OVERVIEW

- Dramatic jejunal lesions in a calf with necrotising bacterial enteritis
- Schmallenberg virus infection identified in three herds in Aberdeenshire
- Epidermolysis bullosa in a neonatal beef calf
- Unusual digital lesions in young lambs
- Review of coccidiosis in game birds

CATTLE

Toxic conditions

Dumfries identified discarded car batteries as the sources of lead poisoning on three farms. Two of these farms were adjacent to each other and had been grazing heifers in neighbouring fields. Between the two farms, five heifers aged 18 months had died. Another three animals showed clinical signs consistent with neurological disease including blindness and ataxia. One heifer from each farm was submitted for postmortem examination. There were no significant gross pathological findings but kidney lead values were elevated in both cases at 107 mg/kg and 50.7 mg/kg (reference range <20 mg/kg). Five heifers out of 52 also died on the third unrelated farm. Kidney lead value in the one animal submitted for necropsy was 34.5 mg/kg. The Food Standards Agency was informed in each case.

Alimentary tract disorders

Dumfries diagnosed clostridial enterotoxaemia type D in two to three-month-old suckled calves from two hill farms. On one of these affected farms, there had been seven sudden deaths of thriving stabiliser calves. Lesions of focal symmetrical encephalomalacia (FSE) were found in the brains of two submitted calves and intestinal contents were positive for epsilon toxin in both cases. The same diagnosis was made in a three-year-old Holstein cow in the late dry period. The cow had been ill for a short period, became moribund and was euthanased on welfare grounds. Histological examination of the brain identified lesions of FSE.

Severe necrotising bacterial enteritis with secondary pneumonia was responsible for the death of a three-month-old Dexter calf submitted to Dumfries. The animal died after a ten day period of respiratory signs that were non-responsive to treatment. Necropsy confirmed anteroventral lung consolidation and pleurisy however the primary pathology affected the jejunum where near full thickness ulcers were seen (Figure 1). Histopathology confirmed a severe necrotising bacterial enteritis and Pseudomonas aeruginosa was isolated in septicaemic distribution suggested that the pneumatic changes were secondary to haematogenous spread of bacteria from the intestine to the lungs.

Reproductive tract conditions

In June, Aberdeen identified the first cases of congenital Schmallenberg virus (SBV) infection outwith Dumfries and Galloway. The first case occurred in a herd in Kincardineshire where a Simmental-cross calf weighing only 15 kg was stillborn with arthrogryposis, marked scoliosis and hydranencephaly. Foetal fluid tested positive for antibody to SBV and SBV RNA was detected by real time PCR on brain tissue. Histological examination of the brain and spinal cord identified changes consistent with SBV infection. The dam of the affected calf was a homebred heifer and also tested positive for antibody to SBV. No other deformed calves were born on this holding and the herd had not purchased any stock from known infected areas since the summer of 2012.

Two further cases of congenital Schmallenberg virus infection were diagnosed by Aberdeen in June. In one of the herds, two bulls had been purchased in October 2012 from Wales and Ireland, and these were considered possible sources of infection for local midges. In the other herd a cow and calf had been purchased from Dumfries-shire in August 2012 however the animals had been at another location in Aberdeenshire for several weeks before joining the herd. As viraemia with SBV is only reported to last for up to five days these animals did not appear to have been the source of virus. As in the case of the first affected herd, the source of the virus remained unknown.

Skin diseases

An unusual diagnosis of epidermolysis bullosa was made by Dumfries this month. This condition has been reported in the UK in Simmental, Simmental-cross and Holstein calves (Foster et al, Journal of Comparative Pathology, 2010, 142, 336-340). This case was diagnosed in a shorthorn bull calf that was born alive, but as it was licked by the cow the farmer reported that its skin appeared to be coming off. The calf was euthanased on welfare.
grounds and submitted for postmortem examination. At necropsy, the oral mucosa was found to be sloughing (Figure 2) while the hooves were intact. Most of the hair had been removed by the cow although it did appear that some epidermal layers were still present. Histopathology confirmed a diagnosis of epidermolysis bullosa which results in a fragile, easily lost epithelium.

**Parasitic diseases**

All SAC C VS disease surveillance centres diagnosed scour and deaths due to infection with *Nematodirus battus* during May and June. Lambs submitted to Ayr were frequently infected with both *Nematodirus battus* and *Eimeria* species coccidia. Coccidial oocyst speciation showed that a high percentage originated from pathogenic *Eimeria* species and were therefore contributing to the clinical signs. Nephrosis was also present in a number of these cases in addition to the parasite burden. On some farms the cold spring resulted in prophylactic administration of anthelmintics failing to prevent outbreaks of disease as the main *Nematodirus* hatch occurred after the lambs were dosed. Dumfries noted that cases of nematodirosis often had significant strongyle egg counts. SAC C VS considers that this may have possible implications for treatment choice on farms where benzimidazole resistance is present in species other than *N. battus*.

**Generalised and systemic conditions**

Erysipelas and cryptosporidiosis were diagnosed by Aberdeen on examination of a three-week-old crossbred lamb. The farmer described problems with fading lambs throughout the lambing period and had been losing lambs at a variety of ages. At postmortem the large intestinal content was liquid and there was excess cerebrospinal fluid. *Erysipelothrix rhusiopathiae* was cultured from the liver, lung and brain. A large number of cryptosporidial oocysts were detected in the large intestinal contents. It was not clear which, if either, pathogen was the most relevant to the previous deaths.

**Respiratory tract conditions**

Ovine pulmonary adenocarcinoma with concurrent parasitic gastroenteritis was diagnosed following submission of two ewes to Perth. The flock had lost 100 ewes over a three month period and ewe body condition was described as generally lean throughout. Some ewes showed evidence of respiratory distress before death. One submitted ewe had large, firm pale lesions occupying most of the right lung which were confirmed as OPA on histopathology. Both had fluid intestinal contents and high worm egg counts of 2350 and 3750 strongyle eggs per gram of faeces.

**Musculo-Skeletal conditions**

Digit lesions of unknown aetiology were seen in a six-week-old lamb submitted to Dumfries. The farmer complained of lambs losing their feet and the third case was euthanased for postmortem examination. Necropsy showed evidence of bacterial infection. In the least affected digit there was erosion of distal P3 while in the most severe digit the whole of P3 and the distal two thirds of P2 had been lost (Figure 3). Healing was well advanced with granulation tissue and regrowth of skin over the distal extremities. Lameness was initially noted two to three weeks prior to submission. No other disease processes were evident. Histopathology confirmed the absence of osteomyelitis but also revealed little evidence of bone necrosis. Bone resorption and replacement fibrosis was evident. Findings were not typical of ergotism and dry gangrene associated with *Salmonella* Dublin infection was also ruled out. SAC C VS suggested that the initiating insult could have been exposure to irritating or corrosive chemicals.
Renal diseases
A diagnosis of nephrosis was made 14 times in June compared to three for the same month last year. The increase may have been related to the increase in diagnoses of nematodirosis and coccidiosis as noted above. Nephrosis was determined to be the cause of death in four eight-week-old lambs submitted to Edinburgh from three separate farms. In all cases the kidneys were pale and enlarged with typical tubular damage on histopathology. No specific underlying cause could be established in one lamb but the group had been treated with anthelmintic four times in the previous ten days because of suspected nematodirosis. Underlying coccidiosis was detected in the other three lambs but all had been treated with anthelmintic five or six days prior to death so concurrent nematodirosis could not be ruled out.

PIGS
Generalised and systemic conditions
*Actinobacillus suis* was diagnosed as the cause of five deaths in a litter of 13, three-week-old piglets. The animals developed joint swelling, dyspnea, lost of condition over a few days and died. On post mortem examination there was purulent material in the left carpal joint and the right carpal joint was swollen and the joint capsule was thickened. *Actinobacillus suis* was isolated as the predominant organism in a heavy growth from the lung and left carpal joint.

*Streptococcus suis* serotype 2 was diagnosed as the cause of ataxia, joint problems and depressed mentation in piglets at weaning. Two piglets that were lethargic, ataxic, reluctant to weight-bear and had swollen joints were examined postmortem. In both piglets there were multiple joints affected by excess effusion with excess cerebrospinal fluid also noted in one animal. *S. suis* serotype 2 was isolated as a pure, moderate growth from an affected elbow joint of one piglet.

**Alimentary tract disorders**
Clostridial-type enteritis was diagnosed in one-week-old piglets with scour in an outdoor breeding herd. Postmortem examination of three piglets found liquid, pink-tinged small intestinal contents in each case with mucosal hyperaemia in one piglet. *Clostridium sordelli* was isolated in mixed culture from two piglets and *Cl. perfringens* was isolated in mixed growth from the third. Histopathology demonstrated lesions of clostridial-type enteritis in all piglets. Although a sow vaccination protocol was in place it was believed unlikely to provide sufficient levels of maternally derived antibodies in colostrum to protect piglets against *Escherichia coli* and clostridial disease due to the timing of the vaccination.

*Salmonella Typhimurium* was found to be the cause of sudden loss of condition and scour in newly weaned piglets. Exudative epidermitis (greasy pig disease) was also detected. At postmortem examination there was marked congestion of the kidneys, liver and spleen. The gastro-intestinal mucosa was hyperaemic throughout its entire length and there was scant liquid content within. *Salmonella Typhimurium* was isolated in direct culture as a moderate pure growth from the lung and liver of one piglet, and from the gastro-intestinal tract, as part of a mixed growth from both piglets.

**BIRDS**
Poultry
Combinations of yolk sac infection, poorly healed navels and colisepticaemia were seen in sequential batches of broiler chicks from one to eight days of life. Poorly healed navels and infected yolk sacs were initially noted, but as the birds grew older lesions of fibrinous pericarditis, perihepatitis and splenomegaly were also seen. Bacteriology consistently demonstrated *Escherichia coli*. A hatchery-related problem was suspected.

Coccidiosis was diagnosed in a very thin 12-week-old black hybrid poult which was recumbent. The small intestinal contents were liquid and frothy and the caeca also contained liquid contents. Coccidial oocysts were identified on smears from small intestine and caecum, and a count of 93,400 oocysts per gram was detected in caecal contents.

Serological evidence of exposure to *Mycoplasma gallisepticum* and infectious bronchitis was found in a two-year-old laying hen submitted for postmortem examination. The free range 100 hen holding had been losing adult hens over a period of one year. The hens had been showing clinical signs of a respiratory infection, including coughing, wheezing and weight loss. At postmortem examination the lungs were congested and oedematous. No bacteria were cultured from lung tissue.
Avian tuberculosis was found on postmortem examination of one of two, two-year-old hens from a free range flock of 195. The owner reported vague clinical signs with abnormal vocalisation and some sneezing in about 40 birds, and five had died over the previous two weeks. At necropsy the bird was thin with a small number of lice in the plumage. The abdomen contained abundant clear, yellow, gelatinous fluid and the liver was markedly enlarged by innumerable coalescing off-white nodules from 1 to 10 mm in diameter. Similar nodules expanded the spleen and were scattered over the intestinal serosa and two nodules were present in the lungs. These changes were considered to be highly suggestive of avian tuberculosis and acid-alcohol fast bacilli were seen in smears. Histopathology revealed that the organisms were present within necrotic granulomata confirming the diagnosis. Examination of the second bird revealed egg peritonitis.

Postmortem examination of a two-year-old black rock hen revealed degenerative cardiomyopathy. The history provided indicated that one of seven turkeys, one of nine quail and three of 40 hens had died. The only gross abnormality was a pale focus 5cm in diameter in the left breast muscle considered to be due to a recent antibiotic injection. However, histopathology of the left ventricle of the heart at the apex revealed full thickness replacement of the myocardium by fibroblasts and chronic active inflammation. Small islands of myofibres remained within this focus and were often necrotic. Elsewhere in the heart there were occasional foci of necrosis or single necrotic myofibres replaced by macrophages and heterophilis. Although myocardial degeneration can be sporadic and idiopathic the possibility of ionophore toxicity or nutritional deficiency was highlighted.

Game birds
One of the commonest diagnoses made in game birds in June was rotavirus infection, sometimes preceded or followed by other disorders. Some batches exhibited the typical frothy caecal contents frequently described in birds with rotavirus but sometimes the postmortem picture was of delayed starve-outs. Yolk sac infection was initially diagnosed in a batch of pheasant chicks submitted for necropsy the day following delivery to the rearing site. Their navelcs were poorly healed and their abdomens were distended by large infected yolk sacs. *E. coli* was isolated from the infected yolk sacs. Approximately 10 per cent of the batch died over the following five days, when further birds were submitted for postmortem examination. No cases of yolk sac infection were seen in this second batch, but the submitted birds all had fluid intestinal contents and yellow or green caecal contents with gas bubbles. Rotavirus was subsequently demonstrated by polyacrylamide gel electrophoresis (PAGE). Rotavirus infection was also confirmed in another batch of pheasant chicks aged six days in which the caecal contents were pasty and yellow, and in birds one week older on the same site in which a combination of rotavirus infection and coccidiosis was diagnosed. On a different site on which rotavirus infection had previously been confirmed and mortality had exceeded 10 per cent by 16 days, secondary colisepticaemia was found in the submitted birds. Affected birds had enlargement of the liver and spleen, sometimes with additional fibrinous pericarditis, and heavy pure growths of *E. coli* were isolated from affected birds. SAC C VS comments that these cases demonstrate the value of examining sequential batches of birds if mortality persists.

A generalised streptococcal infection of unknown species was found in a batch of ten-day-old ducklings reared on a game estate. Twelve ducklings had died in two days, and others in the group of 2450 were described as being dull and fluffed up. The birds were bedded on poor quality straw. Three affected ducklings were submitted and showed mild pleurisy and lung congestion. Two discrete white nodules were seen in the left lung of one bird and discrete white plaques were seen in the airsac of another. Mild pericarditis was also noted. Staining of a plaque from the airsac did not identify any fungal hyphae but a *Streptococcus* species was isolated from lung and liver tissues. It was not possible to determine the species, however the isolate was found to be resistant *in-vitro* to tetracyclines, a relevant finding since treatment with tetracycline in the drinkers had been initiated shortly before the submission.

Coccidiosis remains one of the commonest conditions diagnosed in game birds submitted to SAC C VS in the summer months, despite the routine inclusion of anticoccidial drugs in the feed. This may reflect both the potential for large numbers of coccidial oocysts to build up and persist in the rearing and release pens, and the relatively low inclusion rates of the anticoccidial preparations in the feed. 94 per cent of pheasant submissions examined by SAC C VS between 2005 and 2012 in which coccidiosis was diagnosed occurred in the months June, July and August. In partridges however coccidiosis tends to persist into the autumn, with 78% of partridge submissions with coccidiosis occurring in June to August, and a further 13 per cent in September and October (Figure 4). The wider temporal spread in partridges compared with pheasants may be the result of differences in rearing and releasing practices: pheasants are usually released at around six or seven weeks of age but partridges are usually retained in their rearing accommodation for longer and released at around twelve weeks old.
Histomonosis (blackhead) was suspected to be responsible for the severe necrotic typhilitis observed at necropsy of an adult peahen that died after a short illness. SAC C VS comment that peafowl appear to be very susceptible to histomonosis.

**Pigeons**
Pigeon paramyxovirus 1 (PPMV-1) infection was the cause of death of six racing pigeons. Young pigeons had been brought in to the loft two weeks previously and a number of pigeons had been showing signs of diarrhoea. One individual was showing neurological signs and circling. Three pigeons were submitted for postmortem examination, two of which had dilated and impacted crops. PPMV-1 RNA was detected by real time PCR in pooled intestinal contents and mixed viscera. PPMV-1 is a notifiable disease and the DVM was informed.

**Wild birds**
Further cases of presumed trichomonosis were seen in June, mostly affecting siskins (*Carduelis spinus*) but also other species of finch. Changes in the oesophagus varied from mild diffuse reddening and thickening, to small nodule formation, to marked oesophageal necrosis and serositis. Yellow debris almost occluded the larynx of one siskin and a chaffinch (*Fringilla coelebs*) and another chaffinch had necrotic lesions in the oesophagus and oropharynx, extending to the side of the face. Concurrent bacterial or yeast infections were sometimes seen: *Salmonella Typhimurium* RDNC (reacts, does not conform) was recovered from two siskins from one site, *S. Typhimurium* phage type 40 from a chaffinch from another site, and siskins from neighbouring gardens yielded *S. Typhimurium* DT 120 (two birds), DT 1 (three birds) and DT 208 (one bird). *Escherichia albertii* was isolated from one siskin, and *Candida albicans* from a chaffinch.

Aspergillosis was diagnosed in a capercaillie cock. The bird had been lethargic for ten days during which time transient diarrhoea was observed. At gross postmortem examination circular plaques on opaque air sacs, caseous exudate in the trachea and discrete, round granulomatous lung lesions were evident, and *Aspergillus fumigatus* was recovered on lung and air sac culture.

**MISCELLANEOUS**

**Exotic Animals**
*Otariodibacter oris* was isolated from an abscess on the flipper of a captive Californian sea-lion. The abscess appeared after the sea-lion developed a stereotypy which involved constantly nibbling or sucking on the flipper.

[Figure 4 – Spread of coccidiosis diagnoses in game birds](image)