This condition is most commonly found in laboratory mammals as well as muskells and may be idiopathic. Histopathology also identified a marked hepatoxyphy, with degeneration of many cells, frequent hepatocyte necrosis and Kupffer cell proliferation. A toxin was the most likely cause and toxicology identified a residue of bromadiolone at a level within the anticipated lethal range. However, the significance of this finding remains undetermined since the gross findings and histopathology of lung tissue did not indicate involvement of an anticoagulant.

Disease alerts
The following conditions featured in the SAC CVS report for October 2011. Given similar climatic and production conditions, they could also be important this year.

- *Salmonella* Typhimurium outbreaks in beef and dairy herds.
- Late season nematodrosis in spring-born lambs.
- Subacute fasciolosis in adult ewes.
- Lungworm in outdoor-reared pigs.

References
SARGISON, N. D. & SCOTT, P. R. (2011) Diagnosis and economic consequences of triclabendazole resistance in Fasciola hepatica in a sheep flock in south-east Scotland. *Veterinary Record* doi:10.1136/vr.c5332

September 29, 2012 | Veterinary Record | 321

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