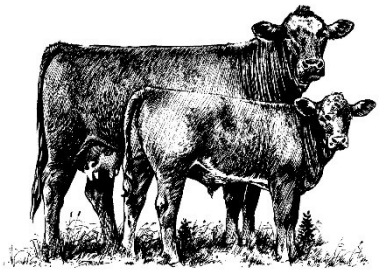
Animal & Plant Health Agency



SRUC

Great Britain cattle quarterly report disease surveillance and emerging threats

Volume 30: Quarter 4 of 2021 (October to December)

Highlights

- **Metabolic disease of recently imported heifers – page 3**
- **Suspected ergotism – page 4**
- **Clostridial myositis – page 6**
- **Stillbirths due to *Coxiella burnetii* – page 21**

Contents

Editor: Vanessa Swinson, APHA Thirsk
Phone: + 44 (0) 208 5654574
Email: Vanessa.swinson@apha.gov.uk

Introduction and overview

This quarterly report reviews disease trends and disease threats for the fourth quarter of 2021 (quarter 4), October to December.

This report contains analyses carried out on disease data gathered from the Animal and Plant Health Agency (APHA), SRUC Veterinary Services division of Scotland's Rural College (SRUC) and partner postmortem providers; and intelligence gathered through the cattle expert group networks.

In addition, links to other sources of information, including reports from other parts of the APHA and Defra agencies, are included. A full explanation of how data is analysed is provided in the annexe available on GOV.UK.

Issues and trends

Weather

The autumn was warmer and milder than average. October was wetter than average in northern Scotland and North-east England, with 128% of normal rainfall. November and December were drier months, especially in southern areas, with 63% in November and 90% in December of the long-term average rainfall level (figure 1).

Average temperatures were above the long-term average, with October being 1.4 °C, November 0.8 °C and December 1.1 °C above the 1981 to 2010 long-term average (figure 2).

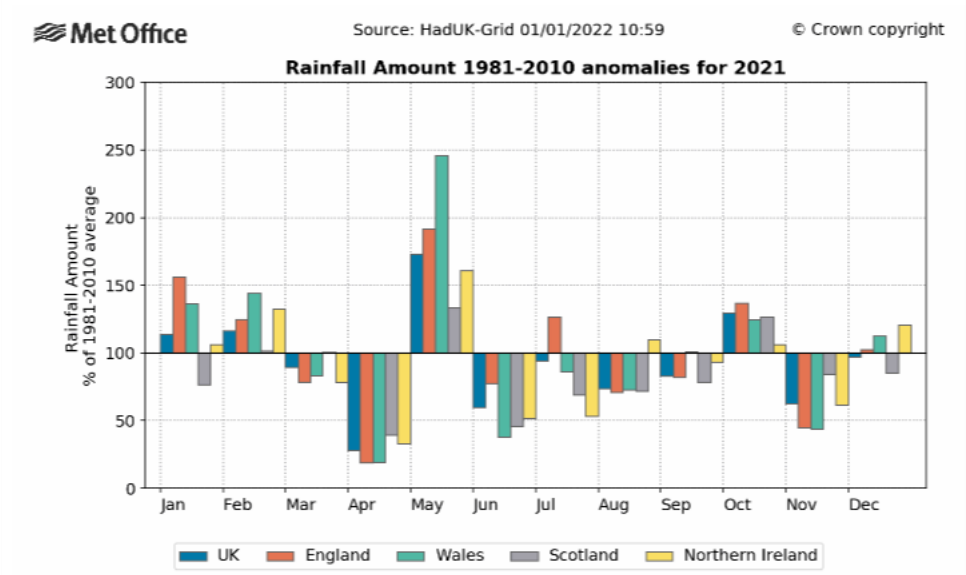


Figure 1: Rainfall amount 1981 to 2010 anomalies for 2021

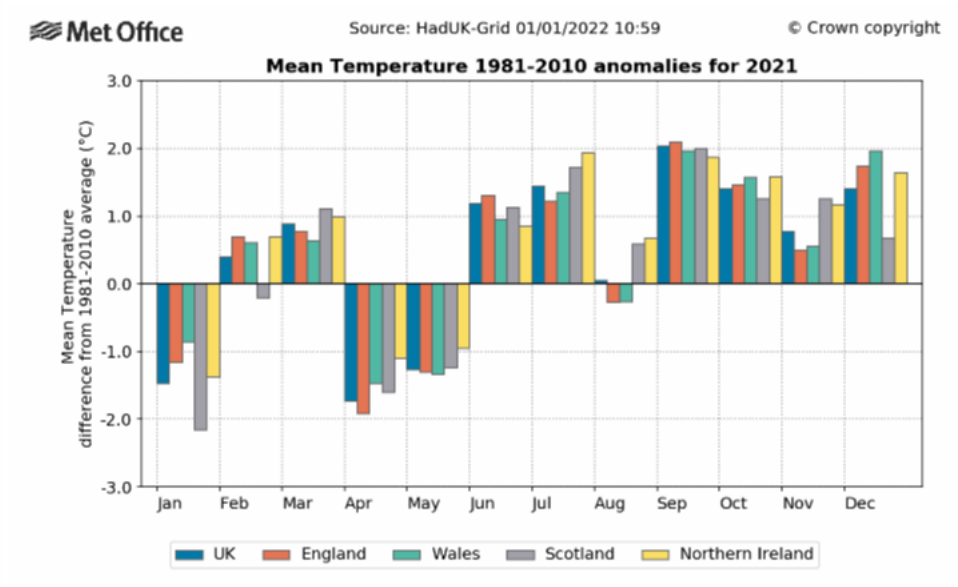


Figure 2: Mean temperature 1981 to 2010 anomalies for 2021

Dairy update

Great Britain milk production has remained reasonably static since the summer and has not risen throughout the autumn like it did in 2020. Milk supplies are tight and spot milk is currently trading at 46 to 48 pence per litre (ppl) delivered, albeit at low volumes. As a result, milk price rises for farmers have been coming thick and fast, with many processors desperate to secure more milk supplies, rather than pay on the spot market. Defra's estimated UK average farm-gate milk price for October was 32.55ppl, 0.98ppl higher than September.

There has typically been a good increase of 2 to 3ppl difference for those farmers with aligned supermarket contracts. Production is stagnant on the back of rising farm costs for feed, fuel, and fertiliser, with increasing concentrates to push for extra milk not seen to be cost-effective at current price of purchased feeds.

Agriculture and Horticulture Development Board (AHDB) Dairy estimated that the full economic cost of production for the 12 months ending July 2021 was 33.9 ppl for the middle 50% of all year-round calving herds. Factoring in recent cost increases for feed, fuel, fertiliser and labour, Kite Consulting estimate the breakeven milk price for the 2022 to 2023 milk season to be between 33 to 34 ppl. These cost of production figures are more than 5ppl over the long-term average and are at record highs.

Dairy industry experts predict that it is unlikely milk supplies will increase any time soon and so commodity prices will likely remain high over the next few months. Given the estimated costs of production, with fertiliser up 60%, compound feed prices up 16%, red diesel up 30% and electricity up 20% compared to last year, further milk price increases from some processors will be required for their farmers to make a decent margin.

You can have a look at the AHDB dairy market dashboards on their website.

Beef update

The fourth quarter of 2021 rounded off a good year for beef prices in the UK. Although not reaching the peak of May 2021 (432 pence per kilogram (ppKg)), prime cattle prices were strong throughout and well above 400ppKg.

The Christmas increase in demand usually leads to good prices in this quarter and this was seen again this year. With strong demand (partly helped by ASDA's commitment to sourcing only British beef) and limited supply, prices for both prime cattle (and subsequently for store cattle) were good.

These beneficial market forces were particularly strong in England, where prices were unusually ahead of the Scottish price by 4 to 5ppKg and, led to some cattle being sent south for killing. The two main industry concerns related to increasing input costs, particularly fertiliser, and reducing consumer demand if higher prices were passed on to the consumer.

ASDA moved away from its promise of sourcing only British beef in January, due to the sustained high price. Cull cow prices were back a little over the quarter, with reports of some farmers deliberately holding back these animals to benefit from an anticipated price risk that typically comes in January (as consumers move to cheaper cuts). Further information on market updates and trends can be found on the AHDB website.

New and re-emerging diseases and threats

Schmallenberg Virus update

APHA offered enhanced surveillance for Schmallenberg Virus (SBV) in cattle and small ruminants in 2021 and are offering it again in 2022. PCR on brain stem samples from congenitally deformed calves, lambs and kids, or serology from up to six animals was offered free of charge.

Six cases of foetopathy due to SBV were confirmed in cattle in 2021 and there have already been cases confirmed in sheep in 2022. The disease typically presents itself in waves, with peaks identified in 2012 and 2017. This is due to waning immunity and susceptibility of younger naive animals. Depending on the stage of gestation at which the abortion occurred, the virus may have cleared, resulting in negative PCR test results.

Metabolic disease of recently imported heifers

Two investigations at Shrewsbury Veterinary Investigation Centre (VIC) in this quarter highlighted the risk of metabolic disease in imported dairy heifers. In one case, a group of 44 Jersey heifers was imported from Denmark in October. One was found dead 20 days later, while a second animal was recumbent and comatose, and was euthanased by the practitioner.

The heifers had been turned onto grass since their arrival and, had been on the same pasture until they moved fields that morning, when the dead and recumbent animals were discovered. In addition to having pasture grass, the group was fed 1kg per head per day of stock nuts.

The two dead heifers were submitted for postmortem examination, and both had similar gross pathology. Each had generalised jaundice and a markedly enlarged friable fatty liver, which had orange-coloured parenchyma (see Figure 3).

The heifers' rumens were significantly reduced in size, having only a little grass content. Both animals were pregnant with calves weighing 16kg and 18kg. The findings indicated that the animals had eaten little recently and that the death of the first one, and the cause of recumbency of the second one, were probably due to ketosis and severe metabolic dysfunction.

In the other case, two of a group of 98 pregnant Holstein heifers died within a fortnight of having been purchased from Germany and, had been turned onto pasture since their arrival. Postmortem examination of one heifer revealed the liver was similarly orange-coloured and fatty and there was lack of feed in the rumen.

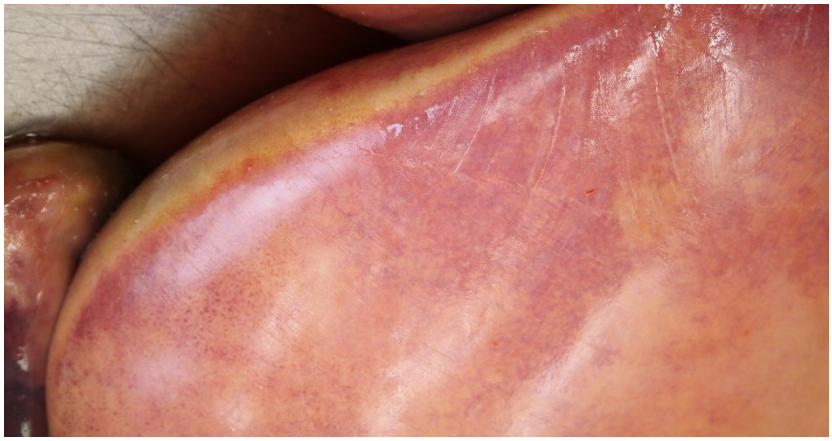


Figure 3: Liver of pregnant heifer showing swollen, fatty, and orange-coloured appearance

Investigations have identified similarly affected animals in APHA VICs in the past. A report on the findings for 13 heifers was published (Hepple and others 2010). The animals were all pregnant and had died within six weeks of being transported from European countries. Deaths and dehydration of others were also recorded.

It is important that the risks of metabolic disease are considered, and that animals are managed appropriately from the time they are moved off the original premises, until they arrive at the final UK farm destination.

There is the suspicion that such animals fail to ‘adapt’ to the UK farm systems, it is possible that some heifers will not have grazed prior to export to the UK, and fail to eat pasture grass, or other feed offered, in the UK. It is an offence to move animals in the final 10 percent of gestation, as this constitutes ‘unfitness to travel’ (other than seeking veterinary treatment), and it is not recommended that animals are moved long distances while in their final two months of pregnancy.

Suspected ergotism

Three homebred weaned suckler calves aged 14 to 15 months, in a group of 12, lost condition over a period of 4 to 6 weeks. They also exhibited unsteadiness on their legs, and irregular skin loss, most noticeably affecting the lower limbs and the end of the tail. One also lost hair from the top of its head.

The skin of the legs of the most severely affected animal became hairless (see figure 4), very moist and had a sour smell. Localised treatment using antibiotic spray resulted in drying of the skin, and generally increased demeanour and locomotion.

Figure 4: Bilateral loss of hair from the forelimbs of the most severely affected animal (Images courtesy of the private veterinarian)

A visit was made to the farm to investigate further. The onset of signs approximated with the time when the feeding of an old batch of homegrown cereal finished, before fresh barley was introduced.

Tests for *Salmonella* Dublin (by culture of faeces and serology), Malignant catarrhal fever (MCF) and Bovine Viral Diarrhoea (BVD) ruled out these infections, and based on the lesions and their distribution, a presumptive diagnosis of ergotism was reached.

A severe outbreak of ergotism was investigated in 2019 in quarter 4, occurring in suckler cows in the same area of England (West Midlands), and 2 cases were seen in the previous autumn in the Aberdeen area, indicating possible increased risk of this mycotoxicosis at this time of the year.

Changes in disease patterns and unusual diagnoses

Systemic disease

Suckler cow with BVD, lungworm and bacterial pneumonia

Two suckler cows (second calvers) in a group of nine died suddenly over 24 hours, there were calves at foot which were unaffected. The cows and calves were housed two weeks previously, at which time closantel was administered. No vaccines were used in the herd. The second cow to die was submitted for investigation.

As anthrax was a possibility this was first ruled out. Cranioventral lung consolidation was present. Within the consolidated areas were small abscesses containing cream-coloured pus. Moderate numbers of live *Dictyocaulus viviparus* were identified in the bronchi of the middle and caudal lobes. *Histophilus somni,* and a *Pasteurella* species which could not be speciated, were isolated from the lung in culture, and a polymerase chain reaction (PCR) test for pestiviruses on the spleen identified BVD virus.

This was an unusual combination of pathogens in an adult suckler cow, with BVD infection likely to have been causing immunosuppression and facilitating secondary bacterial infection. The lungworm infestation possibly reflected naivety, as the animals had only been purchased a few months earlier. Further investigations for BVD infection in the herd were recommended.

Diarrhoea due to copper deficiency in beef animals

A group of thirty 12- to 24-month-old bullocks, organically reared at grass, had all had diarrhoea and wasting over the summer. Three months earlier, blood tests had indicated a copper deficiency in the group and copper boluses were reported to have been administered.

The diarrhoea and loss of condition continued to worsen in some animals. One animal was culled and submitted for necropsy. Gross lesions included very poor body condition, tissue pallor suggestive of anaemia, and loose faeces. No mineral bolus was found in the stomachs. Worm counts were very low.

Magnesium concentration in the vitreous humour was borderline deficient, but the main finding was a liver copper concentration of 149 µmol/kg DM, (reference range 314 to 7,850) indicating an ongoing copper deficiency. It was recommended to assess the blood copper status of the worst affected animals in the group in case others had lost or depleted their copper bolus.

Clostridial myositis

Several cases of disease due to *Clostridium chauvoei* ('Blackleg') were diagnosed during this quarter. Blackleg was the cause of death of a 7-month-old calf, one of two to die suddenly. The calf was submitted to Wales Veterinary Science Centre for postmortem examination. It had been found recumbent in a field and was taken into a shed but, died the next day.

Typical Blackleg lesions were seen in forelimb and hindlimb muscles (see figure 5). Diagnosis was confirmed by fluorescent antibody testing (FAT) for *Clostridium chauvoei*. Vaccination is an inexpensive means of avoiding this costly disease, but this should be given before the time of risk, such as before animals go out to grass.

Figure 5: Typical blackleg lesion in the triceps muscle of a 7-month-old calf

Blackleg was also diagnosed in an 11-month-old steer, which had exhibited forelimb lameness and then become recumbent. Another calf in the group of 20 had been found dead the week before. The group had previously been out at grass and receiving concentrate but had been housed for six days. The group were unvaccinated.

The main gross findings were subcutaneous oedema, zones of red-black muscle in the left hind musculature and myocardium, and diffuse petechiation.

Action in the face of an outbreak could include vaccination and treatment with penicillin, although fatality can be expected to be high in affected animals. Vaccination was advised for future control.

Clostridium chauvoei is found in the intestinal tract of healthy animals, its spores remain viable in the soil for years, which may be the initial source of infection. Outbreaks may sometimes be associated with recent flooding or excavation work. Organisms are thought to be ingested and pass to the blood, with subsequent deposition in muscles and other tissues, where they may remain dormant indefinitely.

Development of lesions occurs when anaerobic conditions arise and toxins are released, causing tissue damage. This is not necessarily associated with trauma in cattle and the actual ‘trigger’ for development of an anaerobic environment is not well explained.

Digestive system disease

The pie chart below (see figure 6) shows the percentages of diagnoses for diarrhoea in pre-weaned calves at Starcross VIC during quarter 4 of 2021. Cryptosporidiosis and rotaviral enteropathy remained two of the main enteric diagnoses in pre-weaned calves during 2021 in the whole surveillance network and represented 32% and 21% of diagnoses for diarrhoeic calves respectively for Starcross in quarter 4. *Salmonella* Dublin also represented 21% of diagnoses in figure 6.

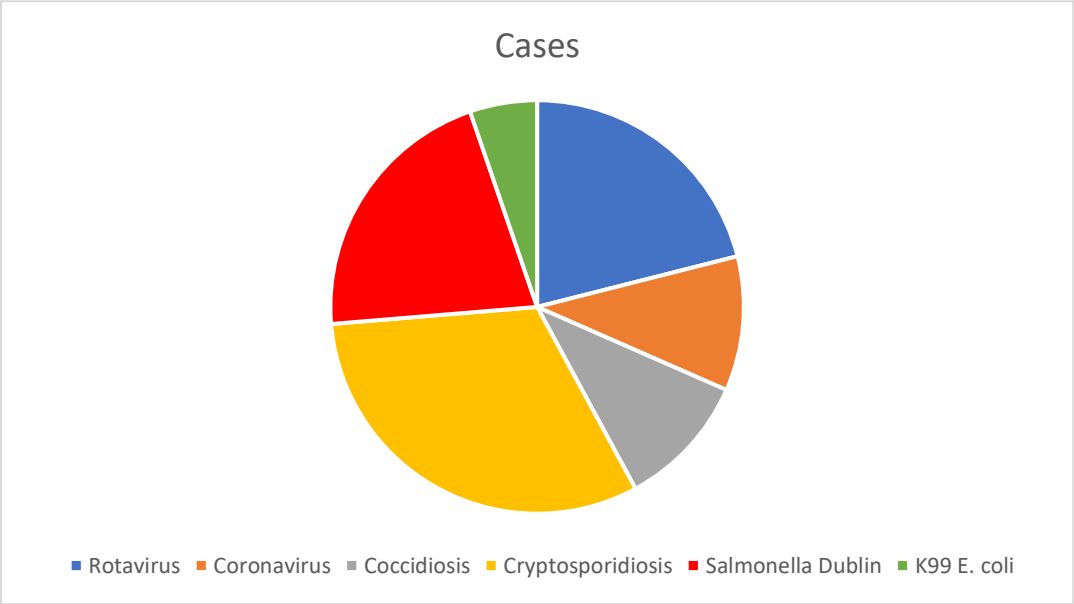


Figure 6: The causes of diarrhoea diagnosed in pre-weaned calves at Starcross VIC during quarter 4 of 2021

Abomasal disorders

Abomasal disorders have been increasingly identified as a cause of death in pre-weaned calves (particularly dairy calves) and we have reported cases in our quarterly reports earlier in 2021. These disorders can manifest as abomasal bloat, abomasitis and abomasal ulceration.

The underlying reasons, however, can be difficult to identify, and a review of feeding and husbandry is warranted where such cases arise. Possible risk factors include the ingestion of large amounts of fermentable carbohydrate and the use of antibiotics in the calf in the immediate post-partum period. The micro-organisms within the abomasum produce fermentative enzymes, and this can lead to excess gas production.

Inadequate colostral antibody absorption, poor hygiene, the feeding of large volumes of milk, or feeding of milk at inappropriate temperatures, and improper mixing of milk replacer, could also affect abomasal function. *Clostridium* and *Sarcina*-like bacteria have been identified in some of the affected animals, however these are probably secondary invaders.

As we have reported before, where such incidents are identified, it is worth reviewing the feeding and management of the calves, to include:

- ensuring optimal systemic colostral absorption
- checking that milk powder is reconstituted to the correct dilution
- ensuring the milk is fed at the correct temperature
- checking that teats are clean and undamaged and not allowing over-fast drinking
- regulating the amount of milk fed so that calves are not overfed or receive varying amounts

- ideally, feeding at the same time and in the same order at each feed
- always providing fresh water and suitable forage

This report published in the Vet Times also discusses abomasal disease in calves:

Abomasal bloat and rupture was diagnosed in a three-week old milk-fed calf submitted to Bury St Edmunds VIC. The calf was fed milk twice daily and had died suddenly. Gross findings included a very pale liver, a bloat line in the oesophagus at the thoracic inlet (see figure 7), and abomasal ulceration (which had perforated over several centimetres). These findings indicated an acute abomasal bloat and rupture leading to rapid death.

Histologically, numerous *Sarcina*-like organisms were visible at the edges of the ulcer. Bloat and ulceration at this age is often reported to be acute and can occur shortly after the start of forage feeding. It has been proposed that coarse fibre is poorly digested in the rumen and may pass into the abomasum causing mucosal trauma.

Overly rapid feeding of milk replacer has also been reported to cause abomasal bloat and ulceration. *Sarcina* spp have been associated with abomasal bloat but can also be found in the abomasum of healthy calves (Edwards 2008). Other deaths had occurred in the group and a review of feeding was advised.

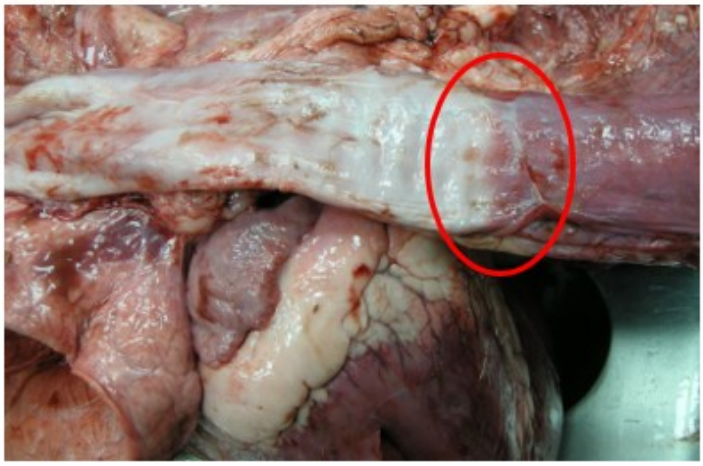


Figure 7: Bloat line in the oesophagus of a calf which died with abomasal bloat

Parasitic gastroenteritis

Suspected lack of efficacy of ivermectin pour-on in *Ostertagia ostertagi* and *Cooperia oncophora* in first season grazing dairy calves

Weight loss and mild diarrhoea were noted in late July 2021 in four 4-month-old dairy calves, two weeks after turn-out onto pasture that had been grazed by older (8- to 10-month-old) calves since April. Older and younger calves had been wormed with an ivermectin pour-on product four days prior to clinical signs being noted.

In mid-August, two of the affected calves died and the remaining two were housed and treated with ivermectin pour-on and diclazuril oral suspension. One of these calves died in mid-September and was submitted for postmortem examination.

A total worm count detected 10,300 adult *Ostertagia ostertagi* worms in the abomasum and 45,500 adult *Cooperia oncophora* worms in the small intestinal tract. Faecal egg counting detected 3,850 Trichostrongyle-type eggs per gram (epg) of faeces in the submitted calf and 5,000 Trichostrongyle-type epg in the surviving affected calf. Lack of efficacy of the ivermectin pour-on was suspected.

The farmer confirmed that the product was in date and correctly stored, that the applicator was functioning as expected and that the calves had not been under-dosed. Ivermectin pour-on had routinely been used for control of gastro-intestinal nematodes in youngstock in previous years and the same permanent pasture was used for youngstock each year. The suspicion of lack of efficacy was reported to the VMD.

Since 1999, when ivermectin (IVM) resistant *Cooperia was first reported in the UK,* there have been a few reports of reduced efficacy following administration of macrocyclic lactones in UK cattle. Macrocyclic lactone (ivermectin and moxidectin) resistance in *Cooperia oncophora* was then confirmed in the UK by controlled efficacy trial in 2012 by Bartley et al. Further investigations into the possibility of anthelmintic resistance are ongoing.

Find advice on parasite control is available on the COWS website.

Salmonella Mbandaka

S. Mbandaka was confirmed as the cause of scouring and deaths of young calves in a Cheshire dairy herd with 400 cows.

Six calves were affected, four of which died. S. Mbandaka has been increasingly isolated from cattle over the last ten years, and this was discussed in the Scotland Rural College (SRUC VS) surveillance article in the Veterinary Record (20/27 November 2021). The predominant clinical sign associated with detection of S. Mbandaka is diarrhoea in all age groups.

There is often concurrent disease, and S. Mbandaka may be a secondary pathogen. However, the presence of this pathogen in a herd is likely to result in increased morbidity, particularly in periods of stress, such as the transition period of dairy cows.

Bovine papular stomatitis

A group of eight post-weaned calves on a dairy farm presented with a one-month history of scour and weight loss. Four calves died, with the others euthanased due to the significantly poor condition and nil response to treatment. The group had been housed since birth, and were the only group affected on the farm. Two calves were submitted for postmortem examination.

Gross findings were similar and included: poor bodily condition, severe oesophagitis with an overlying malodourous diphtheritic membrane, and liquid large intestinal content. One calf also had extensive multifocal tongue ulceration. Despite never having grazed, the range of lesions raised suspicion of ‘summer scour syndrome’ (SSS) and a large range of testing, including PCR testing for pestiviruses, was actioned. As a result of the chronicity of lesions in one calf, an inciting cause could not be determined.

However, histopathological examination of the second calf revealed intracytoplasmic inclusion bodies within tongue tissue, which raised suspicion of bovine papular stomatitis virus (BPSV). Despite negative electron microscopy of tongue tissue, parapoxvirus immunohistochemistry confirmed BPSV involvement.

Additionally, there was histological evidence of previous endoparasitism (likely coccidiosis) and an associated dysbiosis, which was likely to have led to maldigestion and malabsorption and the observed wasting, as well as being a predisposing factor for BPSV involvement.

A full review of pre and post weaning calf nutrition and prompt investigation of calf scour cases was advised. BPSV is commonly reported in young cattle, but typically only causes mild lesions in the mouth and on the nose. However, a severe oesophagitis due to BPSV has been previously reported in an adult bull (Jeckel and others, 2011).

A herd outbreak of milk-drop and pyrexia due to a Salmonella Dublin

A 2-year-old dairy heifer was submitted to SRUC Dumfries for postmortem examination, following a five day illness, three months into lactation. There had been a sudden milk-drop and persistently high fever, which was non-responsive to non-steroidal anti-inflammatory drugs (NSAIDs), steroids, or antibiotics.

The farm also had six other cows on treatment, all with persistently high fevers, and three of these with diarrhoea. The farm was a new dairy established 9 to 10 months before, so new animals were arriving regularly to increase numbers.

There were excessive amounts of serosanguinous peritoneal, pericardial, and thoracic fluid present when the carcase was opened. The lungs were emphysematous and there were prominent interlobular septa throughout. *Salmonella* Dublin was detected from all tissues cultured. No evidence of respiratory viruses was found by PCR.

Histological findings were consistent with sequelae to bacterial septicaemia. A submission of faeces from affected cows submitted at the same time found *Salmonella* Dublin in three out of five samples.

Salmonellosis due to *Salmonella* Typhimurium RDNC

Salmonella Typhimurium RDNC (which is an abbreviation of ‘reacts but does not conform to a recognised type) was identified as the cause of sudden death of a suckler cow. The animal was examined postmortem by the practitioner, who found chronic pleural

adhesions, enlarged mesenteric lymph nodes, and thickened intestine with haemorrhagic contents. *S*. Typhimurium RDNC was isolated from the intestinal content on direct culture and histopathology confirmed a severe subacute erosive enteritis.

Respiratory system

In quarter 4, we usually see an increase in clinical signs and deaths associated with the bovine respiratory disease complex. It is a consequence of a combination of factors, including animals being housed, groups being mixed together, and colder and more humid weather.

This has been the case in quarter 4 of 2021, when rising trends have been observed for a number of respiratory pathogens. These trends have generally been more pronounced in Scotland, where the percentage of diagnosable submissions in quarter 4 of 2021 is at an all-time-high for pneumonia due to *Mycoplasma bovis*, parasitic pneumonia or husk, and respiratory syncytial virus (BRSV).

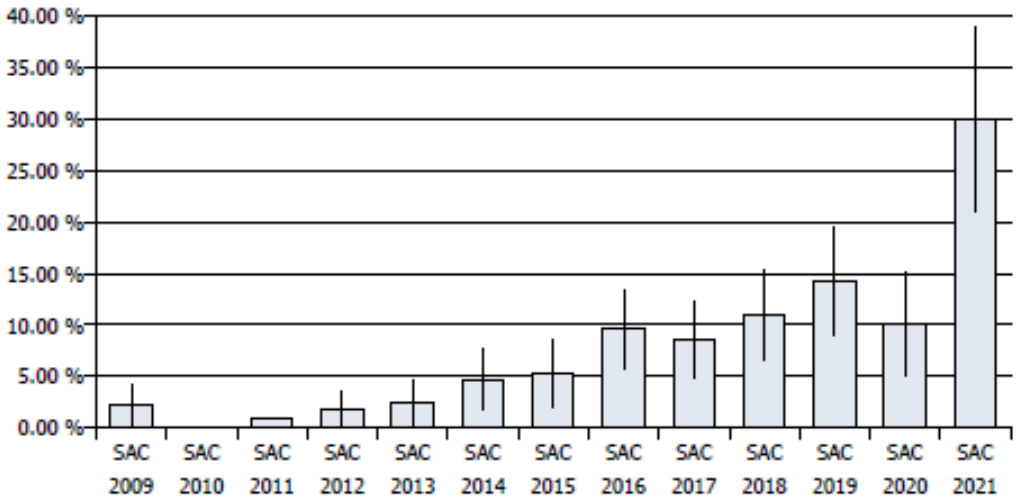


Figure 8: SRUC VS incidents of *Mycoplasma bovis* in cattle as percentage of diagnosable submissions in quarter 4 of 2021 (Vertical bars represent 95% confidence limits)

Overall, the increase in respiratory disease cases generally seems to have been reported in post-weaned animals from beef and rearing units, located predominantly in Scotland, followed by North of England.

Infectious bovine rhinotracheitis (IBR)

Cases of IBR have been diagnosed across the postmortem provider network during quarter 4 of 2021.

Severe respiratory distress was described in eight dairy cows, in a herd of 300, which were at pasture. The first cow died, whilst a second, which had calved 10 days previously, developed severe respiratory distress and was euthanased and submitted for postmortem examination.

At postmortem examination a large proportion of the lungs were consolidated, especially ventrally, and there were large bullae in the caudal lobes. Necrotic debris was present in the trachea and bronchi. *Klebsiella pneumoniae* was isolated from the affected lungs and PCR testing identified bovine herpesvirus-1, confirming IBR.

Histopathology identified lesions consistent with bacterial infection and the presence of large nematodes within terminal airways, which indicated that the disease was probably precipitated by lungworm infection. (See figure 9)

Figure 9: Anteroventral consolidation and bullous emphysema in the lungs of an adult cow with IBR and lungworm infection

A yearling steer was submitted to investigate a pneumonia outbreak characterised by pyrexia and dyspnoea, affecting around 12 animals from a group of 90, five had died. The group had been wormed by injection 4 to 5 days previously. Treatment with antibiotics and non-steroidal anti-inflammatory drugs (NSAIDs) had given a poor response. The shed was described as not especially well ventilated, although problems had not been experienced in previous years. Recent youngstock monitoring for BVD had not detected antibodies.

Postmortem examination revealed reddening of the tracheal mucosa, with well-adhered yellow material overlying (see figure 10). There was dark-red consolidation of the cranioventral region of the lung with some less than 1mm diameter abscesses on cross section. The respiratory tract lymph nodes and tonsils were enlarged and dark red.

Figure 10: Reddened tracheal mucosa with adherent fibrinonecrotic material in a steer with IBR

Laboratory testing detected the presence of BHV-1 nucleic acids by PCR, confirming IBR. Bacterial culture of lung yielded a tetracycline resistant *Pasteurella multocida* in pure growth and *Mycoplasma bovis* was detected by DGGE. Vaccination against IBR was undertaken. A review of management factors such as ventilation, dampness, and older cattle in the same airspace was advised, to ascertain whether any management improvements could be made.

Marked tracheitis in three growing beef calves, with differing aetiologies, were described from three cases that presented to SRUC Aberdeen in November and December. In two of the three cases, the tracheitis was likely to have been of sufficient severity to be the cause of death (due to asphyxiation). In the first case there was no evidence of prior tracheitis.

There was a severe, acute bronchopneumonia associated with *Pasteurella multocida*, *Mannheimia haemolytica* and *Histophilus somni*. Histopathology indicated that the tracheitis was acute and considered most likely secondary to bacterial septicaemia.

In the second case there was evidence of chronic bacterial tracheitis, and then a subsequent acute viral tracheitis due to BoHV1 (see figure 11). This is likely to have led to a negative feedback loop of increased respiratory effort and reduced tracheal lumen leading to asphyxiation. *Mycoplasma bovis* and H. somni were also detected by multiplex PCR.

In the third case, there was also chronic bacterial tracheitis and then acute changes of haemorrhage and oedema of the tracheal wall, fibrin exudate in the lumen and no respiratory pathogens were detected. This last case was considered typical of ‘Honkers syndrome’ for which there is no known aetiology. Tracheitis is a common sequel to bronchopneumonia.

Figure 11: Acute BoHV-1 infection in an animal with pre-existing chronic bacterial tracheitis, which led to a feedback loop of increased respiratory effort and reduced tracheal lumen prior to death by asphyxiation

Nervous system

Cerebrocortical neuronal necrosis

Ayr investigated the case of blindness in multiple dairy heifers. The 48 grazing dairy heifers were split into two groups. Those suspected to be in-calf were housed and those not in-calf kept outside with the bull. The housed heifers were put onto a silage only diet, with the silage reported to have been acidic. The outside heifers were grazing the same silage fed from a trailer.

They were on a stubble field and had access to fodder beet which had been missed by the harvester, and which they appeared to be eating in preference to the silage. Over the following eight days, 17 heifers became blind with many progressing to recumbency.

On clinical examination affected animals were reported to have no menace or pupillary light response, but no nystagmus or opisthotonos was observed. Ten of the affected animals were from the inside group and six from the outside group and they represented animals that had come from all three original grazing groups.

Eleven of the affected animals died or required euthanasia on welfare grounds. There was no history of closantel administration to these animals. Blood samples from affected animals showed no evidence of lead poisoning or Vitamin A deficiency.

Histological examination of the brains from two affected animals submitted for postmortem examination identified cerebrocortical neuronal necrosis (CCN) and white matter vacuolation. SRUC VS considered that the diet changes may have been a predisposing factor for CCN, which possibly became compounded by a lack of water intake in affected animals.

Skin

Cutaneous lymphoma in a dairy cow

A practitioner described multiple skin masses in a dairy cow. The animal had deteriorated in condition and become recumbent by the time she was examined and was euthanased.

The skin lesions consisted of variably sized firm raised lumps, the smallest being ‘grape-sized’, whilst the largest were the size of a satsuma. Superficial lymph nodes were not considered to be enlarged. Fixed samples were collected from some of the masses and fresh tissue was retained frozen.

Histopathology identified a lymphoma, and as this raised the possibility of enzootic bovine leucosis (EBL), which is notifiable, the case was reported to the APHA field services.

It was considered that, as the affected cow was only two and a half years of age and EBL is considered a disease of animals of 3 years of age or older, further investigation was not required. Cutaneous lymphomas in younger animals are considered to occur sporadically and are of unknown aetiology.

Actinobacillosis in fattening calves

A farmer rearing fattening calves reported having four animals with purulent skin lumps over a period of a year. There were approximately 100 animals on the unit. The practitioner reported a reasonable response to topical iodine application. Swabs and a fixed biopsy were received from the most recent case. No significant bacteria were isolated, but histopathology confirmed chronic pyogranulomatous inflammation with Spledore-Hoeppli material, which is consistent with a diagnosis of actinobacillosis.

The causative organism, *Actinobacillus lignierisii* is an oral commensal, and disease is typically seen in the oral cavity, tongue, or fore-stomachs, with spread to regional lymph nodes, but skin of the head, neck and limbs can also be affected. It is thought that infection is percutaneous, entering the skin through wounds or abrasions with young cattle appearing to be susceptible.

Psoroptic mange in beef cattle

Skin scrapes were submitted from a group of 57, 21-month-old Belgian Blue-cross store cattle. The group had been bought in as weaned calves and were housed for winter. In mid-November, one animal developed pruritus, alopecia and crusting of the skin over the withers, extending over the dorsum to the tail head (see figure 12). An in-practice skin scrape identified presumptive *Psoroptes* spp. mites, and two doses of ivermectin were administered, one week apart.

Some improvement was noted, however pruritus remained and by mid-December, a total of seven animals were displaying clinical signs. Skin scrapes and scab material was submitted from all seven, and live *Psoroptes* sp. mites were detected in five out of seven animals (see figure 13), indicating scab infection.

Scab in cattle is an uncommon diagnosis, however Belgian Blue cattle appear to be more susceptible to infestation. There have been 22 The Veterinary Investigation Diagnosis Analysis database (VIDA) diagnoses of *Psoroptes sp.* since 2011, and this case was the second in 2021. Clinical signs are due to an allergic dermatitis and can be very severe. They include intense pruritus, exudative dermatitis, hair loss and marked weight loss.

Signs tend to improve at turnout but, can recur when housed for the winter. Control can be challenging as mites can spread easily via fomites (such as, equipment, gates, and clothing) and animals with low numbers of mites can be difficult to identify and sustain infestation in the group.

Macrocyclic lactones are the only licensed acaricide for *Psoroptes* spp. in the UK, however there are concerns regarding efficacy of these products in recent years, with resistance of *Psoroptes* to macrocyclic lactones in Belgian Blue cattle reported by Wouter van Mol and others (1). In this case, the decision was made to re-treat the whole group with a doramectin pour-on.

Visibly affected animals were isolated, whilst the remainder of the group were turned out to allow cleaning of the shed. Good clinical resolution was noted however it was recommended that repeat scrapes were performed at three weeks post treatment to check for residual mites.

Figure 12: Alopecia and crusting in a Belgian Blue with Psoroptic mange (photograph provided by Claire Rudd of Synergy Farm Health)

Figure 13: Microscopic view of Psoroptes sp. mite from cattle (image from APHA Parasitology Carmarthen)

Lice in a dairy heifer

Skin scrapes were submitted from a 15-month-old dairy heifer. The animal was displaying a low-grade pruritus, with marked thickening of the skin affecting the pinnae, peri-orbital areas, neck, shoulders, and perineum.

A large amount of seborrheic material was present in the coat (see figure 14). The issue had begun in summer whilst grazing, and this was the only animal affected in the group. Treatment with deltamethrin was carried out three weeks prior to submission of skin scrapes and hair plucks.

Microscopic examination identified live *Bovicola* sp. lice in hair samples taken from the neck. Lice were deemed to be the most likely cause of the dermatitis and repeat treatment of this animal was recommended.

Deltamethrin is licensed for treatment in cattle and should generally eradicate lice with one application. However complete clearance can take up to five weeks, and reapplication is needed on rare occasions at 6 to 8 weeks.

It was unknown why this animal appeared to be affected when others in the group were not. Comorbidities were investigated. Blood biochemistry was unremarkable, and BVD antigen testing was negative.

A blood copper level in this animal was low (3.8 µmol/l. Reference range 8 to 25), and although no direct link could be made between this and the dermatitis, it was recommended that others in the group were tested to investigate hypocuprinosis further.

Figure 14: Skin thickening and scaling due to Bovicola sp. lice (photo provided by Nigel Clarke of Otter Vets)

Scaly alopecia associated with ringworm, lice, and poultry mites

Salmonella Dublin infection, acute bacterial pneumonia and chronic ruminal acidosis were diagnosed in two 12-week-old heifer calves. In addition, scaly alopecia consistent with ringworm was noted on the dorsum of both. One also had black lice (appearance consistent with *Linognathus* sp. sucking lice), along with small beige mites identified as poultry red mite, *Dermanyssus gallinae*. SRUC VS noted that the poultry red mite is known to feed off non-avian hosts, taking blood meals and causing dermatitis in some hosts.

While not of pertinent clinical significance in this case, as mites appear to have problems feeding through mammalian skin, it was noted that they may be managing to feed by co-infesting alongside the sucking lice. If these mites were completing their life cycle within the cattle housing, the population could grow, with the potential to impact the welfare of these animals (George 2015).

Circulatory system

Endocarditis due to Staphylococcus aureus, possibly secondary to rib fracture

A 16-month-old Aberdeen Angus bull suffered progressive weight loss, increased respiratory effort, increased lying time and staggery gait over a period of 1 month. On postmortem examination there was brisket oedema, marked ascites and mesenteric oedema.

The right ventricle was filled with fibrous yellow exudate, strongly adherent to the endocardium and tricuspid valves. The liver had a nutmeg appearance due to chronic vascular congestion. A purulent lesion on the valve produced a pure growth of *Staphylococcus aureus*.

Healed fractures of ribs 8 and 9 of the left thorax were detected and a lesion in rib 9 was suggestive of a resolving osteomyelitis (culture sterile), which may have acted as a septic focus and resulted in the endocarditis (see figure 15).

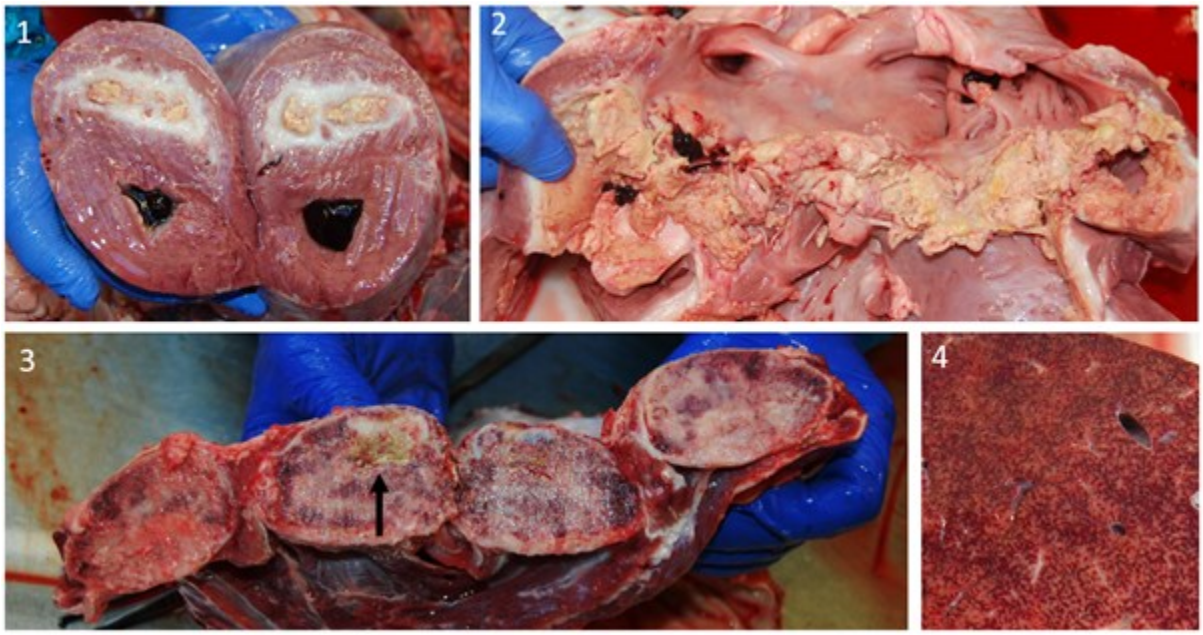


Figure 15: Clockwise from top left: 1. Cross section of ventricles. 2. Thick adherent fibrinous material adherent to the tricuspid valve, a large amount of material had been removed from the ventricle prior to the photograph. 3. Cut surfaces of 2 rib fractures, lesion in rib 9 (black arrow). 4. Nutmeg liver vascular congestion

Idiopathic aneurysm in a dairy cow

Thirsk VIC received the carcase of a 4-year-old Holstein Friesian dairy cow, which had died without showing clinical signs. Upon opening the carcase, a large blood clot was present in the abdominal cavity, with free blood encasing the mesentery and occupying the space between the omasum and reticulum. The cause of death was deemed to be hypovolaemic shock, resulting from rupture of a vessel associated with the fore stomachs.

Sections of the affected vessel were examined histologically and identified as abdominal artery. A focal aneurysm was diagnosed, with evidence of intimal and medial proliferation, suggesting attempted repair following injury or degeneration of the vessel over a period of weeks.

Catastrophic abdominal arterial aneurysm and rupture occurs sporadically in dairy cattle and is most often reported in Holstein Friesian cows around 4 to 5 years of age. Lesions, when identified, are most often found in the abdominal aorta, coeliac artery, cranial mesenteric artery or uterine arteries. Animals are usually found dead, however if found alive, animals display sudden milk drop, recumbency, colic and death. The cause of this condition is unknown.

Local vasculitis secondary to bacterial, fungal or parasitic infection, trauma and hereditary defects have all been hypothesised in literature. The condition is most likely multifactorial and may be related to the breeding and management of these dairy cattle for high yield milk production. This condition was discussed by Crawshaw et al in 2011 and Lamm et al in 2007.

Reproductive system - Abortion

Porencephaly and cerebellar hypoplasia in a Shorthorn fetus

Twin Shorthorn fetuses submitted to the Royal Veterinary College had been aborted approximately 4 to 6 weeks prior to the due date. The same dam had also aborted twin calves during the previous pregnancy.

One of the fetuses had skull abnormalities, with the dorsal skull bones not having fused and a markedly thickened dura mater. Fluid exuded from the underlying brain and from bilaterally markedly expanded ventricles, which were surrounded by markedly thinned cerebral hemisphere tissue. These findings were indicative of hydrocephalus, or potentially of hydranencephaly or porencephaly.

As infection with Bluetongue Virus (BTV) has to be considered a potential differential diagnosis for porencephaly, this case was notified to APHA, but further testing negated BTV. There was also no PCR or fetal serological evidence for the involvement of SBV.

Histopathological examination revealed a marked paucity of cerebellar cells (cerebellar hypoplasia). A common cause for this is BVD but again, PCR and fetal serological results

were negative for BVD. Although this does not exclude the possibility of BVD involvement, it was considered unlikely in this case, as the herd had a BVD negative status.

Alternatively, there is some literature evidence that genetic causes can be associated with congenital cerebellar hypoplasia. It was however interesting to note in this case that the brain and skull of the twin calf were unaffected.

Salmonella Dublin

Salmonella Dublin was, as in previous years, identified as the most common cause of abortion, most commonly affecting dairy cattle. Enteritis was also a feature in some of these herds. In many herds, vaccination was undertaken following the confirmation of disease, and this was usually followed by a reduction, and subsequent cessation, of clinical disease.

In a Cheshire herd of 175 cows, which had been closed for more than 25 years, *S*. Dublin was identified as the cause of scouring in one cow, and a month later was confirmed as the cause of a single abortion. *S*. Dublin had also been identified causing abortions in the herd four years previously (in 2017), and since then the herd has been vaccinated, with annual boosters given.

No other infectious agents were identified and no underlying reason for the apparent 'lack of efficacy' of the vaccine was evident. A report on the outbreak was made to the Veterinary Medicines Directorate.

Control of salmonella infection is predominantly by good hygiene; especially in the calving pen, as cows with latent infections may shed more around calving, also by good colostrum management, and cleanliness of feeding equipment. Vaccination against *Salmonella* Dublin is also available and could be considered as part of a disease control plan. A very informative overview of *S.* Dublin including aspects of control is provided by Henderson and Mason 2017.

Foetopathy associated with BVD type I

Foetopathy associated with BVD type I infection was diagnosed following submission of a third trimester fetus, from a dairy herd of 300 milking cows, where five abortions had been reported over a short period of time.

Despite the initial report that the dams were vaccinated against IBR and BVD, it later became apparent that BVD vaccination had not been used and several animals had been bought into the herd. No maternal illness was reported following abortion, with both heifers and cows being affected. No other abortifacients were detected through testing.

Stillbirths associated with Coxiella burnetii (Q fever)

Both SRUC Dumfries and SRUC St Boswells diagnosed stillbirths associated with Q fever this quarter. Dumfries examined five stillbirths from a well-managed dairy herd. All had occurred in heifers over a long period of time and other factors (such as sire, nutrition, management or body condition) were considered to be optimised.

Q fever was diagnosed as the cause in 3 out of 5 cases based on histopathology, IHC and then PCR. Heifers returning to the main cow herd were being exposed eight weeks prior to calving and serological testing of heifers at the rearing unit, plus heifers that had been in the herd for up to six months, showed a clear difference with those pre-calving being seronegative and those in the herd seropositive.

St Boswells examined a stillborn calf, which was one of three stillborn or weak calves, in a herd of 180, over four days. Q fever involvement was confirmed by placental histopathology and PCR.

Congenital disease

Multiple congenital abnormalities in an aborted calf

A near-full-term aborted calf was presented for examination, as the owner was concerned about SBV infection. It was born to a primiparous heifer, in a dairy herd of 100 cows and 30 heifers. No other disease was reported. The calf had a very short neck, with the head twisted.

The tongue was over-large and protruded from the mouth. The right limbs were reasonably normal, although the joints were partially ankylosed. In contrast, the left hind leg was under-developed and was not jointed with the pelvis, the proximal end of the femur being free within a large skin or visceral pouch (see figure 16). This pouch also contained the stomachs, which were distended with amniotic fluid, and the intestines.

The left forelimb was partially ankylosed and had four digits (see figure 17). The skull was deformed, having twisted, or angulated, articular facets, and the cranium was domed and distorted. The abdomen was open and the liver, which was misshapen, protruded from the body cavity.

The heart had a large ventricular septal defect. The brain was congested but otherwise grossly normal, as was the spinal cord. The multiple abnormalities were not typical of viral infection and PCR testing for SBV and pestiviruses was negative. The malformations were considered likely to be caused by a sporadic developmental defect.

Figure 16: Partial ankyloses of right-side limbs, underdeveloped left hind leg extending from skin and body wall pouch, abnormal left forelimb with four digits, shortened angulated neck and open abdomen with exposed liver in an aborted calf

Figure 17: Polydactyly of the left forelimb

Cerebellar hypoplasia

A 5-day-old British Blue calf was delivered by caesarean section and appeared to drink on its own. It deteriorated in demeanour over several days and was dog sitting and reversing on day four. The calf then fitted on the morning of submission and died and was submitted to SRUC Dumfries. All joints examined contained flocculent yellow joint fluid.

In the brain, there was a loss of sulci definition and the cerebral blood vessels were markedly congested. The cerebellum was approximately a quarter of the size expected. An extremely low ZST of 1 was detected. E.coli was cultured in a pure growth from all sites, including the liver, spleen, meninges, carpus and stifle, supportive of an *E.coli septicaemia*.

Changes in the brain included cerebellar hypoplasia, malformation of the lobes and pale myelin. This calf was negative for BVD virus, but BVD exposure during pregnancy could not be ruled out and the herd had a non-negative status in the Scottish Government BVD database. Virus screening of a small number of animals on farm which had not been previously tested and, screening the dam for BVD antibody, to exclude BVD as a possible cause of the cerebellar hypoplasia, was recommended.

Mastitis

Mastitis following drying off

In quarter 3 of 2021, we reported two cases of toxic mastitis following drying off. The move to reduce usage of dry cow antibiotic tubes, and increased use of teat sealants, means that strict hygiene at drying off is more important than ever. Shrewsbury diagnosed another case of mastitis following drying off, where more than one cow had been affected.

Five cows in a dairy herd of 100 died, each within a few days of drying-off using only teat sealant. The fifth animal to die was examined postmortem. The udder skin was discoloured red-purple and had early sloughing of the skin over one hind quarter. Diffuse oedema was present subcutaneously in the udder and inguinum.

The milk in one hind quarter was dark red, pink in the other hind quarter, and clotted and watery in the two front quarters. Teat sealant was present in clumps in all four teats, mostly within the teat canal but with some also in the teat cistern.

The findings were consistent with mastitis occurring following drying off. *E. coli* was isolated in pure culture from one quarter, and in mixed culture from two others, with *Burkholderia cepacia* isolated in pure culture from the fourth quarter. The latter is an environmental organism found in soil and water. A review of the procedure employed for drying off was being undertaken.

Centre of Expertise for Extensively Managed Livestock (COEEML)

The COEEML was developed by APHA to address potential surveillance gaps for extensively managed animals. Extensive management of livestock potentially makes regular or close inspection for disease detection more challenging.

The centre is based at the APHA Veterinary Investigation Centre in Carmarthen however, it is a Great Britain wide resource and forms part of the wider veterinary surveillance system operated by APHA.

Planning is underway for a COEEML conference to be held in Wales in 2022.

Antimicrobial use and resistance

The Veterinary Antibiotic Resistance Sales and Surveillance (UK-VARRS) report 2020 has been published by the Veterinary Medicines Directorate (VMD) on GOV.UK.

This shows that sales of veterinary antibiotics for use in food-producing animals, adjusted for animal population, have shown a 52% decrease since 2014, and sales of Highest Priority Critically Important Antibiotics (HP-CIAs) have decreased 79% since 2014.

While usage data for ruminants is not currently available, there is an ambition that the Medicine Hub (which was launched in January 2021) will provide an independent, central repository to collate, report, and compare antibiotic use at farm level for both cattle and sheep.

Furthermore, the 'Farm Vet Champions' initiative, with a training and engagement programme delivered by RCVS Knowledge, has the potential to embed antimicrobial stewardship into practices across the country.

Chemical food safety

The latest chemical food safety report can be found on GOV.UK.

Lead poisoning in calves

Three out of a group of 30 4-month-old suckler calves at grass had become ill four days after having had access to a broken car battery. They showed blindness and ataxia, 2 died and one recovered. The calves were voluntarily restricted and six were blood sampled four months later.

The calf that had recovered and appeared clinically normal had a raised blood lead concentration of 1.32 µmol/l, concentrations more than 0.15 µmol/l are consistent with exposure to a source of lead and concentrations more than 1.2 µmol/l are usually detected in animals exhibiting clinical signs of lead poisoning. Hence, although the calf was clinically well, it was not fit for the food chain.

Unfortunately, after ruminants ingest lead in forms such as that inside a battery it can take months or years for the blood lead concentration to drop to safe levels, and further monitoring of this individual was advised. If the animal were to be sold then food chain information (FCI) should be included, stating that discard of the offal would be required at slaughter.

Haematuria in organic dairy cows

APHA received reports of six herds affected by haematuria during 2021, and this case was the fifth organic dairy herd in which haematuria was reported. Approximately 12 cows in the high-yielding group had been affected since January 2021, in the herd of 500.

Organic rape seed meal was fed from one supplier from October 2020 to October 2021, and since removing this ration, the other affected cows had ceased exhibiting haematuria, apart from the submitted cow. She had since exhibited milk drop, weight loss and blood clots in the urine. She was euthanased prior to submission. Multifocal, irregularly shaped pale and haemorrhagic lesions were present on the kidney surface, with wedge-shaped extension into the cortex (infarcts).

The bladder and renal pelvises contained a small amount of red urine, and the bladder mucosa was reddened. These findings raised suspicion of a pyelonephritis. Haematology revealed a mild anaemia and kidney parameters were measured and within normal limits.

Histopathology confirmed chronic inflammation of the bladder and severe renal necrosis with nephritis. The pattern of renal pathology suggested a haematogenous insult (infectious thromboemboli) however bacteriology of multiple organ sites including kidneys remained sterile.

The underlying pathological process resulting in haematuria is still uncertain and APHA are keen to hear about any similar cases to further understanding.

Suspect bracken fern poisoning in a suckler calf

A 6- to 7-month-old suckler calf died after being unwell for approximately 10 days. Signs included malaise, mild epistaxis, then pyrexia and diarrhoea with mucosal casts before dying. No other calves were currently affected by similar signs in the group of 24, however there had been similar losses which started in the summer, and 4 or 5 had died. The calf was still sucking from the dam and had access to hay and haylage, no concentrate feed was given. Cows and calves had been housed for three weeks.

Gross findings included: haemorrhages throughout the carcase (see figure 18), necrotic ulceration of the small intestines with adhesions between intestines and omentum, an enlarged, bronze-coloured liver, yellow fat suggestive of jaundice and thin, watery blood suggestive of anaemia.

Histopathology of bone marrow showed marked suppression of all cell lines, and it was considered likely that this was the primary pathology in this case. Bracken fern toxicity was considered the principal differential in this age of calf. Further history gathered was that this group had grazed upland over the summer months with likely access to bracken until the end of September when they were brought to lower ground.

Bracken contains some genotoxic or possibly genotoxic substances including ptaquiloside, kaempferol and shikimic acid. Ptaquiloside from bracken ingested by food producing animals (for example, dairy cows) can be passed into milk that might be consumed by humans.

No information is available on the amount of ptaquiloside and other possibly genotoxic substances that may be left as residues in other animal-derived foods, and further studies are required to be able to specify a withdrawal period prior to slaughter for human consumption of meat and offal.

This case was reported as a potential food safety incident. Advice was given to determine the possibility of bracken being incorporated into hay or haylage. If so, feeding of contaminated forage should be stopped immediately and an alternative fed.

Alongside the bone marrow changes, histopathology also demonstrated a necrotising bacterial infection of the intestine, with systemic spread of bacteria and accompanying thrombosis and necrosis affecting the lungs and liver. *E. coli* was isolated in pure growth from lung, liver, and spleen on bacteriology.

The histopathologist commented that the enteric pathology was reminiscent of Idiopathic Necrotising Enteritis of suckler calves, but this more typically occurs in younger calves (around 2- to 3-months old).

Figure 18: Haemorrhages in the mesentery and serosa of a calf with bracken toxicity

Hypersensitivity reaction to injected oxytetracycline

An adult dairy heifer that was treated with 50ml intramuscular oxytetracycline for digital dermatitis, fitted and died within minutes. Two more heifers from the same herd were submitted later the same week. One survived for 24 hours post injection, had low calcium and high creatinine kinase (CK) detected in blood samples, then died and the third died within 15 minutes of injection.

An injection site was found in the gluteal muscles of one hindlimb of all three heifers, with varying amounts of associated haemorrhage, muscle firmness and possibly foreign material detected in one. The vitreous humour magnesium was low in the first heifer, but unremarkable in the other two.

On histopathological examination of the skeletal muscle there were both chronic and acute changes in all three animals. Chronic changes appeared to be associated with foreign body material, presumably previous injections at the site. Marked numbers of eosinophils were present, possibly due to the presence of foreign body material or indicative of a hypersensitivity reaction. Changes in the spleen, liver, lung and heart were consistent with a systemic inflammatory process.

A diagnosis of an acute hypersensitivity reaction was made in all three heifers, possibly compounded by previous injections made at the same anatomical location, or injection of foreign material.

The batch numbers of the oxytetracycline used were recorded, and the private veterinarian informed the Veterinary Medicines Directorate (VMD) and the drug manufacturer of a possible drug reaction.

Horizon scanning

Bluetongue (BTV) update

In December, in Europe there were 10 outbreaks of BTV in Portugal.

Currently the risk of BTV incursion to the UK remains low. Animals travelling to or from BTV-affected areas of Europe, and back to the UK, must be vaccinated against both BTV-8 and BTV-4.

Further advice on how to spot and report BTV can be found on GOV.UK.

More information on the current BTV situation in Europe is also available on GOV.UK.

The current BTV restricted zones are shown on the map in Figure 19.

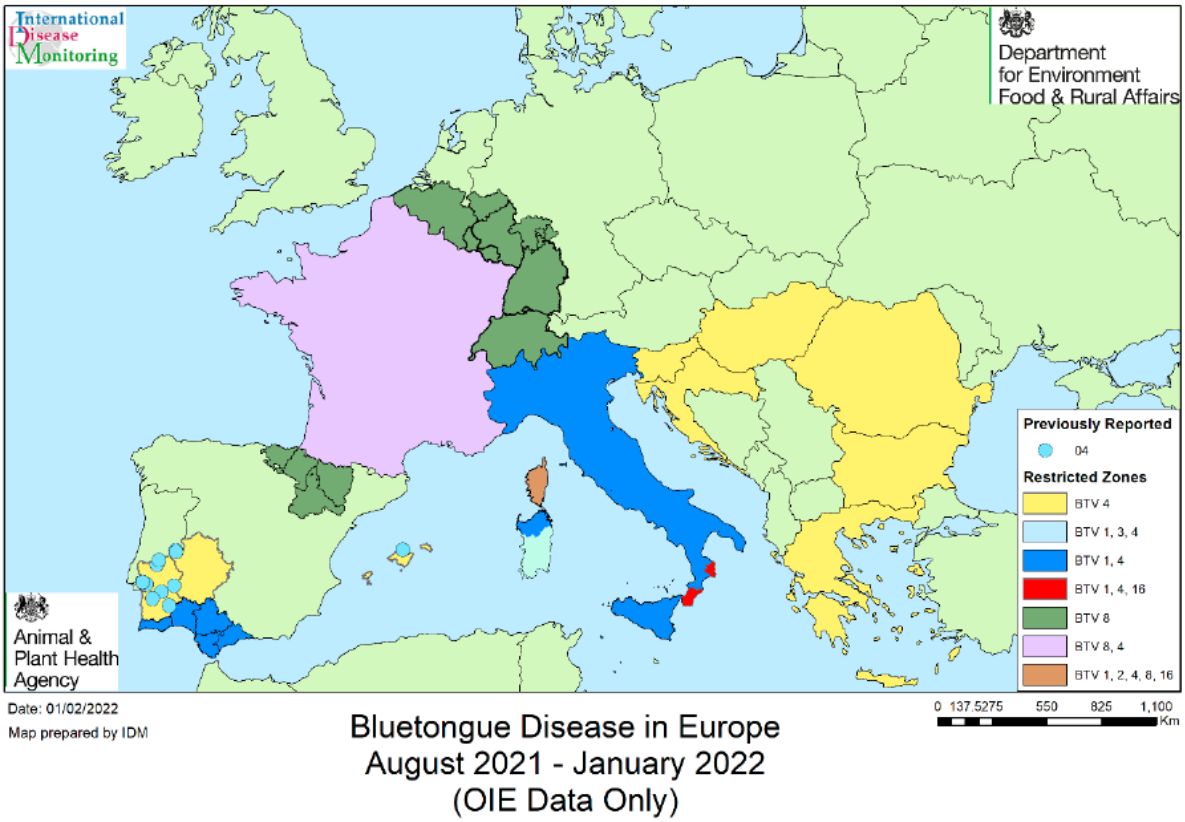


Figure 19: Bluetongue disease in Europe August 2021 to January 2022

For more information, see our BTV Outbreak Assessment on GOV.UK.

APHA have released a series of animations on Facebook and Twitter to inform keepers of BTV.

References

Hepple, S., Watkins, G., Crawshaw, T., Harwood, D., Ellis-Iversen, J., Clark, J., Pollock, A. and Brough, T. (2010) Risks to cattle transported long distances in late pregnancy. Vet Rec 167, 796 Risks to cattle transported long distances in late pregnancy - Hepple - 2010 - Veterinary Record - Wiley Online Library

Edwards, G., Woodger, N., Barlow, A. and Bell (2008) Sarcina-like bacteria associated with bloat in young lambs and calves. Vet Rec 163 (13) 391-3 Sarcina-like bacteria associated with bloat in young lambs and calves | Request PDF (researchgate.net)

Blowey, R.W. (1994) Calf feeding practices in relation to health. Cattle Practice 2 (3) 375-382

Blowey (1994) A discussion of prevention and treatment of abomasal bloat in calves, in Progressive Dairyman (https://www.progressivedairy.com/)

Henderson, K., Mason, C,(2017) Diagnosis and control of *Salmonella* Dublin in dairy herds https://doi.org/10.1136/inp.j1160

Jeckel S, Bidewell C, Everest D, McInnes C, Wood A, Dare J, Schock A. Severe oesophagitis in an adult bull caused by bovine papular stomatitis virus. Vet Rec. 2011 Sep 17;169(12):317

Cahalan SD, Sheridan L, Akers CR. Lorenz I, Cassidy J. Atypical cutaneous actinobacillosis in young beef cattle Veterinary Record 2012;171:375 https://doi.org/10.1136/vr.100906

Wouter van Mol, Nathalie De Wilde, Stijn Casaert, Zhenzhen Chen, Marieke Vanhecke, Luc Duchateau and Edwin Claerebout. Resistance against macrocyclic lactones in Psoroptes ovis in cattle. *Parasites & Vector* (2020) 13:127

George, D.R., Finn, R.D., Graham, K.M. et al. Should the poultry red mite Dermanyssus gallinae be of wider concern for veterinary and medical science? Parasites Vectors 8, 178 (2015). https://doi.org/10.1186/s13071-015-0768-7

Crawshaw T, Wessels M, Howie F, McElroy M, Patterson T, Peperkamp K, Lamm C. Idiopathic arterial aneurysm/rupture causing sudden death in dairy cattle. Vet Rec. 2011 Sep 3;169(10):261. https://doi.org/10.1136/vr.d5547

Lamm CG, Guard CL, Erb HN, Njaa BL. Characterization of Rupture of Abdominal Artery Aneurysm in Dairy Cattle. Journal of Veterinary Diagnostic Investigation. 2007;19(3):273-278. doi:10.1177/104063870701900307

Publications

APHA staff

APHA (2021) Disease surveillance in England and Wales, November 2021. *Veterinary Record* Disease surveillance in England and Wales, November 2021 (wiley.com)

Deeney AS; Collings R; Ridley AM (2021) Identification of Mycoplasma species and related organisms from ruminants in England and Wales during 2005-2019. BMC Veterinary Research 17, Article number: 325.

Swinson V; Papadopoulou C; Rafferty L (2021) Bluetongue virus surveillance study (letter). Veterinary Record 189 (9) 369.

Bartley DJ; Jewell NJ; Andrews LM; Mitchell S; Morrison AA (2021) Confirmation and characterisation of fenbendazole resistance in Ostertagia ostertagi derived from clinically affected dairy calves at grass in the UK. Cattle Practice 29 (1) 9-11.

Murphy A and Swinson V (2021) Diagnostic sampling: What type of samples do I take and how do I get the best chance of a result? Cattle Practice 29 (1) 67.

Otter A (2021) Clostridial diseases and diagnostics. Cattle Practice 29 (1) 56.

Otter A; Torrens N and Martindale L (2021) Pestivirus infections of cattle. Veterinary Record 189 (7) 281-282.

Bartley DJ; Jewell NJ; Andrews LM and Mitchell S; and Morrison AA (2021) Molecular and phenotypic characterisation of fenbendazole resistance in a field-derived isolate of *Ostertagia ostertagi*. Veterinary Parasitology 289, 109319.

Melville LA; Innocent G; Van Dijk J; Mitchell S and Bartley DJ (2021) Descriptive analysis of nematode management practices and Nematodirus battus control strategies on UK sheep farms. Veterinary Record 189 (9) e775.

Other publications of interest

Bartley DJ, McArthur CL, Devin LM, et al. (2012) Characterisation of macrocyclic lactone resistance in two field-derived isolates of *Cooperia oncophora*. *Vet Parasitol.* 21, 190(3-4), pp.454-60. Characterisation of macrocyclic lactone resistance in two field-derived isolates of Cooperia oncophora - ScienceDirect

Statement regarding use of this material

This publication is available at:

https://www.gov.uk/government/collections/animal-disease-surveillance-reports

Any enquiries regarding this publication should be sent to us at SIU@apha.gov.uk

http://apha.defra.gov.uk/vet-gateway/surveillance/index.htm

The Animal and Plant Health Agency (APHA) is an executive agency of the Department for Environment, Food & Rural Affairs, and also works on behalf of the Scottish Government and Welsh Government.