OVERVIEW
- Mortality due to idiopathic necrotising enteritis of beef suckler calves
- *Clostridium perfringens* type D disease in a bull
- Diaphragmatic rupture and hernia in a beltex ewe
- Viral-type pneumonia and enteropathy in weaned piglets
- Colisepticaemia and adenovirus infection in housed broilers

GENERAL INTRODUCTION
After an unsettled start February was a month characterised by sunshine across Scotland. Initial rain and snow was replaced by dry and cold weather across most of the country. The dry weather was welcomed by many farmers as it allowed access to arable land for essential and overdue work in preparation for sowing spring barley and other forage crops.

A series of meetings to update farmers on the progress of the PARABAN project was announced in February. Since 2010, researchers from Scotland’s Rural College (SRUC), the University of Edinburgh, University of Glasgow, and the James Hutton Institute have worked with farmers and their vets to identify the best way to control paratuberculosis (Johne’s disease) in Scottish conditions. With the project now nearing its end the meetings offered an opportunity for farmers to hear the conclusions that can be drawn from two years of intensive testing of blood and faeces from cattle, abattoir sampling and analysis of the environment around farms.

CATTLE
Parasitic diseases
Fasciolosis continued to be diagnosed in cattle throughout February with a total of 63 diagnoses compared with 36 and 35 cases diagnosed in the same month in 2011 and 2012 respectively.

Dumfries diagnosed fasciolosis and concurrent parasitic enteritis as the causes of ill-thrift and death of an out-wintered six-month-old Galloway calf. Necropsy revealed very large numbers of adult *Fasciola hepatica* in the liver and *Oesophagostomum* species worms in the caecum.

Generalised and systemic conditions
Aberdeen suspected *Histophilus somni* infection was responsible for multiple myocardial abscesses and severe meningo-encephalitis in an 11-month-old Charolais-cross heifer. It was the second animal to die from a group of 52 over a period of five days. There was a history of pneumonia in the group and the submitted animal was treated with antibiotic and anti-inflammatory drugs a week prior to death. Three days after treatment it was found recumbent, displaying opisthotonus and bruxism. At necropsy there were myocardial abscesses of up to three centimetres in diameter (Figure 1). Neurohistopathological examination revealed an abscess between the septum pellucidum and thalamus along with a severe, chronic, mixed inflammatory cell meningoencephalitis centred on the forebrain. A bacterial aetiology was suspected but previous antibacterial therapy and the chronic nature of the lesions precluded the recovery of any significant bacteria. SAC C VS considered that the clinical history and pathology were consistent with *H. somni* infection.

Alimentary tract disorders
A high incidence of mortality due to idiopathic necrotising enteritis of beef calves was experienced in a 100 cow suckler herd over a three week period. Three of four calves aged nine to ten weeks that died after displaying tenesmus, were submitted to Aberdeen for postmortem examination. All investigated cases were negative for BVD antigen by ELISA and PCR testing. Gross findings were typified by necrotic mucosal lesions throughout the intestinal tract (Figure 2) and histological findings were highly suggestive of idiopathic necrotising enteritis of beef calves.
All of the affected calves were in a group that had access to a grass field during the day. SAC C VS commented that, despite this condition being recognised for many years, the aetiology is still unclear.

St. Boswells diagnosed *Clostridium perfringens* type D infection in a 15-month-old Limousin bull. The diagnosis is unusual for an animal of this age as over the past 10 years 85 per cent of cases diagnosed by SAC C VS occurred in calves less than six-months-old. The bull was dull and inappetant prior to developing ataxia, collapsing and dying. Histological examination of the brain found changes consistent with focal symmetrical encephalomalacia caused by the epsilon toxin of *C. perfringens*. Although clostridial toxins were not detected in the intestinal contents, the changes in the brain suggested that toxin was circulating, causing tissue damage and death. The affected bull was one of nine housed and individually penned. Ten days previously, several in the group started scouring following feeding of a new batch of feed. SAC C VS considered that the sudden change in diet may have caused proliferation of *C. perfringens* in the intestinal tract.

**Respiratory tract diseases**

Ayr diagnosed IBR (infectious bovine rhinotracheitis) and suspected secondary bacterial involvement in a pneumonia outbreak experienced on fattening unit. The affected farm had 120 young stock aged nine to 15 months from multiple sources housed in one shed. Respiratory vaccinations were not routinely used on the farm. Some animals in the shed were already coughing when a new batch of 26 animals was added. Within two weeks of arrival all animals in the new batch had signs of respiratory disease and four had died. Necropsy of one, a ten-month-old Limousin-cross bullock, revealed inflammation of the ocular conjunctivae, diffuse inflammation of the tracheal mucosa with purulent debris in the bronchi, and consolidation and abscessation of the cranial lung lobes. The caudal lung lobes were hyper-inflated. BoHV-1 DNA was detected in lung tissue by real time PCR and histopathology confirmed a severe, acute necrotising tracheitis and an acute, necrotising and suppurative bronchopneumonia. Although bacterial cultures were unrewarding, most likely due to antibiotic therapy prior to death, the gross and histological lung changes were considered typical of *Mannheimia sp. / Pasteurella sp.* infection. SAC C VS recommended a review of the purchasing, quarantine and vaccination policy of the farm.

Inverness diagnosed a ruptured pulmonary aneurism in a three-year-old British blue bull that was found dead. Necropsy revealed a cavity of approximately ten cubic centimetres in the lungs that was filled with clotted blood and surrounded by congested and consolidated tissue. The heart had a rounded shape and right ventricular hypertrophy was evident. Histopathology confirmed extensive pulmonary fibrosis and arteriolar hypertrophy as the cause of the ventricular hypertrophy. SAC C VS considered the aneurism had resulted from a previous focal pneumonia.

**Reproductive tract conditions**

Abortions dominated submissions to all centres this month with foetopathy due to *Bacillus licheniformis* being the most common diagnosis. Twelve cases were diagnosed in the month, the same number as in February 2012. Abortions due to *Listeria* species and fungi were also diagnosed. SAC C VS suspects that these pathogens could be related to spoiled silage, likely a reflection of the poor weather last summer.

**A review of blackleg diagnoses - 2002 to 2012**

*Clostridium chauvoei* infection or blackleg was diagnosed by SAC C VS 163 times between January 2002 and December 2012. Figure 3 shows the number of blackleg diagnoses expressed as a percentage of Scotland’s total cattle population between 2002 and 2012. After adjusting for the change in the Scottish cattle population during this period, increases in the incidence of blackleg can be seen during 2003 and 2012.

Most diagnoses were made in the cattle dense area of Dumfries and Galloway while most diagnoses as a proportion of the county cattle population were made in Orkney. Studies in Argentina (Uzal et al 2003) and Nigeria (Useh et al 2006) have demonstrated a positive correlation between average annual rainfall and outbreaks of blackleg, leading to the hypothesis that rainfall may increase the risk of blackleg by disrupting the soil and causing *Cl. chauvoei* spores to surface. However, the relationship between total annual rainfall and the incidence of blackleg is not straightforward in
Scotland as Meteorological Office data shows that Scotland’s annual rainfall was above average in 2012 but below average in 2003. The average age of an affected animal was 9.2 months and the median age was six months. The disease was most prevalent in cattle four to six-months-old with the highest incidence in this age range occurring between June and October, the period when most of these calves are out on grass for the first time. There was no statistical difference in the number of diagnoses made in each gender; 58 in males (0.42; 95% confidence interval 0.34 to 0.51) and 79 in females (0.58; 95% confidence interval 0.49 to 0.66).

References:

SMALL RUMINANTS
Nutritional and metabolic disorders
Severe energy deficiency was confirmed in a group of ewes due to lamb within a month. Blood samples submitted to Dumfries from five twin and five triplet bearing ewes gave a mean BOHB result of 2.88mmol/l. The target mean for scanned ewes is <1mmol/l.
Aberdeen diagnosed pregnancy toxaemia in three ewes that were 12 days from the start of lambing. The group was handled the previous week for oxytetracycline injections as an aid in the control of EAE and five then showed signs of pregnancy toxaemia. Three ewes were blood sampled and BOHB levels were high at 8.9, 8.4 and 9.0 mmol/l.

Alimentary tract disorders
Ruminal acidosis was an unexpected diagnosis in a ten-month-old Cheviot hogg found dead and submitted to Inverness. Three other wintering hoggs were also found dead and a further two were moribund. Opening the rumen revealed a large amount of wheat and the pH of ruminal fluid was 4.0, confirming acidosis. No cereals were being fed however the source proved to be a neighbouring pheasant pen into which the sheep had escaped.

Both Perth and Edinburgh diagnosed intestinal torsion as the cause of death in five-week-old pedigree lambs shortly after introduction of creep feed. Dumfries examined a neonatal Texel lamb that died six hours after birth. Gross postmortem examination revealed dark red colouration of the jejunum, ileum, caecum and colon with haemorrhagic fluid in the intestinal lumen. Although the changes were similar to those seen in cases of intestinal torsion this was considered extremely unlikely given the age of the lamb. There was no gross evidence of a torsion, cultures were sterile and clostridial toxin tests were negative. Histopathology revealed dramatic mucosal congestion with haemorrhage into the lumen. There was no evidence of bacteria or necrosis. SAC C VS considered the most likely explanation in this case was a problem with circulation to the intestine resulting in transient hypoxia causing damage to the endothelial cells. Haemorrhage then followed when blood flow resumed.

Generalised and systemic conditions
Pasteurellosis due to *Bibersteinia trehalosi* was strongly suspected by Dumfries as the cause of deaths in a group of wintering blackface hoggs. Nine hoggs were found dead over a 48 hour period and one was submitted for postmortem examination. Necrotic lesions were found in the pharynx (Figure 4) and there were multiple ulcers of the oesophageal mucosa. The lungs were dark red and consolidated with petechial haemorrhages. Although *B. trehalosi* septicaemia was suspected only a pure, profuse growth of *Trueperella pyogenes* was isolated from the lungs. Histopathology however confirmed changes typical of pasteurellosis suggesting that the *T. pyogenes* was a secondary infection. The vaccinal status of the sheep was unknown.

Respiratory tract conditions
Diaphragmatic rupture and hernia was diagnosed in a Beltex ewe submitted to Dumfries for necropsy. Three housed, heavily pregnant ewes were treated for suspected pneumonia of three day’s duration and all subsequently died. Prior to death the submitted ewe was in respiratory distress with abdominal breathing and no breath sounds on the left side of the thorax. Postmortem examination revealed a 12 by 10 centimetre tear in the diaphragm through which the abomasum and reticulum had herniated, collapsing the left lung (Figure 5). There was some blood clot and fibrin in the thorax and adhesions had formed between the edges of the tear and the viscera. Twin lambs with a combined weight of ten kilograms were present *in utero*. Spontaneous
diaphragmatic hernias were recognised in Dutch texels in late pregnancy. The phenomenon is thought to be associated with the short length between the diaphragm and pelvis and heavy, usually triplet, lambs in-utero. To counter the issue, breeding for increased length was initiated and the problem is now seen less often.

Nervous system disorders
A flock owner reported the deaths of blackface hoggs with vague signs of illness. The group were treated with a combined fluke and worm drench one week previously. One animal submitted to Dumfries for postmortem examination showed a diffuse multifocal hepatitis and a few dead fluke that suggested treatment was successful. Neuropathology revealed widespread, severe spongy change consistent with a hepatic encephalopathy considered to be secondary to severe, chronic fasciolosis.

Skin diseases
Chronic sheep scab was diagnosed in a texel tup submitted to Dumfries because of poor condition and recumbency. Two other tups housed with this animal had lost condition and died. No scour or respiratory disease was reported. Clinical examination found the tup was sternally recumbent and continuously making chewing movements with its mouth. It was unresponsive to handling even when laid on its side. There was extensive crusting and patches of wool loss over the whole body with some skin thickening and enlargement of peripheral lymph nodes. *Psoroptes ovis* mites were identified in skin scrapings confirming extensive, unresolved sheep scab. The tups were housed and treated twice for sheep scab with ivermectin injection in October. SAC C VS considers that treatment with ivermectin is not appropriate in housed sheep as it has no persistent effect and the mites are able to re-infest the sheep as they can survive in the environment for up to 17 days. Following euthanasia, necropsy revealed excess, clear ascitic fluid in the abdomen; no fluke were found in the liver and 850 *Teladorsagia* species worms were recovered from the abomasum. Biochemistry revealed a hypoalbuminaemia of 19g/l, (reference range 30-40g/l), considered to be a result of protein loss through serum exudation from damaged skin.

PIGS
Generalised and systemic conditions
A viral-type pneumonia and enteropathy was diagnosed as the cause of ill-thrift and coughing in five-week-old piglets. At weaning the piglets’ accommodation had taken time to get up to temperature so it was suspected that they may have become chilled. Food and water intakes had been poor since weaning. Four of the five euthanased piglets were submitted for necropsy were thin, dehydrated and hairy. Their lungs were affected by congestion, interstitial and interlobular oedema, and consolidation with a cranio-ventral distribution. The intestines were distended and the colonic contents were liquid and yellow. Bacterial culture, rotavirus testing and parasitology did not detect any significant organisms from any samples of intestinal content. A profuse mixed growth that included *Pasteurella multocida* was isolated in culture from the lung of one piglet. Swine influenza and PRRS PCR testing of pooled lung tissue was negative. Histopathology of lung tissues revealed lesions of viral-type interstitial pneumonia with widespread lymphocyte and neutrophil infiltrates in the affected lobules. A complicating bacterial insult was observed to be affecting the lungs of one pig. Intestinal histopathological examination detected viral-type enteric changes with villus atrophy and patchy degeneration of surface epithelium at villus tips. Although some of the villus atrophy was attributable to weaning, the severity, coupled with the epithelial degenerative changes was suggestive of an additional enteric viral insult. Advice was given that submission of further affected acute cases may be worth considering.

Gastro-intestinal diseases
Coccidiosis with concurrent cryptosporidiosis in some animals was diagnosed as the cause of scouring and ill-thrift in a litter of six, three-week-old Tamworth / Large White cross piglets. One piglet and one faeces sample were submitted for examination. Postmortem examination of the piglet revealed poor body condition, severe dehydration, scalding around the tail and perineum and pasty fluid intestinal contents. The faeces sample from another ill-thriven piglet was formed rather than fluid and scant cryptosporidium oocysts were seen. Coccidial oocyst counts were low in both a sample from the piglet and the submitted faeces, however histopathology on the intestine of the piglet revealed moderate numbers of coccidial forms in the intracellular developmental stages, with degenerative changes in the...
affected villi. SAC C VS commented that due to the lifecycle of coccidial species, it was not uncommon to find clinical signs before large numbers of coccidial oocysts were visible in the faeces. Cryptosporidiosis may have been a contributor in some animals, as the clinical signs had been present for some days before submission.

**Respiratory tract disease**
Routine abattoir inspection of lungs from an enzootic pneumonia-free herd revealed widespread pulmonary consolidation. Lungs from 13 pigs submitted for examination showed areas of acute pneumonia either in the ventral aspect of the cranial lobes or scattered through the other lobes (Figure 6). These foci were congested and oedematous and considered to be suspicious of swine influenza. Six samples of lung were grouped into two pools of three for PCR testing. Influenza A (H1N1) RNA was detected in both pools; no *Mycoplasma hyopneumoniae* DNA was detected in either pool.

![Figure 6](image)

**BIRDS**

**Poultry**
Colisepticaemia was diagnosed in a batch of nine to ten-week-old broilers from a multi-age organic farm. Out of the 2,000 birds in the affected age group, 600 had died and 300 were not performing as expected. Three of the four submitted birds showed almost identical gross pathology characterised by a fibrinous polyserositis and an enlarged spleen. The gizzard of the fourth bird contained a large blood clot and the kollin layer had become detached. *E. coli* was recovered in mostly confluent and pure growth from multiple organs of all four birds. Histopathology of two birds with polyserositis showed evidence of systemic bacterial infection and in one case a focal area of necrosis was suggestive of toxaemia. Histological findings of the affected gizzard demonstrated an acute necrotising ventriculitis, with large intranuclear basophilic inclusion bodies in the epithelial cells suggestive of an adenovirus infection. Antibodies to avian adenovirus were detected by gel diffusion test supporting the suspicion of adenovirus involvement. Intense heterophil infiltrates were also present in the necrotic zones suggesting a complicating bacterial involvement. Ventriculitis associated with adenovirus infection is a well-recognised condition in broilers and can also occasionally be seen in adult birds.

**Wild birds**
All six buzzards (*Buteo buteo*) received for necropsy from five different locations appeared to have starved, possibly as a result of the prolonged cold wet weather. Concurrent findings included severe necrotic stomatitis associated with large numbers of hairworms (*Eucoleus* sp.) in one bird and caseous airsacculitis associated with *Aspergillus fumigatus* in another. Radiographs of a third buzzard revealed the presence of two pieces of shot but there were no injuries to suggest that shooting had been the cause of death. Winter deaths have been encountered in buzzards in previous years.

**MISCELLANEOUS**

**Camelids**
TB was suspected to be the cause of multiple, creamy, caseous abscesses in a ten-year-old male llama. The llama was purchased four months previously from the Borders. Two elderly guanacos had died on the holding at the end of last year and one of these was found to have multiple, caseous masses when examined at the knackery. The submitted llama had caseous abscessation of the lungs, liver, spleen and kidneys as well as the mesenteric and mediastinal lymph nodes. Mycobacterial cultures were sent to AHVLA and results are pending at time of publication.