

# Surveillance

## SAC C VS DISEASE SURVEILLANCE REPORT

# Bovine coronavirus suspected in the deaths of housed calves

- **Suspect bovine coronavirus pneumonia in calves**
- **Renal disease in 17-month-old Holstein Friesian heifers**
- **Tetanus in two- to six-week-old lambs**
- **Salt poisoning in three-month-old pigs**
- **Mass mortality of organic broiler chicks following suspected inhalation of toxic gases**

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

MAY was a generally unsettled month with rain and some heavy and occasionally thundery showers. There were some brief spells of more settled weather mid-month and in the last two days of the month, which saw some higher temperatures. It was a dull month, particularly for western Scotland, which had its dulllest May in a series from 1929. Overall sunshine hours were only 68 per cent of average.

### Cattle

#### Toxic conditions

Aberdeen suspected a toxic aetiology in the deaths of three 17-month-old Holstein-Friesian heifers. Postmortem examination revealed acute to subacute renal tubular necrosis, with areas of haemorrhage and interstitial oedema. Approximately half of a group of 50 were reported to have had poor rumen fill and illthrift since being turned out to permanent grass, three weeks previously. The worst affected animal that survived has recovered and the remainder are improving in condition. No toxic plants or substances were identified.

#### Generalised and systemic conditions

Inverness diagnosed unusual bone marrow pathology in a six-day-old suckler calf that was progressively ill since birth. The calf was tubed with colostrum, as it failed to suckle after birth. At postmortem examination, minor generalised haemorrhages were present

over the pericardium, spleen and within the subcutaneous tissues of the limbs. The bone marrow appeared pale, while gelatinous material was seen in the hock joints. Zinc sulphate turbidity testing of postmortem blood indicated total failure of colostrum absorption. No mature cells were present in the bone marrow but hyperplasia was evident on histopathological examination. A significant number of immature megakaryocytes and occasional groups of maturing erythroid cells were seen. All cells in the group were immature, with very little evidence of haemoglobinisation. There was no evidence of myeloid maturation in the expected areas around blood vessels and bone spicules. SAC C VS considered that a bone marrow insult could have occurred very soon after birth. It was considered unusual that an acute systemic disease, which could have caused such damage, did not prove immediately fatal.

#### Alimentary tract disorders

Aberdeen diagnosed two cases of idiopathic necrotising enteritis (INE) in beef calves, aged nine and 10 weeks, from two different farms. In both cases, these were the only affected animals. The first calf was illthrifted, lethargic and showed signs of tenesmus, but diarrhoea was absent. The second calf was dull with hypersalivation and diarrhoea. In both cases necrotic, ulcerated lesions were seen in the larynx and throughout the thickened small intestine. In

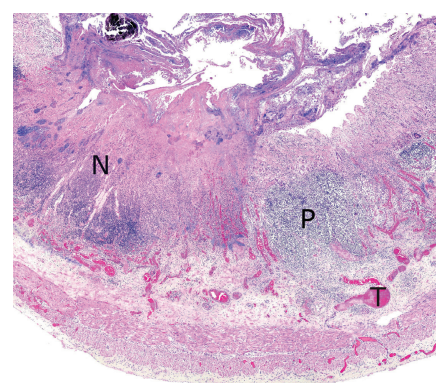


FIG 1: Idiopathic necrotising enteritis in the small intestine of a calf. The necrosis (N) is well demarcated, segmental and involves the underlying Peyer's patches (P); T Thrombosis

one calf an abomasal ulcer was present at the pylorus and the other calf had a concurrent fibrinous pleurisy and pericarditis. Histopathological findings were consistent with INE (Fig 1) and screening for bovine viral diarrhoea virus by PCR was negative.

Dumfries diagnosed congenital hepatic fibrosis in a neonatal Holstein-Friesian bull calf that was found dead. At postmortem examination the liver was found to be hard and fibrous. On histopathological examination portal fibrosis with pale, vacuolated and disorganised hepatocytes was present; this pathology was considered to have happened in utero. SAC C VS commented that congenital hepatic fibrosis is recognised as a sporadic condition in all breeds and that a genetic component is suspected in Holstein-Friesian calves.

#### Respiratory tract diseases

Perth investigated an outbreak of respiratory disease in housed suckled calves. There

This summary is produced by SAC C VS and is based on reports from its centres in Edinburgh, Perth, St Boswells, Ayr (Auchincruive), Dumfries, Aberdeen, Inverness and Thurso and in collaboration with the Moredun Research Institute.

SAC C VS monthly reports are available online at [www.sruc.ac.uk/downloads/120204/veterinary\\_services\\_publications](http://www.sruc.ac.uk/downloads/120204/veterinary_services_publications) from the first of every month.

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had been six deaths from a group of 100 over a three-month period. A further six calves responded to treatment with broad spectrum antibacterials and non-steroidal anti-inflammatories. All calves were given an intranasal vaccine against bovine respiratory syncytial virus (BRSV) and parainfluenza 3 virus (PI3V) at 10 to 21 days of age. Affected animals developed clinical signs from two months of age. One three-month-old calf was submitted for postmortem examination. There was bilateral consolidation of the cranial lung lobes with congestion and occasional bullae in the caudal lobes. No significant bacteria were recovered from the lung lesions, most likely because of recent antibacterial therapy. Screening for bovine herpesvirus 1 (BHV-1), BRSV and PI3V by PCR was negative. Severe acute bronchointerstitial pneumonia, with necrosis of bronchiolar epithelium, strongly suggestive of a viral insult, was seen histologically. Bovine coronavirus (BoCV) RNA was detected by RT-qPCR screening of lung and bronchial lymph node tissues.

Immunohistochemistry would have been of interest in this case to determine if BoCV was associated with the observed lung lesions. This diagnostic test is currently being developed. SAC C VS commented that BoCV is reported as a cause of respiratory disease in cattle in North America and mainland Europe. Survey testing by PCR for BHV-1, PI3V, RSV and

BoCV was carried out by the Moredun Research Institute on samples submitted from cases of respiratory disease. BoCV was the sole viral agent in 16 per cent of 593 samples tested and it was codetected in a further 3.7 per cent. Further work is required to establish if the presence of virus was associated with pneumonic lesions.

### Musculoskeletal conditions

Dumfries diagnosed an unusual congenital malformation in a one-day-old Holstein heifer. The calf had been tachypnoeic since birth and was unable to suck. On postmortem examination the sternum was unusually short with only two sternebrae, although a normal number of ribs were present (Fig 2). The thoracic inlet was wider and more caudal than usual, resulting in the heart being incompletely enclosed within the rib cage and the atria visible cranial to the first rib.

### Nervous system disorders

Two cases of clostridial enterotoxaemia, due to *Clostridium perfringens* type D, were diagnosed. The first case was in a five-day-old suckled calf that had displayed opisthotonos and generalised stiffening of the muscles before being euthanased. No significant gross pathology was present. The second case was in a two-month-old blue-grey suckled calf that suddenly died. Stable foam was seen in the trachea and



FIG 2: Congenital sternal malformation in a one-day-old Holstein heifer

interlobular oedema was present throughout the lungs. In both cases, epsilon toxin was detected in terminal small intestinal content. Histopathological examination revealed perivascular serum leakage in the brains, suggestive of clostridial enterotoxaemia.

### Small ruminants Parasitic diseases

Two blackface gimmers in poor condition, from a 500-ewe flock that reported poor lambing percentages, were submitted to Edinburgh for postmortem examination. Ewes scanned for singles that grazed the hill, with no supplementary feeding, were particularly affected. Worm and fluke treatments plus copper, cobalt and selenium boluses were administered the previous autumn, but no anthelmintic treatment was given at lambing time. Both gimmers were suckling single lambs. One was noted to be unwell before death. On postmortem examination significant numbers of *Dictyocaulus filaria* were seen in the bronchi and there was evidence of pneumonia in one gimmer, from which *Mannheimia haemolytica* was isolated. The gastrointestinal contents were fluid and there was faecal staining of the hindquarters. In one gimmer 12,200 *Teladorsagia circumcincta* and 5800 *Trichostrongylus axei* were recovered from the abomasum as well as 20,700 *Trichostrongylus* species and 100 *Nematodirus* species from the small intestine. Liver analysis showed no evidence of significant trace element deficiency. Poor nutrition, periparturient rise and moving from the hill to in-bye grazing probably contributed to the significant worm burdens.

### Generalised and systemic conditions

Several two- to six-week-old lambs in a flock, which were not vaccinated for clostridial diseases, were rigid and unable to stand. A single Texel cross lamb, that

## Review of Schmallenberg virus activity in 2013 and 2014

Schmallenberg virus (SBV) is vector-borne and classically causes brain defects and fetal malformations, particularly deformities in the limbs of newborn calves and lambs as seen in the figure below. The effects can be variable with some farms suffering high lamb or calf mortality while other herds or flocks suffer few effects. The first Scottish case was diagnosed in March 2013.

Surveillance by SAC C VS indicates that there were no diagnoses of SBV infection in aborted, stillborn or neonatal deformed calves or lambs in the first six months of 2014. All suspected cases tested negative for SBV by PCR screening. In addition to routine testing of suspected cases, the National Farmers' Union Scotland funded the testing of milk samples from dairy herd bulk tanks across Scotland during 2013. This found no evidence of SBV exposure in any of the herds tested. Feedback from veterinary practices throughout Scotland supplemented these surveillance activities.

The absence of new cases is unexpected. Following the SBV diagnoses in Dumfries and Galloway and Aberdeenshire last year, it was anticipated that the disease would spread with new cases emerging in the first six months of 2014. Surveillance will continue in recognition of the need for continued vigilance in case of outbreaks in other parts of the UK and across Europe.







FIG 3: Lamb in partial sternal recumbency due to polyarthritis

showed staring eyes, flared nostrils and a 'saw horse' type gait, which was worse on the hindlimbs, was submitted for postmortem examination. Elastrator rings had been applied and the distal tail was shed leaving an open wound. There were no significant gross postmortem findings nor evidence of neurological disease on brain histopathology. A diagnosis of tetanus was made based on the clinical signs. The docking wound was a possible route of entry for *Clostridium tetani*.

St Boswells diagnosed pulpy kidney disease on seven different farms. This accounted for one third of the cases diagnosed by SAC C VS during May, an increase of 33 per cent compared to 2012 and 2013. Six of the cases occurred in lambs two to three weeks of age and the seventh case was in a one-year-old gimmer. The gimmer and the ewes from four other flocks had received clostridial vaccine. However, there was no information on whether this had been carried out correctly or whether there had been adequate transfer of maternal colostral antibodies. Most cases were found dead, but two cases exhibited recumbency and opisthotonos for a short time before death. There was gross swelling of the cerebral gyri and coning of the cerebellum in some cases. Diagnosis was confirmed on detection of epsilon toxin in the intestinal contents and demonstration of characteristic changes on neuropathological examination of the brain.

### Reproductive tract conditions

Perth isolated *Campylobacter lari* from the abomasal contents of two aborted lambs. The flock, made up of 1100 ewes, reported 50 abortions and had a history of *Campylobacter* species abortions eight years previously. *Campylobacter* species are most commonly associated with wild birds but can also be isolated from cattle and from wild mammals, such as rabbits and badgers. Access of wild birds to feed stores or aggregations of migratory wild birds in fields or near water troughs could be a risk factor.

### Musculoskeletal conditions

Two live three-week-old lambs were submitted to St Boswells to investigate an outbreak of joint ill that affected nearly 50 lambs in a flock of 1600. The majority of affected lambs had died despite antibiotic therapy with long-acting amoxycillin and oxytetracycline. The lambs were born outside and were not navel dressed or given prophylactic antibiotic therapy. On clinical examination, both were bright and alert, but reluctant to move before becoming sternally recumbent (Fig 3). Both lambs had distension of multiple joints and *Streptococcus dysgalactiae* was isolated, confirming this as the cause of the polyarthritis. *S. dysgalactiae* is the most common cause of arthritis in lambs. Lambs usually acquire infections in the first two weeks of life, most probably from carrier ewes (Rutherford and others 2014).

Severe myositis and cellulitis, affecting the tissues of the ventral neck extending to the mid-thorax, was seen on postmortem examination of a six-week-old Texel cross lamb. It was one of eight orphan lambs that had been vaccinated for pasteurellosis the previous week. There was a large necrotic cavity in the right neck muscles and fresh haemorrhage caudal to the larynx. A deep penetrating wound was the suspected source of the lesions and unhygienic vaccine technique was suggested as a possible cause.

Aberdeen found vertebral osteomyelitis to be the cause of lameness affecting a five-month-old Charollais ram lamb that had not responded to various treatments. There was evidence of inflammation of the spinal meninges at T2-T3. The vertebrae were sectioned at this level and a 1 cm area of necrosis was found. Histopathology revealed severe, chronic disruption of normal spinal cord architecture and confirmed a necrotising and suppurative osteomyelitis. *Escherichia coli* was isolated in culture from the affected vertebra.

### Nervous system disorders

Dumfries examined a four-week-old Texel cross lamb that was found dead. No other deaths were reported in its cohort. Neuropathology revealed a severe mononuclear meningoencephalitis, likely due to sarcocystosis. Dogs or foxes are the final hosts for these protozoan parasites, becoming infected through scavenging of sheep carcasses. Oocysts are then excreted in their faeces and ingested by grazing sheep. Sarcocysts are a common incidental finding seen on histopathology of tissues such as skeletal muscle but they have also been reported to cause neurological disease. (Caldow and others 2000). Outbreaks can occur when sheep are grazing areas contaminated with dog faeces, such as fields crossed by footpaths.

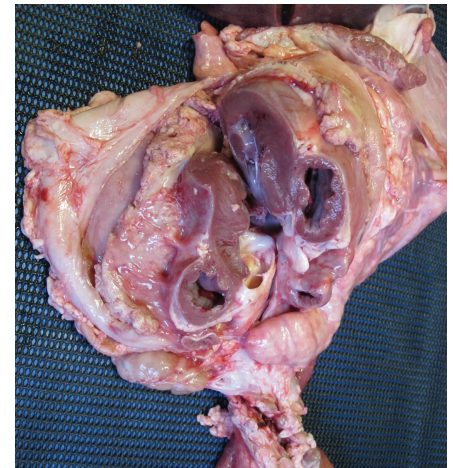


FIG 4: Fibrous adhesions between the pericardium and epicardium in a finishing pig with severe chronic pericarditis

### Pigs Circulatory disorders

Severe chronic pericarditis was diagnosed in a pluck submitted from a slaughtered finishing pig. The pericardial sac was distended with purulent fibrinous material and fibrous adhesions between the pericardium and epicardium were present (Fig 4). A pure culture of *Streptococcus suis* serotype 33 was isolated from the exudate. This serotype is not unusually associated with inflammatory lesions in UK pigs.

### Respiratory tract conditions

*Haemophilus parasuis*, *Pasteurella multocida* and porcine reproductive and respiratory syndrome (PRRS) virus were all associated with respiratory signs and failure to thrive in a breeding to finishing unit. An ill-thriven, untreated 12-week-old pig and a three-week-old piglet that was the smallest in its litter were submitted for postmortem examination. The younger piglet showed cranioventral congestion and some patchy collapse of the right cranial and middle lung lobes. *Haemophilus parasuis* was isolated from the lung. Histopathology revealed multiple small foci of suppurative pneumonia, suggestive of early *H. parasuis* infection in preweaned pigs. In the older animal there was congestion of the left lung and pale red cranioventral consolidation with some dark red cranial congestion and adjacent interlobular oedema of the right lung. A profuse growth of *P. multocida* was isolated from the lung. PRRS virus RNA (EU strain) was detected by PCR testing on the lung tissue from this animal.

### Neurological conditions

Edinburgh diagnosed salt poisoning in a three-month-old sandy and black cross pig and the condition was suspected in two others found in extremis gasping for air. The group of seven pigs was kept outdoors close to the shore. Neuropathology showed widespread eosinophilic vasculitis of the cerebrum with swelling of endothelial cells of affected

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capillaries. Water deprivation was indicated but a clear history relating to water provision could not be obtained from the owner.

### Birds Poultry

Inverness examined viscera submitted from a layer in a backyard crofter flock. The bird presented clinically with abdominal distension and on postmortem examination a multilobular tumour was present. Ovarian adenocarcinoma with metastases to the intestinal serosa and invasion of the intestinal wall was seen on histopathological examination.

Ayr diagnosed tenosynovitis due to *Staphylococcus aureus* in two 11-week-old broilers that were culled due to lethargic demeanour. Both birds had excess serosanguinous fluid in the hock joints and enlarged gastrocnemius tendons, from which *S aureus* was isolated. Another bird from the same batch had been culled due to lethargy, and an enlarged spleen was seen at postmortem examination. *S aureus* was isolated in systemic distribution and a diagnosis of staphylococcal septicaemia made.

Perth investigated a mass mortality incident, suspected to be due to an inhaled toxin, in a shed of 20,000 organic Ross broiler chicks. The birds showed no clinical signs when the shed was inspected the previous evening. The entire group, bar only 60 survivors, was found dead and already showing some autolysis by the following morning. The adjacent shed, containing chicks from the same delivery, were not affected. Two years previously a similar incident in a different shed on the premises occurred, although the mortality rate was not as severe. An inhaled toxin was suspected from the findings at the time but no source was identified.

Two carcasses submitted for examination showed advanced autolysis. The warmth of the shed could have played a part in this finding. However, the temperature had not reached excessive levels and was not thought to have contributed to the deaths. Significant findings at postmortem examination included dirty vents, mild devitalisation of a small area of skin on the plantar surface of the pedal epithelium in all feet, crops containing corn and full gizzards. Both chicks had deeply congested, oedematous lungs.

On histopathological examination the lungs were severely congested and oedematous, with areas of haemorrhage into airsacs. The hearts showed hypoxic-type changes comprised of rounding of myocardial nuclei and some fibre swelling. Widespread separation of myocardial fibres, suggestive of myocardial oedema, was seen. The findings indicated acute cardiopulmonary insufficiency and hypoxia. SAC C VS advised that ventilation failure and death by ammonia or carbon dioxide pooling were possibilities. As toxic gases are heavier than air and accumulate at low levels, lethal concentrations could build up in a shed. These are undetectable by staff unless a member of staff descends to the level of the gas, in which case a potentially fatal accident could occur. Briefing all staff on the potential risks was recommended as an immediate measure.

### Gamebirds

Perth diagnosed aspergillosis in a batch of six-day-old red-legged partridge chicks. They were seen gasping and showing orthopnoea and clicking noises associated with breathing. The premises had suffered groundwater accumulation the previous year in the area in which the chicks were raised and had used wood chip to create a layer of substrate on top of which the usual wood shavings would be placed. This was intended to create extra height to keep the chicks from any damp at ground level. However, bark chips, instead of wood chips, had been delivered in error and were used instead. A total of 26,000 chicks arrived as day-olds and around 900 chicks died by day 6. Visible firm white/cream nodules in the lungs and thoracic air sacs, typical of aspergillosis, were seen in several chicks and yellow-white discolouration of the air sacs in others. The chick with the worst respiratory signs on examination had a white plug almost completely occluding the trachea. There was a wide range of sizes among the chicks; those showing the most obvious chronic lesions being the smaller chicks.

Histopathology confirmed multifocal areas of abscessation associated with mycotic hyphae affecting the lung tissues, airsacs and thoracic walls. The hyphae were septate and branching, consistent with *Aspergillus* species infection. SAC C VS

advised that the damp bark chips were strongly suspected to be the source of the fungus.

### Wild birds

Thurso diagnosed salmonellosis in an adult male lesser redpoll (*Carduelis cabaret*) that was found dead near a feeder. On gross examination the carcass was emaciated and the gastrointestinal tract was empty. *Salmonella* Typhimurium was recovered from the intestines and viscera.

Three linnets (*Carduelis cannabina*) were submitted for postmortem examination to Dumfries, after being found dead close to a feeding table. No significant gross lesions were seen. *S Typhimurium* was isolated from pooled liver and intestines. Mortality incidents due to salmonellosis are commonly linked to feeding stations, where there is congregation of birds in a small area. Some birds carry *Salmonella* species in their intestines and can contaminate the environment around feeding sites.

### Miscellaneous species Rabbits

Two juvenile wild rabbits were found in a garden in the Borders. As one was moribund and the other fitting, they were euthanased and submitted to Edinburgh for postmortem examination. No significant gross abnormalities were detected. Hepatic necrosis was detected by histopathology and rabbit viral haemorrhagic disease virus was detected by PCR. Further testing revealed this to be the new type 2 (variant).

### Guinea pigs

Perth diagnosed renal amyloidosis in an aged female guinea pig that was found dead. On postmortem examination 2 cm to 3 cm abscesses were found in the connective tissue adjacent to the duodenum, the mesentery and the connective tissue at the centre of the spiral colon. Both kidneys were enlarged, irregular, roughened and fibrous, showing mottled congested and paler patches. Renal amyloidosis was diagnosed on histopathology. The abscesses were suspected to have developed after the chronic renal disease, possibly secondary to immunoincompetence associated with the poor body condition and likely protein loss through the kidneys. Focal hepatic necrosis was also present, the lesions of which were acute in appearance and were thought likely to be associated with a septicaemia as a terminal event.

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doi: 10.1136/vr.g5250

### Disease alerts

The following conditions were reported by SAC C VS disease surveillance centres in September 2013. Given similar climatic and production conditions, they could also be important this year.

- Parasitic pneumonia in cattle.
- *Mycoplasma bovis* pneumonia in calves.
- Selenium deficiency in cattle.
- Louping ill in sheep.
- Cobalt deficiency in lambs.
- Systemic pasteurellosis in sheep.

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