OVERVIEW
- Idiopathic necrotising enteritis in a five-month-old calf
- Nutritional osteodystrophy in eight-month-old Holstein Friesian bulls
- Erysipelas arthritis in nine-month-old lambs
- Duck viral enteritis in a backyard flock
- Salmonellosis in horses

GENERAL INTRODUCTION
January was largely unsettled, with some heavy rain at times and a succession of vigorous low pressure systems that brought very stormy conditions. Rainfall overall was 142 per cent of average and approached double the long-term average for parts of western and northern Scotland. The latter part of the month brought some colder and briefly more settled weather. Temperatures occasionally fell below minus 10°C in the Scottish glens and there were significant snowfalls across high ground. The mean temperature for the month was 0.1°C below the 1981-2010 average and sunshine amounts were 119 per cent of average overall.

SAC C VS advised that many commercial sheep flocks could be affected by a rise in the incurable viral disease maedi-visna (MV) and recommended that flocks where ewes have lost condition since tupping should target test 12 older, thinner animals using the MV diagnostic test. A similar approach should be taken to sheep showing ill-thrift or exercise intolerance.

DISEASE ALERTS
The following conditions were reported by SAC C VS disease surveillance centres in May 2014. Given similar climatic and production conditions, they could also be important this year.
- Cryptosporidiosis in beef calves
- Idiopathic necrotising enteritis in beef calves
- Streptococcus dysgalactiae arthritis in lambs
- Pulpy kidney disease in lambs
- Coccidiosis in lambs

CATTLE
Respiratory tract diseases
Bovine respiratory syncytial virus (BRSV) was the most commonly diagnosed cause of pneumonia in January. St. Boswells diagnosed the condition on four farms. In two outbreaks the diagnosis was made by detection of the virus from guarded nasopharyngeal swabs by real-time PCR. Sampled animals were dyspnoeic calves aged two to nine months that were pyrexic with a serous nasal discharge. On the other two farms paired serology was used to make the diagnosis. On each farm six of the affected nine-month-old calves were blood sampled in the acute stages of the disease and again three weeks later. In all sampled animals there was evidence of seroconversion to BRSV.

Edinburgh diagnosed BRSV at postmortem examination of a nine-month-old British blue cross bullock that died suddenly. None of the other 50 spring born calves in the group showed clinical signs of pneumonia. At postmortem examination the larynx was oedematous and the tracheal mucosa congested. The cranioventral lung lobes were consolidated and suppuration was evident. BRSV was detected in lung lesions by real-time PCR and both Pasteurella multocida and Trueperella pyogenes were recovered on bacterial culture.

Bovine herpes virus-1 (BHV-1) was the next most commonly detected respiratory virus. Perth examined viscera from one of three deaths in a group of 31 beef cross fattening cattle. The tracheal mucosa was inflamed and overlaid by a thick layer of mucopurulent, necrotic material. The cranioventral lung lobes were consolidated with abscesses throughout. The remaining lung fields were mildly affected by emphysema and oedema. BHV-1 was detected by real-time PCR and Bibersteinia trelhalosi was recovered on culture. Histological changes were consistent with infectious bovine rhinotracheitis (IBR) and secondary bacterial pneumonia.

Alimentary tract disorders
Edinburgh diagnosed idiopathic necrotising enteritis (INE) in a single-affected, five-month-old Charolais calf from the group of 50 cows with calves at foot. The calf was ill thiven, was treated three times for pneumonia and developed diarrhoea a few days before death. At postmortem examination there were ulcers on the tongue and the laryngeal epithelium was necrotic. The cranioventral lung lobes were consolidated and the caudal lobes contained scattered dark red, firm blood-filled lobules. There was extensive ulceration of the abomasal mucosa and necrosis of the submucosal lymphoid deposits on the mucosal surface of the small intestine (Fig 1), resulting in localised thickening of the intestinal wall and fibrinous adhesions between loops of intestine. Screening for bovine viral diarrhoea virus (BVDV) was negative. Histological examination identified fungal invasion of the abomasal ulcers. Secondary infarctions were seen in the lungs and large multinucleate giant cells and syncytia were seen in the terminal airways and alveoli. There was also lymphoid depletion and trilineage hypoplasia of the sternal bone marrow. Although this condition typically affects six- to 12-week-
old calves at grass, SAC C VS considered the findings consistent with INE.

DSCs rarely see cases of mucosal disease as a result of the eradication scheme in Scotland but Ayr diagnosed the disease in a four-month-old Charolais-cross heifer calf, from a group of four housed cows with calves at foot, that was treated for suspected coccidiosis and pneumonia in the two weeks before death. At postmortem examination there was enlargement of the carcass lymph nodes and spleen, linear striations in the oesophageal mucosa and extensive consolidation and abscessation of lung lobes. Serum collected from the carcass tested positive for BVDV by antigen ELISA. 

Mannheimia haemolytica was recovered from lung lesions, but screening for BHV-1, BRSV and parainfluenza-3 virus (PI3V) by real-time PCR was negative. Histological lesions comprised oesophageal ulceration, marked intestinal crypt necrosis and loss of Peyer’s patches with herniation of crypts into the vacated space. SAC C VS considered these findings consistent with mucosal disease and screening to identify any further viraemic animals in the herd was advised.

Reproductive tract conditions

Ayr diagnosed abortions due to Campylobacter fetus in three suckler herds and one dairy herd. In one of the affected suckler herds 17 out of 30 cows, due to calve in spring, were barren. One cow aborted and at postmortem examination the foetus, of approximately six months gestation, had fibrinous pleurisy, pericarditis, peripheratitis and an intercotyledonal placentitis. A pure growth of C. fetus was recovered from the stomach contents and the genetic variant is being determined by molecular techniques. C. fetus was recovered from only one sample of vaginal mucus from eight barren cows. An autogenous vaccine is currently being prepared from this isolate. In another herd three abortions, due to C. fetus, occurred in one week from a group of 33 suckler cows. The barren rate on this herd had been increasing over a number of years and 28 out of 180 cows were barren. Replacement heifers on this farm were sourced from dairy herds. Although sheath washings from four of the bulls were negative for Campylobacter spp., venereal campylobacteriosis was still suspected.

Dumfries examined two foetuses from a herd of 450 spring calving suckler cows, where three abortions occurred over a period of one month. In the first foetus a fibrinous perirenalitis and peritonitis was present and a pure growth of Streptococcus pluranimalium was recovered from the stomach contents. In the second foetus, no gross abnormalities were detected, but BVDV was detected in foetal fluid by antigen ELISA. SAC C VS advised further screening in the herd to detect and remove any animals persistently infected with BVDV.

Other agents identified as causes of bovine abortion this month included Neospora caninum, Bacillus licheniformis, Listeria monocytogenes, Escherichia coli, T. pyogenes and Yersinia pseudotuberculosis.

Ayr examined a stillborn anasarca calf from a ten-year-old Charolais cow, in a 80 cow beef herd, that required assistance at calving. The calf, weighing 65 kg, had oedematous tissues and extensive fluid in the abdomen. The spine was fractured at the thoracolumbar junction, there were five fractured ribs and both inhalation and ingestion of meconium were present. The right lung appeared underdeveloped, while the left lung was markedly enlarged and cystic. Histological examination of the lungs identified lesions consistent with congenital adenomatoid malformation (Fig 2), which is a sporadic congenital defect.
**Musculo-skeletal conditions**

Aberdeen suspected nutritional osteodystrophy as the cause of fractures and gait abnormalities in a group of 12 eight-month-old Holstein Friesian bulls. Two animals were euthanased due to suspected leg fractures. At postmortem examination of one bull both hind limbs exhibited abnormal range of motion on abduction. Bilateral, comminuted, displaced femoral fractures, with associated haemorrhage and oedema, were present. On histological examination thinning of cortical bone, haemorrhage and reduced numbers of epiphyseal bone trabeculae were identified and there was evidence of a previous fracture in the rib, with attempted healing. As there were reduced amounts of morphologically normal bone, SAC C VS considered these findings consistent with osteoporosis. Follow up investigation found that the group were fed an *ad lib* barley ration and that the clinical signs resolved when the diet was supplemented with minerals.

**Toxic conditions**

Inverness diagnosed plant toxicity as the cause of death of a two-year-old Scottish blackface ewe, which was found dead in a garden containing a yew tree. At postmortem examination the rumen contained a significant amount of dark-green macerated vegetation, which included fragments of yew (*Taxus baccata*) leaves in addition to other garden plants. The cardiac atria were dilated and the lungs were congested with stable foam in the bronchial tree. Yew contains the alkaloid taxine, which can cause death within minutes of ingestion via its action on the myocardium, and is most toxic during winter (Payne and Murphy, 2014). SAC C VS notes that incidents of plant poisoning often involve a history of straying and/or snow cover. In this case the animals had no access to supplementary feed and there were recent hard frosts.

Ayr suspected toxicity in five ewes and two rams that died within 24 hours of treatment with nitroxynil flukicide injection. The ewe and ram submitted for postmortem examination were given double the recommended dose. Lesions consistent with laryngeal chondritis were seen in the ram and it was considered that the hyperthermia and tachypnoea associated with nitroxynil overdose, in combination with a narrowed airway, could have predisposed it to respiratory compromise and death.

**Generalised and systemic conditions**

Edinburgh diagnosed colisepticaemia in two lambs from a pedigree Suffolk flock in which several lambs faded and died within 48 hours of birth. Initially the lambs appeared vigorous and all received large doses of powdered colostrum before sucking the ewes. At postmortem examination one lamb had evidence of scour and *E. coli* K99 was detected. Colisepticaemia was diagnosed in both lambs with zinc sulphate turbidity (ZST) test results of 2 and 3 units confirming hypogammaglobulinaemia (reference range >14 units).

The immediate administration of powdered colostrum could have delayed ingestion of colostrum from the ewe. Colostrum replacers are good sources of energy and can thus prevent starvation/hypothermia but their...
imunoglobulin content is variable (Corke, 2012; http://www.icne.co.uk). SAC C VS comments that ensuring lambs suck the ewe leads to more effective transfer of immunity and better protection against *E. coli*.

**Reproductive tract conditions**
A three-year-old nanny goat aborted while housed and the foetus was submitted to Edinburgh for investigation. No gross abnormalities were detected but *C. fetus* was isolated from the stomach contents. Ovine abortions due to EAE, toxoplasmosis and *Yersinia pseudotuberculosis* were diagnosed during January.

**Musculo-Skeletal conditions**
Dumfries diagnosed erysipelas arthritis at postmortem examination of two, nine-month-old Texel-cross lambs from a lowland flock that were euthanased for investigation of chronic lameness. Around 2 per cent of 800 lambs were affected, with clinical signs beginning at four-to-six weeks of age. Response to treatment with antibiotics and non-steroidal anti-inflammatories (NSAIDs) was poor. One lamb had a bilateral hock enlargement due to thickening of the peri-articular tissues. There was no evidence of joint effusion, pus or cartilage erosion. The second lamb had whitish joint fluid in the left stifle and slight enlargement of both hocks. Multiple swabs and sections of synovial membrane were cultured, but *Erysipelothrix rhusiopathiae* was only isolated from one joint. SAC C VS comments that the chronicity of the condition, with a long interval between initial infection and bacteriology, could explain failure to culture the organism from more joints. Erysipelas serology results, which were highly positive at >1:20,480 in both cases, further supported the diagnosis. Previously the flock owner had vaccinated ewes pre-lambing with Eryvac® (Zoetis) when it was still licensed for use in sheep, and this had been effective.

**Other diseases**
Dumfries isolated heavy growths of *Mycoplasma conjunctivae* from two ocular swabs that were submitted from a flock with ongoing kerato-conjunctivitis (OKC) (Fig 3). The condition was first seen in September 2014 and since then individual and group antibiotic treatments, plus isolation of affected animals, had been undertaken. A small group of 12 ewes was reported to have recurring problems. *M. conjunctivae* is the most common cause of OKC and it has been shown that treatment may not eliminate infection from the eye, resulting in a carrier state and flare ups of disease (Egwu, 1992; Hosie and Greig, 1995).

**PIGS**

**Generalised and systemic diseases.**
Edinburgh diagnosed porcine reproductive and respiratory syndrome (PRRS) in a 400 place weaner unit that was experiencing problems with varying growth rates and ill-thrift in piglets from four to eight weeks of age. The unit was all-in, all-out and stocked from a single breeding unit. Two successive batches had been affected, with 5 per cent to 7 per cent mortality and an unsatisfactory level of size variation at the end of the four-week period. Clinical signs were vague with mainly low levels of scour and coughing. Blood samples were collected from 20 four-week-old weaners in the next batch to arrive at the unit. Samples were tested in four pools and two of these were positive for the EU strain PRRS virus. The breeding herd was known to be positive for PRRS virus, but was fully vaccinated in an attempt to achieve herd stability. The finding that some of the weaners were viraemic at the time of weaning indicated that herd stability had not been achieved, so consideration was given to vaccinating suckling piglets to protect them after weaning.

**Enteric diseases**
Edinburgh examined rectal swabs from an outbreak of neonatal diarrhoea, which affected approximately 20 per cent of piglets and caused 5 per cent mortality. The farrowing house was well-managed and the piglets had received colostrum. *E. coli* was isolated from all samples, but isolates were untypable by standard serotyping as the poly A, B and C antisera autoagglutinated in combination with culture material. Isolates were confirmed as positive for the heat-stable toxin gene target when tested with the *E.coli* virulence PCR test, but none of the fimbrial gene targets were demonstrated. The sows were on an *E.coli* vaccination programme, but it...
appeared that there was no protection against this particular toxigenic strain.

**BIRDS**

**Poultry**
Aberdeen diagnosed coligranulomas as the cause of wasting in an 18-month old Rhode Island red cockerel, from a small free-range flock, that was euthanased on welfare grounds. At postmortem examination there was a 3 cm round fawn-coloured mass in the left lung, which had a dark necrotic centre, and scattered small abscesses in the liver and spleen. *E. coli* was cultured from multiple organs. Coligranulomas are seen sporadically in adult birds, but are generally not considered to be a flock problem. There was no evidence of any other underlying disease.

Ayr diagnosed duck viral enteritis (DVE) in an adult duck and a drake, two of eight ducks from a flock of 25 that died suddenly over a one week period. On postmortem examination both ducks had blood-stained proximal small intestinal contents. Histopathology revealed lesions typical of DVE in the intestine with viral inclusion bodies seen in the intestines of both ducks and the spleen of one (Fig 4).

![Fig 4. Suspected duck viral enteritis. Intestine. Necrotic crypt epithelial cells with eosinophilic intranuclear inclusion bodies (arrows). H&E. Bar = 10 µm.](image)

Perth investigated a case of sporadic weakness, ataxia and mortality in a flock of 60 young Khaki Campbell and Indian runner ducklings that were reared on sawdust bedded courts. The submitted birds were around seven weeks old, some of which were found dead while others showed ataxia and weakness prior to death. Clinical examination of live ducks revealed tremor, ataxia and recumbency. There were moderate bumblefoot lesions in all birds submitted. At gross postmortem examination, two of the ducks had thick white deposits on the pericardium and epicardium, perhepatitis and discoulouration of the air sacs. *Riemerella anatipestifer* was isolated from the lungs of three out of five dead birds. Disease due to *R. anatipestifer* is most common in ducklings and entry is thought to be most often via the respiratory route or through damage to feet. *R. anatipestifer* was not isolated from the foot lesions, but they may have been the route of entry for the organism.

**Cage and aviary birds**
Aberdeen diagnosed a cervical abscess in a two-year-old African grey parrot with a three month history of neurological signs. Initially proprioceptive deficits had been noted by the owner. The bird became progressively weaker, more vocal and eventually developed seizures. The parrot was hospitalised for treatment on two occasions, but despite intermittent improvement its proprioceptive deficits remained. A subcutaneous mass, of approximately 3 cm by 1 cm, was observed ventral to the cervical spine. The mass contained dry, grey material consistent with a chronic abscess. The abscess was causing mild ventral displacement of the trachea and oesophagus and its position was likely to be causing pressure on the cervical spine, with resultant neurological signs.

**MISCELLANEOUS**

**Horses**
Perth isolated *Salmonella Typhimurium* phage type 1 from one of two sampled horses in a livery yard, in which three horses had diarrhoea. One horse had diarrhoea with weight loss, and the other, which had diarrhoea for one month, remained bright with a good appetite.

Horses are considered to be a common reservoir of *S. Typhimurium* (AHVLA, 2014), but *S. Typhimurium* phage type 1 is an unusual isolate in Scotland and is generally thought to be associated with wild birds. However, phage type 1 has been isolated from horses in England in recent years.

**Exotic animals**
Inverness diagnosed toxoplasmosis in a seven-year-old male Pallas’s cat (*Felis manul*). The cat had presented in status epilepticus, with dilated pupils, horizontal nystagmus, tachycardia and pyrexia of 41º C, and was euthanased after failure to respond to treatment. At postmortem examination, 2 ml of serosanguinous fluid was found in the pericardium and the bladder was dilated with copious straw-coloured urine. Neuropathology
revealed a marked, non-suppurative to granulomatous meningoencephalitis, with intralesional protozoal parasites consistent with *Toxoplasma gondii*. *Toxoplasma* cysts were not detected in the other organs.

References


**Feature - Review of bovine neonatal enteritis 2014**

Bovine neonatal (less then one month of age) enteritis diagnoses, as a percentage of diagnosable submissions in Scotland in 2014, were reviewed. *Cryptosporidium parvum* was the most commonly diagnosed infection at 25.7 per cent, followed by rotavirus (17.2 per cent), coccidiosis (10.8 per cent), coronavirus (4.5 per cent), *Salmonella* Dublin (2.8 per cent), K99 strain of *Escherichia coli* (1.6 per cent) and other *Salmonella* species (0.7 per cent) respectively. Other *Salmonella* species included *S. Typhimurium*, *S. Arizonae*, *S. Enteritidis* and an untypable group D *Salmonella*. Mixed infections were detected in many enteritis outbreaks. Hypogammaglobulinaemia, from inadequate colostrum absorption, was a common predisposing factor. In recent years there have been diagnoses of enteritis due to attaching and effacing *E. coli*. These diagnoses could be missed if there is a delay between death and harvesting of intestinal samples into formalin, as histological examination of very fresh intestine is required.

Figure 1 shows the number of outbreaks of bovine cryptosporidiosis in 2014 by month and calf type. The peak of cases in April and May is driven by the presence of susceptible spring-born suckler calves. It is assumed that the majority of outbreaks where breed was not recorded were also in suckler calves. By contrast, outbreaks of cryptosporidiosis in dairy calves were relatively constant throughout the year, as the majority of dairy herds in Scotland calve all year round.

The zoonotic potential of both *C. parvum* and *Salmonella* species should be remembered when dealing with cases of neonatal enteritis. Appropriate hygiene measures should be taken and clients advised accordingly.

**Figure 1 – Outbreaks of bovine cryptosporidiosis in 2014 by month and calf type**

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Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec