OVERVIEW

- Ewe deaths due to immature rumen fluke
- Amyloidosis in a Suffolk-cross lamb
- Haemonchosis in Valais blacknose ewes
- Deaths and diarrhoea due to Salmonella Reading in 26-week-old gilts
- Feline dysautonomia in a kitten

GENERAL INTRODUCTION

August in Scotland began unsettled with westerly winds, but the second half of the month was more settled. The mean temperature for August was 0.3°C above the long-term average, with 109 per cent of average rainfall overall and 103 per cent of average sunshine.

An outbreak of American Foulbrood (AFB), a disease affecting colonies of honeybees, was found in an apiary near Inverness. The AFB infected hive was destroyed, as there is no permitted treatment for the disease in the UK.

DISEASE ALERTS

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

- Abortion in cattle
- Pneumonia in housed cattle
- Black disease in cattle and sheep
- Parasitic gastroenteritis in sheep
- Acute fasciolosis in sheep

CATTLE

Nutritional and metabolic disorders

Dumfries diagnosed acetonaemia in a two-year-old Jersey heifer that was at grass with no supplementary feeding. It was due to calve in approximately 40 days and was the second that died from a batch of 60 heifers imported from two sources in Denmark one month previously. This heifer deteriorated over the course of eight hours, showing non-specific signs of malaise and dullness. Postmortem examination revealed poor rumen fill and an orange, greasy liver, sections of which floated in water. Vitreous humour beta-hydroxybutyrate was 24.37 mmol/l (reference range less than 1.2 mmol/l), consistent with marked ketosis. SAC C VS considered the stage of gestation, stress of transport and mixing of different batches likely decreased feed intake predisposing to hepatic lipiddosis and ketosis. In addition some of the heifers had never grazed previously. SAC C

VS advised that supplementary feeding should be provided for subsequently purchased heifers.

Toxic conditions

Perth diagnosed lead poisoning at postmortem examination of an 11-month-old Aberdeen Angus-cross stirk. Markedly elevated lead levels were found in liver and kidney tissue at 15.8 mg/kg fresh tissue (FT) and 59.4 mg/kg FT respectively (values greater than 2.07 mg/kg FT are considered consistent with a diagnosis of lead poisoning in cattle). The stirk was from a batch of five moved onto pasture where two metal detectors were present. Two animals died, one went missing and a fourth showed ataxia, tremors and apparent blindness.

Generalised and systemic conditions

Edinburgh diagnosed juvenile multicentric lymphoma in a three-month-old Hereford-cross heifer that suddenly collapsed and died. At postmortem examination the calf was well grown and in good body condition. All carcase lymph nodes were greatly enlarged and cut surfaces were homogenous and pale. The spleen, liver and kidneys were also markedly enlarged (Figs 1 and 2). The provisional diagnosis of juvenile multicentric lymphoma was supported by the cytological changes seen in lymph node touch-prep smears (monomorphic population of large, round, pale cells with prominent nucleoli and a distinct rim of cytoplasm). The diagnosis was confirmed by histopathology where neoplastic immature lymphoid cells replaced the normal architecture in the lymph nodes. Similar cells formed a diffuse infiltrate in the bone marrow, liver and kidney and filled the alveolar capillaries in the lung. Juvenile multicentric lymphoma is well recognised sporadic condition of calves that is not associated with enzootic bovine leucosis virus infection.

FIG 1: Lymphoma in spleen of a three-month-old heifer
Dumfries diagnosed an aortic aneurysm and rupture as the cause of sudden death in a four-year-old Holstein cow. The animal appeared healthy at milking, but was found dead one hour later. Other sudden deaths occurred on the same farm in recent months, but only one other animal submitted for examination died from systemic complications associated with severe mastitis. Postmortem examination revealed large blood clots in the cranial abdominal cavity and haemorrhage tracking around the thoracic aorta. A portion of the cranial abdominal aorta was dilated, with a longitudinal tear present (Fig 3). Histopathology confirmed that the aorta at the point of rupture was thin-walled, consistent with an aortic aneurysm. There was underlying disorganisation and degeneration of the media in both the aorta and the pulmonary artery, indicating an underlying connective tissue pathology. Lamm and others (2007) hypothesized an underlying familial predisposition for this type of arterial degeneration and initial work by both APHA and SAC C VS supports this view.

Six cases of malignant catarrhal fever were diagnosed on six separate farms across Scotland this month. Affected animals were all beef or dairy cows. Clinical findings included pyrexia, conjunctivitis, uveitis, head pressing, mucopurulent nasal discharge and sloughing of the skin or mucosa of the nares, teat and vulva. In all cases ovine herpes virus-2 DNA was detected by PCR on heparinised blood samples.

Alimentary tract disorders
Perth diagnosed concurrent Johne’s disease and ostertagiosis in two four-year-old dairy cows from the same farm that were submitted to investigate an ongoing problem of severe ill thrift. A further eight animals appeared similarly affected. Body condition was poor and both animals had faecal staining of the hindquarters. Small white raised nodules were evident on the abomasal mucosa of both cows and the mucosa of the small intestine, caecum and colon appeared thickened. 450 strongyle eggs per gram (epg) were detected in the caecal contents from one animal but not from the other. Histological examination of tissues from both animals confirmed severe lymphoplasmacytic abomasitis with widespread glandular mucus metaplasia and scattered intramucosal nematode profiles, with cuticular ridges consistent with Ostertagia species. In addition, severe histiocytic enteritis was confirmed and Ziehl-Neelsen stain identified intralesional small acid- and alcohol-fast bacilli, mainly within multi-nucleated macrophages.

Respiratory tract diseases
Dumfries diagnosed bovine herpesvirus type 1 (BHV-1) infection in a one-year-old Holstein-Friesian stirk. It was the only death in a group of animals that were coughing at grass. Postmortem examination identified purulent, malodorous material within the trachea, some of which was adherent to the mucosa. The cranial, middle and
cardiac lung lobes were firm and malodorous, with necrotic areas. BHV-1 DNA was detected by PCR screening of a tracheal swab. Bacterial cultures of the lung and trachea identified Staphylococcus aureus, Trueperella pyogenes, Fusobacterium necrophorum and Prevotella melaninogenica, which were considered to be secondary invaders. Histopathology confirmed a severe necrotizing tracheitis and extensive pulmonary necrosis associated with large numbers of bacteria. There were small areas of necrotizing bronchiolitis, consistent with descending pulmonary BHV-1 infection.

Reproductive tract conditions
Ayr examined a foetus from the third cow that aborted over a one month period in a dairy herd of 180 cows that calved all year round. Abortions occurred at approximately five to six months gestation and no other clinical signs were observed in the dams. No significant gross pathology was noted but, despite advanced autolysis, glial foci with central necrosis were identified on histological examination of the brain consistent with neosporosis. Serum samples from two of the cows that aborted (including the dam of the aborted foetus) tested positive for antibodies to Neospora caninum, and SAC CSVS considered this provided further supportive evidence.

SMALL RUMINANTS

Parasitic diseases
Dumfries examined a ewe from a group of 60 that were reported leaner than expected and where three ewes died over a ten day period. Treatment with closantel was given one month earlier, when the group was moved onto a silage aftermath. At postmortem examination faecal staining was present and small numbers of immature Fasciola hepatica were detected in the liver. The rumen content was excessively liquid and three adult rumen fluke were noted. The small intestinal contents were watery, the entire length of the small intestinal mucosa was covered in fibrin and there was a profuse, malodourous scour. Massive numbers of immature rumen fluke, presumed to be Calicophoron daubneyi, were recovered on an intestinal wash (Fig 4). Treatment with oxyclozanide was recommended although it was noted that none of the anthelmintic products currently available have a licence claim for rumen fluke. Infection was considered to have occurred following the move to the silage aftermath. Wet areas suitable for snails were detected in all areas. It was advised that all access to an adjacent field where very large numbers of snails were detected in the previous year. The field was confirmed during the previous year. The sheep also had pericarditis and multiple 2 to 4 mm cream-coloured foci scattered throughout the myocardium and kidney cortex. The kidneys were also paler than normal. Histopathology revealed areas of chronic active suppurrative myocarditis and multifocal chronic interstitial nephritis. Heavy deposits of amyloid were detected in the renal glomeruli associated with abundant tubular casts consistent with protein-losing nephropathy. Amyloid deposits were also present in hepatic sinusoids. It was proposed that the widespread chronic inflammatory processes led to the amyloidosis, as excess antigenic stimulation leads to overproduction of amyloid. Ménusua and others (2003) reported that, as in cattle, the kidneys are most commonly involved in

and 8500 worms were recovered from the abomasum, 95 per cent of which were confirmed as Haemonchus contortus. Worm egg counts were carried out on the remaining sheep and strongyle egg counts of up to 16,000 epg were detected. A worm egg count reduction test was performed following treatment with a 3-ML anthelmintic. Individual egg reductions of between 0.0 and 40.0 per cent confirmed anthelmintic resistance. It was advised that the group should be treated with either a 4-AD or 5-SI anthelmintic.

**FIG 4:** Immature rumen fluke (presumed to be Calicophoron daubneyi) recovered from the small intestine of a ewe

Generalised and systemic conditions
Edinburgh diagnosed amyloidosis in one of three ill-thrive, three-month-old Suffolk-cross lambs from a group of 90 that were euthanased for postmortem examination. They were raised on milk replacer and then fed hay and concentrates after weaning. Chronic pneumonia with histological features consistent with ‘atypical chronic enzootic pneumonia’ of sheep was confirmed in all three animals, with the addition of moderate purulent bronchopneumonia in lambs 2 and 3 from which Mannheimia haemolytica was isolated in pure growth. The third lamb also had pericarditis and multiple 2 to 4 mm cream-coloured foci scattered throughout the myocardium and kidney cortex. The kidneys were also paler than normal. Histopathology revealed areas of chronic active suppurrative myocarditis and multifocal chronic interstitial nephritis. Heavy deposits of amyloid were detected in the renal glomeruli associated with abundant tubular casts consistent with protein-losing nephropathy. Amyloid deposits were also present in hepatic sinusoids. It was proposed that the widespread chronic inflammatory processes led to the amyloidosis, as excess antigenic stimulation leads to overproduction of amyloid. Ménusua and others (2003) reported that, as in cattle, the kidneys are most commonly involved in
clinically significant amyloidosis in domestic sheep and goats. In their case series gangrenous pneumonia was proposed as the underlying trigger in 16 of 21 sheep. Later work by this group showed that gastrointestinal tract is the most common site for amyloid deposition in sheep (Biescas and others, 2009).

**Alimentary tract disorders**

Perth diagnosed resolving coccidiosis followed by a secondary acute superficial necrotising and fibrinous bacterial typhritis/colitis in a four-month-old Texel ewe lamb. Postmortem examination revealed faecal staining, liquid intestinal contents and a severe necrotic typhritis. No evidence of patent worm or coccidial infection was detected, but histopathology revealed small numbers of entrapped coccidial oocysts typical of a resolved infection. The large intestinal lesions were associated with many bacterial rods indicating secondary infection. SAC C VS receives many faecal samples from scouring lambs in August. If no diagnosis is reached is pursued on parasitological testing, the possibility of bacterial infection of a previously compromised intestinal mucosa should be considered.

**Skin diseases**

Dumfries diagnosed cellulitis in two four-month-old Lleyn lambs from a group of 500, where approximately 30 lambs were lame with swollen limbs, the forelimbs being particularly severely affected. The group were vaccinated with three different vaccines eight days, seven days and four days before clinical signs were observed. The first two vaccines were administered on either side of the neck and the latter intramuscularly in the hind leg. Postmortem examination revealed purulent cellulitis extending from the neck into the left forelimb. Lesions in the other lamb were more severe and extensive with cellulitis being most severe in the neck and then spreading into the left forelimb and subcutaneously along the left thoracic and abdominal walls as far as the medial aspect of the left hind limb. Infection had also tracked through the thoracic inlet causing fibrinosuppurative pleurisy associated with adhesions between the cranial lung lobes and to the mediastinum. *T. pyogenes* and *F. necrophorum* were isolated. It was assumed that infection was introduced at the time of vaccination. The case illustrates the need for good hygiene practices when injecting large numbers of sheep.

**PIGS**

**Generalised and systemic conditions**

*Streptococcus suis* serotype 2 was diagnosed as the cause of recumbency and paddling in post-weaning piglets from a 400 sow closed, indoor pig unit. Outbreaks often followed a stressful event such as cooler temperatures or a feeder blockage. The animals usually responded to treatment with antimicrobials and steroids. In-feed antibiotics were used previously and appeared to reduce the disease incidence. The motivation for the submission was to culture the causative organism for autogenous vaccine production. *S. suis* serotype 2 was isolated in pure growth from the brains of two four week old piglets with nervous signs and sent for vaccine production.

Wasting and diarrhoea was reported in a batch of 30 ten-week-old growing pigs on a smallholding. A typically affected pig submitted for postmortem examination showed chronic typhlocolitis, purulent cellulitis between left hock and stifle, purulent arthritis in a shoulder joint, multifocal 1 mm white spots on the kidneys and some evidence of pneumonia. *Salmonella Typhimurium* was isolated from the typhlocolitis lesions. *Staphylococcus hyicus* was isolated from the cellulitis lesions, affected shoulder joint and internal organs, including kidneys and lung indicating systemic spread of infection.

**Reproductive tract conditions**

Evidence of exposure to swine influenza H1N1 pandemic strain was detected previously in foetal material from aborted piglets from an indoor commercial herd. The herd had on-site farrowing to finishing, was breeding their own replacements and vaccinating for porcine reproductive and respiratory syndrome (PRRS), parvovirus and erysipelas. One sow was off her feed around the time of abortion at 69 days of gestation and the other, which had not shown any clinical signs, aborted at 98 days. The unit had a low abortion rate and no other fertility problems were noted recently. Foetal stomach content cultures and PRRS PCR on pooled foetal tissue were both negative.

**Alimentary tract disorders**

Three deaths occurred during a severe outbreak of diarrhoea in 26-week-old maiden commercial gilts that arrived on an outdoor unit about two weeks previously. A field postmortem examination was carried out on one of the gilts and faecal samples were collected from two other typically-affected gilts. *Salmonella* Reading was isolated from both faecal samples and a sample of intestinal content from the dead animal. Histopathology on the intestinal tissue revealed acute necrotising enteritis associated with a combination of very heavy coccidial infection and invasive bacterial infection.

The findings suggested that the pig was naïve to coccidiosis and had suffered a heavy infection, causing severe damage to the intestinal epithelium. An invasive bacterial infection contributed to the necrotising enteritis and the lesions were consistent with salmonellosis.
Skin diseases
An outbreak of ringworm was reported in a 400-place finishing shed that had not previously housed pigs. Within two to three weeks of arrival approximately 70 per cent of the pigs had extensive, brown, scaly skin lesions over the head, neck and body. *Trichophyton mentagrophytes* was isolated from the lesions. The shed had not housed livestock previously so the source of infection was unexplained. *T. mentagrophytes* typically affects rabbits, so it is possible that there was an unobserved wildlife source of infection.

BIRDS

Poultry
Turkey poult placements for Christmas peak in July and August. Turkeys are more difficult to brood than chickens and management related problems tend to be common at this time. Inverness diagnosed dehydration and pecking/cannibalism in two-week-old poults. On gross examination there were bald, red patches of variable size noted on most birds and the vents of two birds were very red.

Perth diagnosed histomonosis in a one week-old peafowl chick, the third to die from a brood of four. Postmortem examination revealed typhlitis with caecal cores and histopathology confirmed protozoal infection consistent with histomonosis. SAC C VS noted that, although peafowl are known to be particularly susceptible to histomonosis, severe lesions such as these at one week of age seemed remarkable. Histomonosis is usually transmitted through ingestion of either infected *Heterakis* species eggs or by earthworms containing infected *Heterakis* species larvae. In turkeys, direct transmission of histomonads by means of "cloacal drinking" has been reported and this may be a more likely route of infection in this case.

Game birds
As in most years, problems due to intestinal protozoan parasites, mainly spironucleosis ("Hexamita") and coccidiosis, were common in pheasants recently moved out into release pens. Multiple cases were seen by Aberdeen, Ayr, Dumfries Inverness and Perth, most often in birds of around 7 to 9 weeks of age. SAC C VS suspects that many of the cases occurring in this situation are due to "flare ups" of infection in previously asymptomatic or subclinical carriers due to the stresses associated with being moved to an unfamiliar environment sometimes coupled with a change of feed and/or means of supplying feed, adverse weather and inadequate shelter. In contrast, Edinburgh diagnosed combined spironucleosis and coccidiosis in pre-release 3-week-old pheasants.

St Boswells diagnosed staphylococcal tenosynovitis as the cause of recumbency in a group of 5,000 six-week-old pheasants. *S. aureus* was isolated from the lesions. In some cases it is suspected this condition develops following removal of plastic anti-pecking bits causing damage to the nasal mucosa and allowing bacterial entry.

Total worm counts were undertaken on the gut contents from 18 red grouse shot on a grouse moor with a lower than expected population density. The caecal worm *Trichostrongylus tenuis* is believed to have an adverse effect on the health of the birds and the productivity of the moor when the total worm burden in adult birds exceeds 3000. Eight out of 18 had counts in excess of this number. Antibodies to louping ill were found in a blood sample from a hare from the same moor indicating the presence of this virus in the habitat.

MISCELLANEOUS

Cats
Feline dysautonomia was diagnosed in a two-month-old female Maine coon ragdoll cross kitten which presented with anorexia, constipation and urinary incontinence five days after a first dose of multivalent vaccine. Stunting and poor body condition were noted, with protrusion of the nictitating membranes. Hospitalisation followed three days later due to continued anorexia and lethargy, and distension of the abdomen. Difficulty vocalising and regurgitation were seen, followed by death three days later. At necropsy, the kitten was very thin, with a distended abdomen and urine soiling of the tail and hind limbs. The oesophagus showed dilation with roughening and dark red discolouration of the mucosa in the distal third, caudal to the heart base. The small intestine was almost empty but the caecum and large intestine were dilated and full of firm faeces, with a hard faecal ball in the rectum. The bladder was distended with at least 20 ml of pale yellow urine, which could be expressed easily. Histopathology revealed a ganglionopathy in the thoracic sympathetic chain, characterised by neuronal chromatolysis and neuronal cytoplasmic vacuolation involving the large majority of neurones, accompanied by gliosis. These histological features were consistent with feline dysautonomia. The aetiology of this condition is unknown, but it is characterized by widespread dysfunction of the autonomic nervous system, with all breeds and ages susceptible, although the disease appears to be more common in younger cats.
References:


**Featured Article: Virulence determinants in Escherichia coli isolates from piglets with post-weaning diarrhoea in Great Britain from 2010 to 2015**

The prevalence of virulence targets in 150 Escherichia coli isolates from outbreaks of post-weaning diarrhoea in piglets that were widely distributed throughout Great Britain from 2010 to 2015 was investigated. Testing for virulence determinants is a useful tool when considering vaccination to control post-weaning disease due to *E coli*. The bacteria were isolated from faecal samples or post-mortem specimens using standard microbiological techniques and were stored in pathogen bank archives at SAC C VS and APHA laboratories (123 and 27 isolates respectively).

After re-confirmation of identification, the samples were tested at SAC C VS Edinburgh, using an *E coli* virulence PCR test which detects a range of adhesion and toxin targets (Fig (i)). The adhesion targets comprised F4, F18, F5, F41, F6 and Intimin. The toxin targets comprised heat-stable toxins (Sta and Stb), heat-labile toxin (Ltb) and shiga toxin (STX2).

The predominant adhesion factor was F4 (41 per cent of isolates), but F5 and F18 were also detected (11 per cent and 5 per cent respectively). No isolates with F6, F41 or intimin adhesion targets were recorded. Many isolates demonstrated heat-stable and/or heat labile toxins targets as follows: Sta (20 per cent), Stb (34 per cent) and Ltb (36 per cent). The percentage of isolates that were positive for the shiga toxin target was 0.8 percent. Shiga toxin-producing strains of *E. coli* have potential to cause oedema disease, which presents either as sudden deaths or as showing neurological signs.

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**Percentage prevalence of virulence targets in *E coli* for pigs with post-weaning diarrhoea**

![Graph showing percentage prevalence of virulence targets in *E coli* for pigs with post-weaning diarrhoea](image)

Fig (i)
Featured Article: Central blindness in recently housed lambs

Cerebrocortical necrosis is a common cause of central blindness in lambs. Many cases are associated with thiamine deficiency, which may be related to changes in rumen flora associated with dietary changes, particularly with increased concentrate feeding. Unless treated with thiamine very early in the clinical course, the condition is often rapidly progressive to more severe neurological signs and is not infrequently fatal.

In contrast, whilst blindness is the principal presenting sign in ‘post-weaning encephalopathy’ of lambs, there is no clinical response to thiamine treatment and the lambs remain blind; however clinical progression and death are uncommon (Scholes and others 2005). The main central nervous system lesion is midlaminar cerebrocortical necrosis (Fig (a)), and the character and distribution of the lesions are distinct from cerebrocortical necrosis malacia, which is associated with thiamine deficiency. The consistent clinical history in ‘post-weaning encephalopathy’ is either a change to an unfamiliar water supply, often associated with housing, or occasionally lack of access to water including freezing of the water supply. Uncommonly, similar lesions are seen in lambs with cobalt deficiency (ovine white liver disease). However, these cases also involve recently housed lambs and may relate to reduced environmental awareness due to hepatic encephalopathy. The salient features of ‘post-weaning encephalopathy’ are:

- Signs of blindness usually noticed 1 to 2 days after housing
- No clinical response to parenteral thiamine (vitamin B1) treatment
- Low case fatality rate in most flocks
- Occasionally lambs have underlying hepatic disease particularly ovine white liver disease

Fig (a). Histological appearance of cerebral cortex from a 6-month-old lamb with post-weaning encephalopathy. Curvilinear midlaminar rarefaction of neuropil (arrows) is associated with neuronal necrosis and loss.

Reference: