Animal & Plant Health Agency

SRUC

GB small ruminant quarterly report

Disease surveillance and emerging threats

Volume 25: Quarter 1 – January to March 2022

Highlights

- **Rickets in 11-month-old ewe lambs - Page 4**
- **Cerebellar dysplasia in a goat - Page 6**
- **Watery mouth - Page 13**
- **Fetopathy associated with Schmallenberg virus (SBV) infection - Page 15**

Contents

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Introduction and overview

This quarterly report reviews disease trends and disease threats for the first quarter of 2022, January to March. It contains analyses carried out on disease data gathered from APHA, SRUC Veterinary Services division of Scotland's Rural College (SRUC) and partner postmortem providers and intelligence gathered through the Small Ruminant Species Expert 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.

APHA's new Endemic Disease Alert System

This is a new component of the communications from our scanning surveillance network and a new system that the APHA will be using, to keep you up to date with significant disease alerts and information, projects, publication of reports and other items.

This is independent of the notifiable disease alert system.

To receive these notifications please respond to siu@apha.gov.uk

Providing your preferred: -

- email address you would like us to use
- mobile telephone number if you wish to receive text alerts

We hope that you find this new messaging system to be beneficial and any suggestions or feedback are welcome.

Issues & Trends

Weather

Most of January was distinctly colder than average, with some severe frosts in the north, and only brief milder spells, which were most marked in the south; monthly-mean temperatures were 1.5 °C below average, making it the coldest January since 2010 (Figure 1). The first half of February saw some severe frosts, and snowfall, but the second half was much milder, and the monthly mean temperature was 0.4 °C above average . Mean temperatures for March were 1.0 °C above the long-term average, which was good for lambing however, rainfall totals for March were below normal in many places, which limited grass growth (Figure 2).

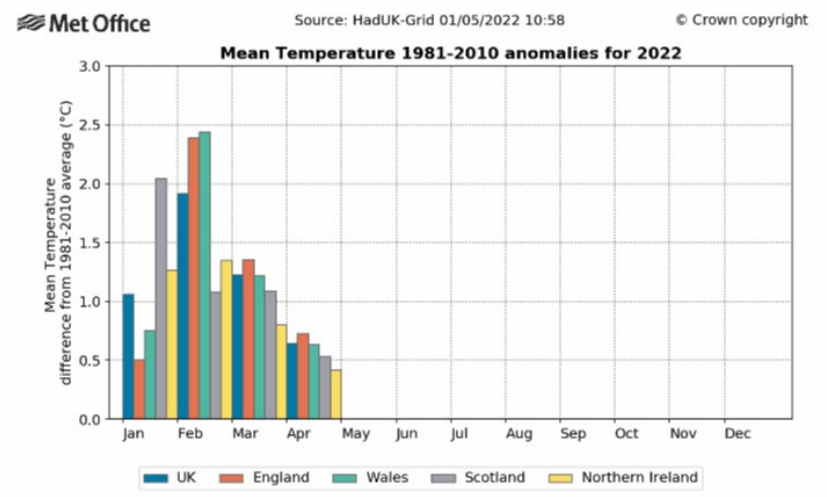

Figure 1: Mean temperature 1981 to 2010 anomalies for 2022

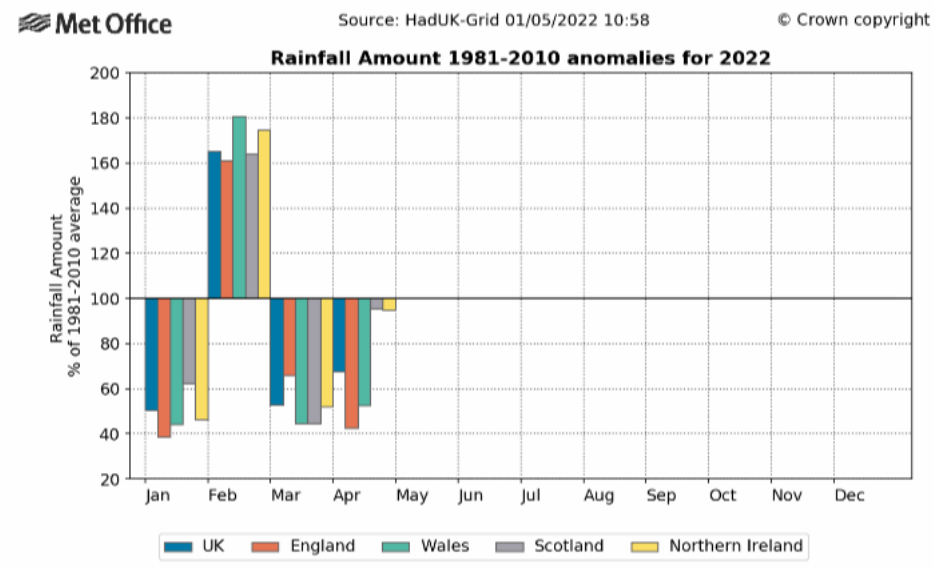

Figure 2: Rainfall amount 1981 to 2010 anomalies for 2021

Industry

In the year to 23 April 2022, estimated clean sheep slaughter was 3.40 million head, up 7% from 3.17m at the same point in 2021. Deadweight sheep prices over the first quarter averaged £5.80/kg, about 10p lower than a year ago but still well up on the five year average.

Only two months' trade data is available, showing that total import volumes stood at 9,100 tonnes in the first two months, up 34% compared to levels a year earlier, and exports totalled 10,400 tonnes, up 27%. Much of the increase can be attributed to recovery from last year's post-Brexit lows. Imports from New Zealand were steady on 2021 levels.
The foodservice market continues to open up, and so consumer demand is shifting towards that, and so away from retail. Retail data for the 12 weeks ending 20 March 2022 compares with a year ago, when more restrictions were in place. As such, primary lamb sales declined by 27% year on year during this period. However, for the 52 weeks ending 20 March 2022, retail demand was only down 5% compared to 2019. Taking foodservice and retail demand together, in the 52 weeks ending 20 March, demand is likely to be down by around 8% compared to 2021.

Indications are that lambing has gone relatively well so far, with many being able to take advantage of the clement weather and turn animals out. Recent widespread rain has been lacking, so while some in the west of the country have already been able to take a first cut of silage, others are hoping for rain to boost grass availability. Although there is an anticipated higher risk of Schmallenberg, on balance any material deviation from the forecast UK lamb crop would come as a surprise. Input prices, already high before Russia's invasion of Ukraine have further increased. As one of the lower input sectors, it is possible that the impact on sheep meat production will be relatively limited. However, it could affect retention rates of adults later in the year, and the typical profile of lamb slaughter might be advanced too, if forage availability becomes tight.

Duncan Wyatt AHDB

Unusual diagnoses

Rickets in 11-month-old ewe lambs

A lamb was submitted to APHA VIC Carmarthen to investigate lameness and front limb deformities in 15 lambs from a group of 200. The lambs were replacement ewe lambs and had been grazing lush dairy pasture over the winter prior to becoming lame. A similar clinical picture had been reported two years previously.

On clinical examination the lamb had been lame on the left front leg, and compared to the left, the right carpus was enlarged and firm. Both front legs deviated laterally from the carpi (carpal valgus), which was most pronounced in the left front leg. Gross examination of fixed tibia and radius revealed irregular thickening of the growth plates (Figure 3) and evidence of growth arrest lines (Figure 4). Histopathological evaluation of these areas revealed severe, multifocal, failure of endochondral ossification with persistent metaphyseal tongues of hypertrophied chondrocytes and myelofibrosis consistent with a diagnosis of nutritional osteodystrophy (rickets).

Testing for vitamin D demonstrated a profound deficiency, despite recent supplementation six weeks previously. A moderate worm burden was also identified, and a concurrent PGE may have affected vitamin D absorption. It was recommended that the group received further supplementation of vitamin D.

Cases of rickets have been reported in northern England (Mearns and others 2008) and Scotland (Hurst and others 2020), in young sheep grazing dairy pasture in the winter months. This case is unusual being so far south and to our knowledge is the first case definitively confirmed in Wales. Sheep breeds with pigmented skin and in full fleece are more likely to be affected due to reduced photobiosynthesis. Sheep obtain vitamin D from UV radiation in the summer months or through their diet, however, there is little vitamin D in grass. In the face of dietary deficiency vitamin D reserves will only last for approximately six weeks. Clinical signs are due to defective mineralization, which in young animals leads to failure of endochondral ossification and mineralization of the cartilage matrix at growth plates. The fastest growing bones are often most affected. This in combination with the lush grazing, which likely promotes faster growth rates, further exacerbates the problem. Crops containing carotene may also antagonise the effects of vitamin D, such as Italian ryegrass and turnips.

It has been suggested that supplementation with vitamin D prior to overwintering on lush pasture is preventative.

Figure 3: A section through the proximal tibia of an 11-month-old ewe lamb with rickets, showing thickening of the growth plate (arrow)

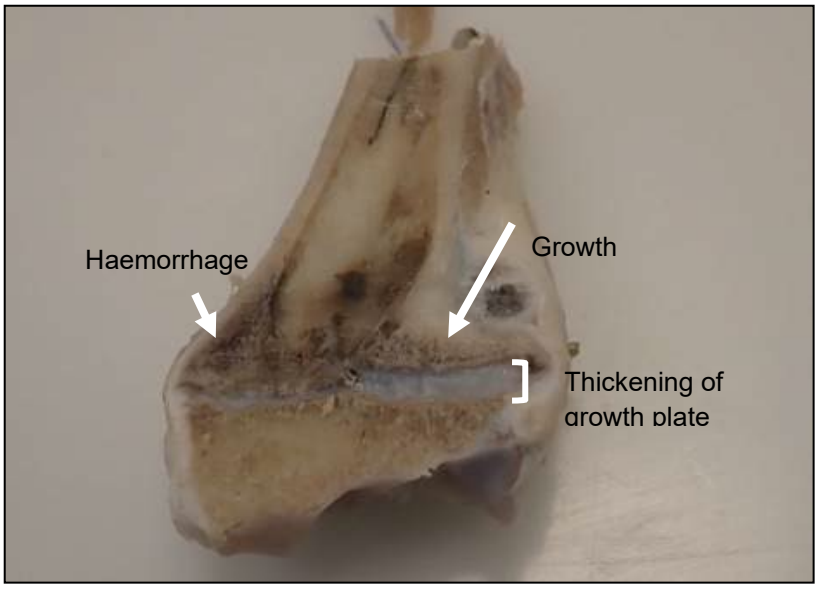

Figure 4: A section through the distal radius of an 11-month-old ewe lamb with rickets indicating areas of pathology

Cerebellar dysplasia in a goat

Cerebellar dysplasia, possibly related to Chiari-type malformation was found in a young pygmy goat kid, which had neurological signs, being 'wobbly', 'floppy' and ataxic. From the seven kids born by the time of submission, three had these neurological signs and two had been stillborn. Gross examination found coning of the cerebellum and histopathology confirmed cerebellar dysplasia but, with the cerebellum being of normal proportion in relation to the rest of the brain. The dysplasia could explain the neurological signs described (ataxia, paresis). Teratogenic viruses are typically considered the most common causes of such changes in neonatal ruminants, however they usually also display a reduction in the size of the cerebellum and coning is not a feature. Cerebellar coning is ordinarily a sign of herniation of the cerebellum into the foramen magnum; most often this results from cerebral oedema, again absent in this case. Considering all these findings, and the age of animal, malformation of the caudal fossa - Chiari-type malformation, could be the primary cause of both the gross and microscopic changes in the cerebellum. Chiari-type malformation is well recognised in brachycephalic and toy breeds of dogs and is occasionally seen in calves and lambs. This is thought to be the first report from APHA of this in goats.

Ovine white liver disease in a mature sheep

A 21-month-old Portland ewe was diagnosed with multiple problems after being submitted to SRUC from a small flock of 50 with a history of weight loss, recumbency and death in several sheep. The sheep were outwintered at grass, but a group of 12 thin animals had been housed for supplementary feeding. The liver was pale and friable and sections of cut

tissue floated when placed in fixative, suggesting significant infiltration by fat. The faeces were diarrhoeic and a multiloculated abscess was found within the mesenteric lymph node. Approximately 25,000 *Teladorsagia* sp worms were recovered from the abomasum and a further 3,600 *Nematodirus* sp worms from the small intestine. *Yersinia pseudotuberculosis* was isolated from the liver and was suspected to have ascended from the intestinal tract, where nematode damage was likely to have favoured its establishment. Histopathological changes of severe chronic active vacuolar hepatopathy, and abundant brown pigment within sinusoidal and portal macrophages, were consistent with ovine white liver disease which is an uncommon diagnosis in mature sheep. This was supported by a low liver cobalt result of 0.03 mg/kg dry matter (DM) (reference range >0.06 mg/kg DM). Liver selenium was also low at 0.17 mg/kg DM (reference range 0.9 to 3.5 mg/kg DM). No significant organisms were isolated from the mesenteric abscess but, antibodies to caseous lymphadenitis (CLA) were detected. Blood and faecal sampling additional animals to further investigate worm burdens, trace element status and the extent of flock exposure to CLA was advised.

Lesions due to squamous cell carcinoma in a sheep investigated as possible tuberculosis

The carcase of an adult Leicester Longwool wether was submitted to APHA VIC Starcross, with a history of chronic weight loss and a non-responsive neck abscess. Postmortem examination showed multiple 0.5-2cm diameter pale lesions throughout the kidneys, spleen and liver, with the bronchial lymph nodes massively enlarged with caseous, gritty material on the cut surface. The possibility of TB was investigated and negated by culture, and histopathology of a range of tissues confirmed the lesions as squamous cell carcinoma, a very uncommon neoplasm in sheep.

Septicaemic yersiniosis in a goat kid

A nine-month-old Boer goat kid was submitted to APHA VIC Starcross, with a history of ill-thrift and scouring. Gross postmortem examination revealed submandibular gelatinous oedema and excess straw-coloured fluid in the body cavities. In addition, there was liquid intestinal content and a colitis/typhlitis, with thickening of the caecal mucosa and raised multifocal pink-and-cream-coloured foci within the mucosa. There was evidence of a parasitic gastroenteritis from a gut wash, although the worm egg count was relatively low. *Yersinia pseudotuberculosis* was isolated from liver tissue but not from caecal content, and histopathology confirmed a severe, multifocal, acute, necrosuppurative enterocolitis, with intralesional bacterial colonies, considered most likely to be secondary to the parasitic gastroenteritis, but resulting in septicaemic spread to the liver.

Changes in disease patterns and risk factors

Syndromic analysis - Syndromic alerts were raised this quarter for GB for the following diseases:

Increasing trends were reported for: hyposelenaemia and hyposelenosis, hypocupraemia and hypocuprosis, Maedi Visna, Parasitic Gastroenteritis Not Otherwise Specified, coccidiosis, OPA (Jaagsiekte), and fetopathy due to Campylobacter.

Decreasing trends were reported for: chronic fasciolosis, and fetopathy due to Chlamydia abortus.

Parasitology

Parasitic gastroenteritis

Parasitic gastroenteritis (PGE) was the most diagnosed disease by APHA and SRUC this quarter, with 50% of these diagnoses being obtained from adult sheep. Almost 60% of the total diagnosis of PGE were reached by the submission of carcases of affected animals. When parasitic gastroenteritis is suspected (in cases where sheep are profoundly ill), a total estimated worm count, as part of a postmortem examination, can be a more informative way to estimate worm burden, than using Faecal Egg Count testing alone.

Nematodirus cases confirmed

Cases of Nematodirosis have been confirmed in affected lambs by APHA and SRUC in this quarter in the following counties: Devon, Carmarthenshire, North-eastern Scotland, and the Scottish Borders.

Where possible, a definitive diagnosis should be encouraged, as there are other possible causes of young lambs scouring, or being found dead, such as coccidiosis, cryptosporidiosis, enterotoxaemia (pulpy kidney disease), and not feeding adequately. A worm egg count (WEC) identifying the characteristic Nematodirus species eggs can confirm diagnosis in those lambs with adult parasites; if none are present (as occasionally occurs with cases of acute nematodirosis) postmortem examination enables examination for immature parasites and potential alternative diagnoses.

Nematodirosis, caused by the species *Nematodirus battus*, is a major cause of severe diarrhoea and mortality in young lambs, predominantly in spring. Under certain climatic conditions *N. battus* worms can strike very quickly, with little or no warning. Cold weather delays hatching, so when we get a sudden change in temperature it can trigger a mass hatch. If this coincides with the time when lambs are starting to take in significant amounts of grass (over about six weeks old), the result can be devastating.

In 2022, as for the previous year, APHA is assisting SCOPS in the production of a Nematodirus Forecast service (https://www.scops.org.uk/forecasts/nematodirus-forecast/). The SCOPS Nematodirus Forecast map predicts the timing of *N. battus* eggs hatching in spring based on local meteorological data, allowing users to target anthelmintic treatment, or alter grazing strategies, at high risk-time points.

In addition to avoiding grazing young lambs on the same fields each spring, the currently advocated control practices for *N. battus* state the use of benzimidazoles (1-BZ) (Melville and others 2021) although, benzimidazole resistance mutations are emerging in UK populations of *N. battus (Melville and others 2020) (Mitchell and others 2011)*. At this stage, the anthelmintic of choice for the control of *N. battus* in the UK remains the 1-BZ, but the use of other drug classes for the control of *N. battus* has increased in recent years. The use of 1-BZ compounds early in the season is still advocated to protect the other anthelmintic classes, which may be required throughout summer and autumn.

The development of effective and sustainable control strategies for *N. battus* in sheep farms in the UK relies on previous history and experience, alternate grazing systems, and Nematodirus forecasting tools, to predict the risk of exposure; and the use of faecal egg count reduction tests to assess anthelmintic efficacy.

Coccidiosis in preweaned lambs

Clinical coccidiosis was the most common cause of diarrhoea diagnosed in preweaned lambs this quarter. Coccidiosis, disease due to *Eimeria spp*, typically affects young lambs four to eight weeks of age, resulting in signs of diarrhoea, ill thrift, and death. Fifteen species of *Eimeria* are recognised in sheep, of which two (*Eimeria ovinoidalis* and *Eimeria crandallis*) are significant pathogens. Thus, the presence of large numbers of oocysts in sheep is not necessarily indicative of disease, and oocyst speciation is necessary to differentiate between highly pathogenic and less pathogenic species present.

Control of coccidiosis relies on improving environmental hygiene (which is key to controlling coccidiosis) and the prevention of the exposure of naïve lambs to overwhelming numbers of coccidia oocysts at any one time. Anticoccidial medications are available for treatment and prevention, and the timing of their use is important.

Sheep scab

Sheep scab was the most common skin disease diagnosed in sheep this quarter. Most of these diagnoses were obtained in Wales, thanks to the Welsh Government, which offered free of charge examination of skin scrape samples from sheep showing suspect clinical signs of sheep scab located in Wales. The aims of this project were to support accurate diagnosis of pruritic sheep, to promote correct treatment and successful control of sheep scab. The project ended on the 1st of April and a full report of this study will be published by APHA later in the year.

Liver Fluke

Chronic and acute fasciolosis diagnoses continue at low levels, likely to be due to recent dry summers. However, APHA VIC Thirsk diagnosed chronic fasciolosis in relation to poor condition and wasting ewes on two farms in this quarter. In both cases, ineffective triclabendazole treatments may have contributed to the occurrence and severity of disease seen.

Case 1 – January:

Two dead ewes were submitted to investigate the cause of wasting, diarrhoea, and death on the unit. The ewes had been part of a group of around 100 in-lamb ewes, that were scanned to have either single or twin lambs on 13th December.

The group were outdoors grazing pasture that they had been on since early November, and were receiving supplementary haylage, concentrate, fodder beet and mineral lick buckets. The group had been having an ongoing issue with sheep developing a ‘bottle jaw’, which then progressed to wasting and diarrhoea.

The group had been treated three times since October with a combination flukicide and wormer containing triclabendazole and ivermectin, however the exact dates of administration were not known. The group had been on the same pasture since November. No other groups were affected. At PME, both ewes had changes consistent with chronic fascioliasis, including pale enlarged livers with large numbers of fluke identified. The submitting vet was advised to carry out further investigations on farm, including ideally a fluke egg count reduction test if triclabendazole resistance was suspected, as well as submitting a lack of efficacy report to the VMD if confirmed.

Case 2 – February.

A thin ewe was euthanased and submitted for investigation due to a concern about ‘iceberg’ diseases; where 20 of 480 ewes were reported as thin, although the whole group was not as fit as expected. The group had been housed in January following treatment with triclabendazole. Postmortem examination revealed severe hypoproteinaemia, with very large numbers of live adult fluke in the liver, despite the flukicide treatment four weeks previously. An alternative adult flukicide, which targeted adults, was recommended and it was also advised to report the suspected triclabendazole treatment failure to the VMD.

Key to the control of liver fluke is determining the best time to treat sheep, ideally using ELISA testing of young stock as sentinels, or coproantigen testing, as well as knowing which product is most effective for the life stage of the fluke present and understanding if lack of efficacy is present on farm. It is important to preserve triclabendazole as a treatment, as it isa key treatment to target early stages of the parasite.

Respiratory disease

Ovine Pulmonary Adenocarcinoma (OPA) “Jaagsiekte”

Ovine Pulmonary Adenocarcinoma “Jaagsiekte” diagnoses recorded by APHA (Figure 5) and SRUC (Figure 6) were increased this quarter, with 15 cases recorded by APHA and 32 cases recorded by SRUC. Diagnostic numbers were raised in both lowland and hill flocks, in Wales, Scotland and all regions of England apart from western England. As a chronic insidious respiratory virus, OPA is easily spread between flocks. However, the current increase in diagnoses could be because of heightened awareness of the disease in recent years, resulting in increasing numbers of flocks testing and using scanning to identify infected sheep for culling.

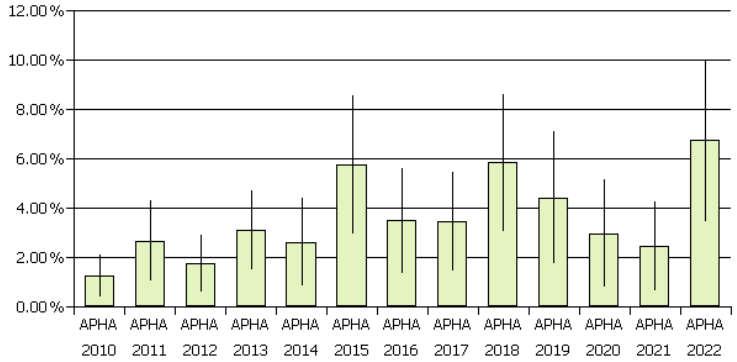

Figure 5: APHA Incidents of OPC/Jaagsiekte in Sheep as % of diagnosable submissions in quarter 1 2022

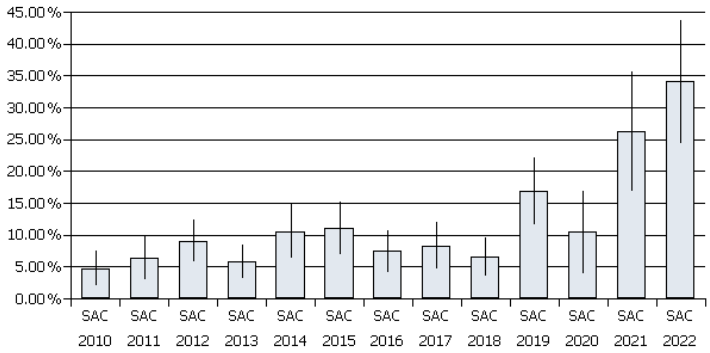

Figure 6: SRUC Incidents of OPC/Jaagsiekte in Sheep as % of diagnosable submissions in quarter 1 2022

Mannheimia pneumonia and Pneumonia Not Otherwise Specified (NOS)

SRUC reported relatively high numbers of Mannheimia pneumonia cases (11) and of Pneumonia NOS cases (15) for this quarter, when compared to previous years. Cases recorded as Pneumonia NOS in sheep are often chronic pneumonias or bacterial pneumonias other than *Mannheimia*, *Mycoplasma* and *Pasteurella multocida*. Bacterial pneumonia commonly occurs in sheep that are stressed or challenged by concurrent

diseases, such as chronic respiratory viruses and endoparasitism, or when there is poor nutrition or weather extremes.

Lungworm diagnosed in a group of 120 store lambs

Although lungworm is often considered of low significance in sheep, under certain circumstances significant disease issues can occur. A lack of immunity due to no prior exposure can predispose bought-in store lambs to heavy lungworm infections, and secondary bacterial infection of the parasitised lung tissue. Effective management of lungworm in growing lambs is normally achieved by a combination of acquired immunity, grazing management, and using routine anthelmintic treatments (as for gastroenteric worm control).

In one case a heavy lungworm infection was identified in a lamb from a group of winter grazed store lambs with ill thrift: an entire group of 120 lambs at grass were in poor condition. A Private Veterinary Surgeon (PVS) postmortem identified severe cranioventral lung consolidation, with large numbers of adult lungworm, *Dictyocaulus filariae*, filling the airways. Histopathology identified severe necro suppurative bronchopneumonia with nematodes. There was also a concern about anthelmintic treatment failure, as a high worm egg count was also found.

***Bibersteinia trehalosi* pneumonia in adult sheep**

Two cases of Bibersteinia pneumonia were diagnosed in adult ewes this quarter. Although this bacterium is primarily a cause of septicaemia in lambs, particularly outbreaks in weaned lambs in the late summer/autumn, disease can still occur in older animals. Since 2010, 17% of Bibersteinia septicaemia diagnoses have been in adult animals. In some cases, *Bibersteinia trehalosi* presents primarily as a pneumonia. Although a less common presentation, with only approximately 10 cases diagnosed a year, almost 40% of these are diagnosed in adult sheep.

A late-gestation four-year-old ewe was found recumbent with ears down and dribbling fluid from the mouth and nose. She improved after calcium administration but died overnight. The flock was on good quality grass with energy blocks and had been wormed and fluked two weeks previously. The flock had not been clostridial disease or Pasteurella vaccinated. Petechial haemorrhages were found in the subcutaneous fat and there was firm, dark red, cranioventral consolidation of approximately 40% of the lung tissue. Bacteriology of lung tissue yielded a mixed bacterial flora including a heavy growth of *Bibersteinia trehalosi*. Histopathology found evidence of acute, suppurative, bronchopneumonia consistent with Bibersteiniosis. Bibersteiniosis may occur in animals that have undergone recent stress including adverse weather, diet change, handling, or concurrent disease. Vaccination can be used as an aid in the control of pneumonic pasteurellosis.

Enteric disease

Watery Mouth

The Small Ruminant group published a focus article in the vet record (Collins and Carson 2022). During March 2019 APHA offered free testing for one sample of small intestine content per farm from lambs which had died of suspected watery mouth disease.

A total of 39 submissions were received.

Bacteriological culture was undertaken on each sample. This generated 36 isolates of *E. coli* for investigation.

From the 36 isolates, examination of the data revealed:

- Tetracycline resistance as the most common followed by ampicillin, spectinomycin and streptomycin respectively (Figure 7).
- Multidrug resistance (resistance to three or more antimicrobial classes) was detected in 18 isolates.
- Two isolates demonstrated Enrofloxacin resistance
- One isolate was resistant to 7 different antibiotics.

Eleven isolates were fully sensitive. Resistance to cephalosporins was not detected.

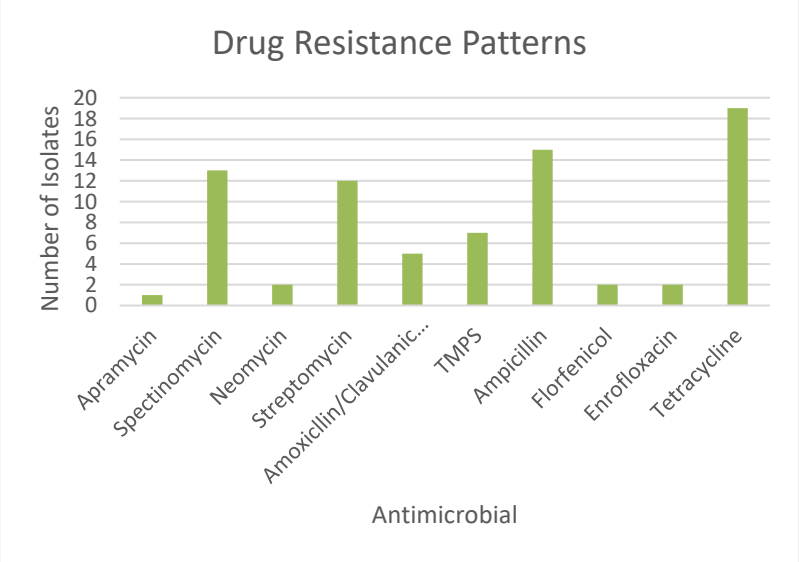

Figure 7: E. coli antimicrobial resistance pattern results from watery mouth cases

The publication of this focus article was prompted by CEVA animal health reporting a shortage of Spectam Scourhalt, the only licensed oral antibiotic for the prevention of watery mouth in neonatal lambs. The Sheep Veterinary Society have prepared guidance on the management of watery mouth. Control is dependent on ensuring provision of good quality colostrum, which in turn is dependent on ewe nutrition, and high levels of hygiene at lambing. Alternative treatments are described:

[Control of watery mouth in neonatal lambs in the face of limited supply of Spectam Scour Halt for the 2022 lambing season - Sheep Veterinary Society (sheepvetsoc.org.uk)]

In addition, Responsible Use of Medicines in Agriculture (RUMA) Alliance aims to produce a co-ordinated and integrated approach to best practice in animal medicine use. One of the areas targeted for improved responsible antibiotic use, (and one where veterinary surgeons may be able to make the most impact to reduce the use of antibiotics on sheep farms), is by reducing blanket treatment of lambs against neonatal bacterial infections.

https://www.ruma.org.uk/wp-content/uploads/2019/10/RUMA-Sheep-Antibiotic-Use-Good-Practice-Guide-July-2019.pdf

Another key factor in the prevention of watery mouth, and other neonatal lamb diseases, is the monitoring of the body condition score of ewes and their nutritional management, to ensure production of good quality colostrum. Hygiene in the lambing environment is also vital, through maintaining strict hygiene of lambing pens, equipment, and hands. Taking appropriate hygiene measures when using injections; dipping navels in a strong iodine solution at birth and again four hours later; ensuring adequate colostrum uptake by newborn lambs and monitoring all lambs for early signs of illness and investigating the cause, are also important.

Reproductive disease

A significant increase was recorded for Campylobacter fetopathy (Figure 8), with a total of 94 submissions diagnosed with this condition in Great Britain, compared to 48 for the equivalent previous season. Detailed analysis of all the fetopathy data will be done at the end of quarter two.

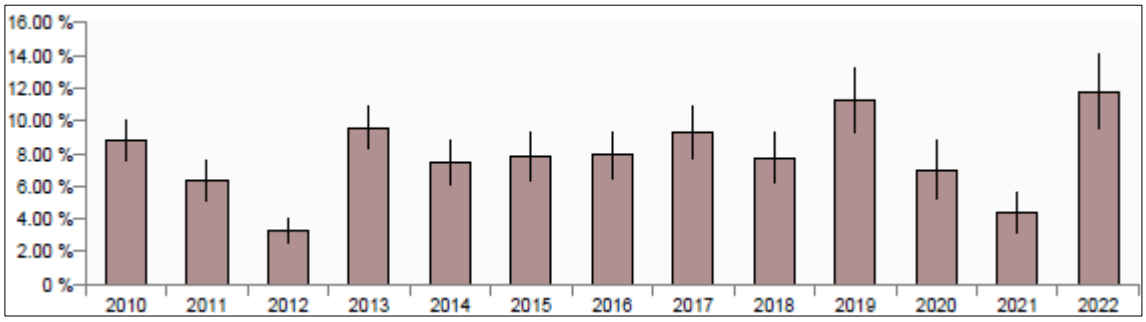

Figure 8: Incidents of Campylobacter fetopathy for Great Britain for quarter 1, as a percentage of diagnosable submissions 2010 to 2022.

Less frequently identified infectious causes of abortion included *Listeria ivanovii* and *Yersinia* species. *L. ivanovii* is recognised as a cause of abortion and stillbirth in sheep, as well as of the birth of live lambs that are weak and often fail to survive. *Listeriae* are environmental organisms which cause sporadic cases of abortion, often resulting from feeding silage, especially bagged silage, contaminated by infected soil. Listeria can also

cause nervous disease, septicaemia and gastro-enteritis in ewes and goats. However, *Listeria monocytogenes* is the only species well documented as leading to neurological disease. *Yersinia pseudotuberculosis* is a recorded cause of ovine abortion. It may cause single abortions but is occasionally isolated in incidents where there have been multiple losses. This organism may be carried in the intestinal tracts of many wild birds and mammals. It is sometimes isolated from the intestinal content of normal sheep but has also been isolated in association with necrotic enterocolitis in older lambs.

Fetopathy associated with Schmallenberg virus (SBV) infection

A total of 27 submissions were diagnosed with this condition in Great Britain this quarter, compared to 9 for the same period last year.

Free PCR testing of fetal brain tissue, and serology on maternal blood samples were offered by APHA and SRUC and will have increased the numbers to some degree, but the increase corresponds to a further wave of cases this lambing season.

SBV was first identified in 2011 and the disease has spread throughout Europe to Finland in the North, Spain in the South and Turkey in the East. UK cases were recorded in 2012 and 2013.

Following a period with low numbers a further wave was experienced in 2016 to 2018 in the UK, Europe, and other countries outside Europe. This correlates with a rapid build-up of immunity that limits circulation of the virus and new cases. Immunity then declines resulting in a naïve population and emergence of increased cases every 4 to 6 years(Collins and others 2019).

In sheep and cattle, lambs and calves can be born with congenital deformities including arthrogryposis, torticollis, scoliosis, kyphosis, brachygnathia inferior and various malformations of the brain and spinal cord, including hydranencephaly, porencephaly, hypoplasia of the cerebellum and thinning of the anterior and thoracic/lumbar spinal cord.

APHA VIC Bury reported an incident where an early lambing group of 550 housed lowland cross-bred ewes, with a lambing period of January 1st to January 16th, in which about half of the first 35 lambings presented with deformed full-term lambs. Within the group 200 ewes were recently purchased, and which at the time of submission remained unaffected. Two lambs, each from a separate multiparous dam, were submitted with concerns about Schmallenberg virus infection. Both lambs were full term and had:

- non-inflated lungs
- arthrogryposis of all major limb joints
- a deep barrel thorax
- torticollis
- scoliosis (Figure 9)

One lamb also had:

- brachygnathia inferior (Figure 10)
- minimal brain tissue at the optic chiasma region and a narrowed brainstem with the cranium appearing almost empty (Figure 11)

Brain tissue from both lambs was positive for Schmallenbergvirus nucleic acid by PCR.

Figure 9 Arthrogryposis and torticollis in a lamb with SBV

Figure 10 Brachygnathia inferior in a lamb with SBV

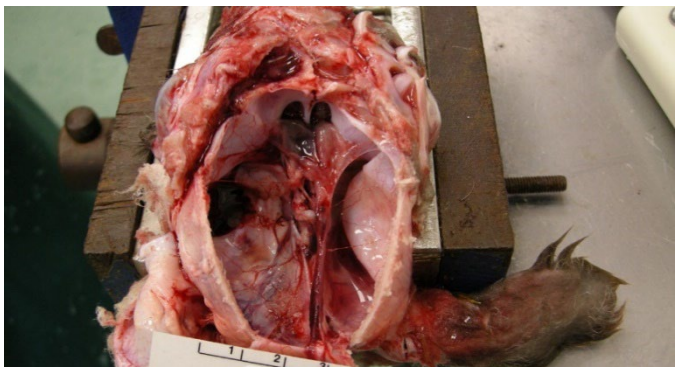

Figure 11 Near absence of brain tissue in the cranium of a lamb with SBV

Border Disease

Border disease virus was detected in one submission submitted to investigate abortion this quarter. Additional surveillance was in place to test for Border Disease virus in every suitable abortion submission (BDV PCR testing on all sheep abortion samples was undertaken on appropriate APHA submissions this season).

Salmonellosis, hypocalcaemia, and abortion in late gestation ewes

APHA VIC Carmarthen reported two ewes in late-stage gestation, from the same premises, submitted separately over the course of one month. They were part of a group of sheep showing varying degrees of neurological signs (which were suggestive of twin lamb disease) and diarrhoea. There had been six deaths in 10 days. The submitted ewes had different clinical signs. The first had a raised respiratory rate and scour the day prior to death and the second was thinner than others in the group and appeared unsteady, getting stuck against the wall of its pen, and latterly at the water-trough most of the time, before being found dead.

Significant PME findings.

- Heavy faecal contamination of the hind quarters and tail and a foul-smelling brown discharge from the vulva.
- Intestinal contents were liquid throughout.
- Ewe 1: abomasitis and several raised, approximately 1cm circular zones in the pylorus (Figure 12). Ewe 2: Necrotic membrane shedding from the mucosa of the caecum and colon.
- Ewe 1: congestion of the lungs, spleen, and brain. Ewe 2: pale kidneys and brain.
- Ewe 2: two fetuses in the uterus, both severely autolysed with brown, autolytic placental membranes.

The ewes both had a severe watery enteritis. *Salmonella* Dublin was isolated from both ewe 1 faeces and foetal stomach contents, and from ewe 2 faeces and spleen. It was strongly recommended to maintain strict biosecurity between affected and unaffected groups on the farm, and to remind the client of the zoonotic potential of *Salmonella* spp. In

addition, ewe 1 had moderate ketonuria and ocular fluid analysis consistent with terminal hypocalcaemia, and it was advised to check that dietary mineral provision was appropriate.

Figure 12 Focus of abomasitis in ewe with salmonellosis.

Systemic disease

Maedi visna

SRUC recorded a relative increase in Maedi visna diagnoses (5 cases). All cases were diagnosed in lowland flocks. Prior to 2021 SRUC typically recorded between 0 and 2 diagnoses during this quarter (Figure 13).

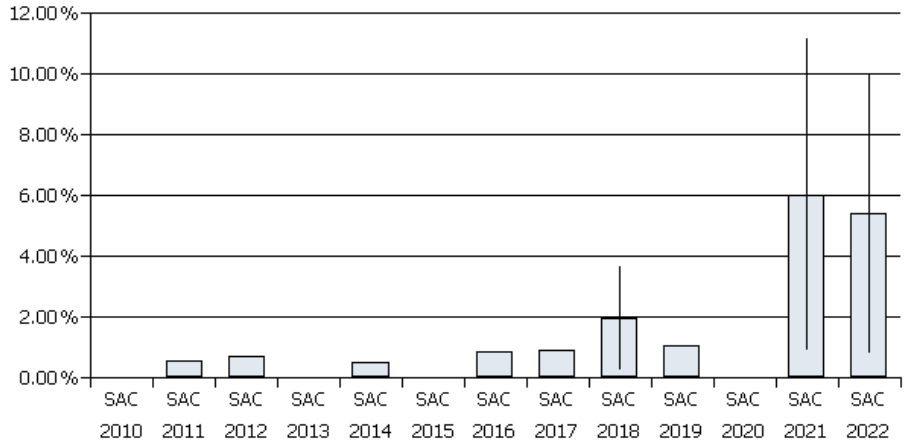

Figure 13: SRUC Incidents of Maedi Visna in Sheep as % of diagnosable submissions quarter 1 2022

Metabolic conditions

During quarter one of 2022 there were syndromic alerts for hyposelenaemia and hyposelenosis, and hypocupraemia and hypocuprosis.

Most diagnoses of hyposelenaemia and hyposelenosis were made in Northern England and Scotland (Figure 14), with most incidents (50%) involving adult sheep.

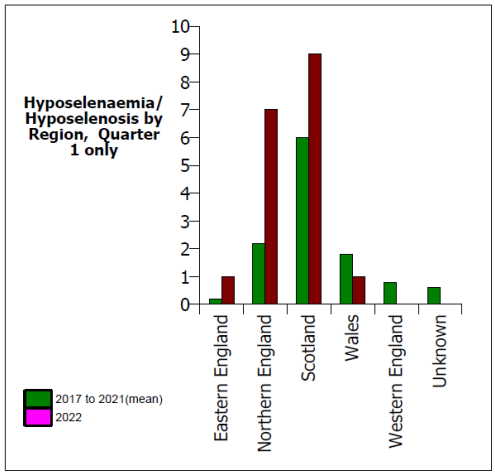

Figure 14: Diagnoses of hyposelenaemia and hyposelenosis made in quarter 1 of 2022 by region.

A total of 12 submissions were VIDA coded with hypocupraemia and hypocuprosis during quarter one (Figure 15), with the diagnosis being made in 2.52% of diagnosable submissions tested, compared to only 1.89% in the same quarter in the previous year.

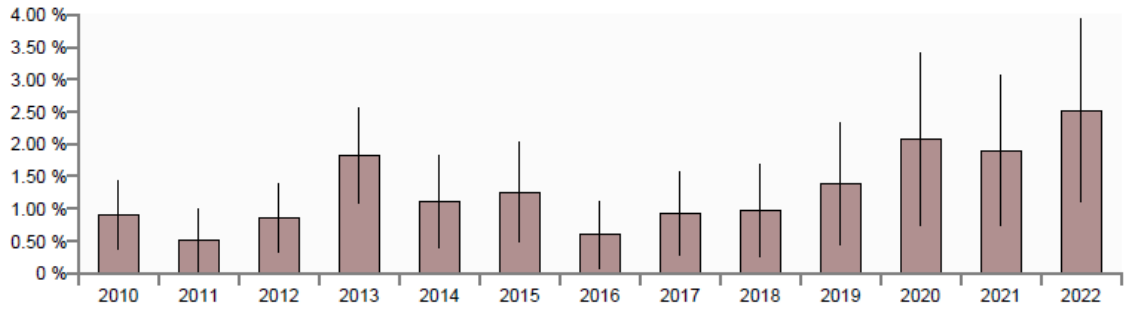

Figure 15: Incidents of hypocupraemia and hypocuprosis for Great Britain for quarter 1, as a percentage of diagnosable submissions 2010 to 2022.

Most diagnoses of hypocupraemia and hypocuprosis during quarter 1 of 2022 were made by SRUC which, when looking at SRUC data only, continues an upwards trend of number of diagnoses made as a percentage of diagnosable submissions year on year in this quarter since 2019 (Figure 16).

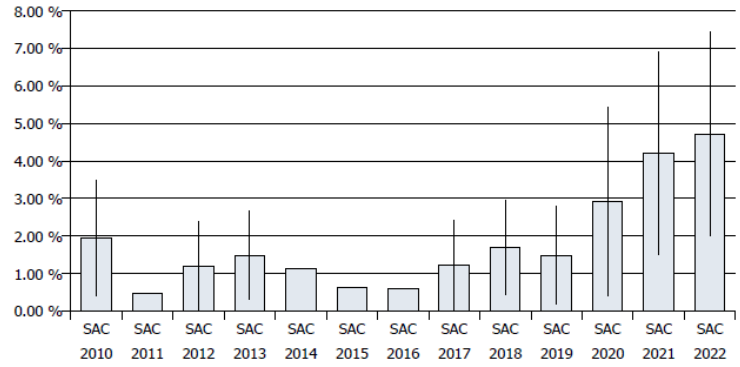

Figure 16: SRUC incidents of hypocupraemia and hypocuprosis as a % of diagnosable submissions in quarter 1 2010 to 2022.

Mainly adult sheep were involved, with hill/ upland sheep being over-represented (Figure 17), this differed from the previous five years, where most cases of hypocupraemia/ hypocuprosis were diagnosed in lowland flocks. The most common clinical sign recorded was wasting, with other reported signs including found dead, recumbency, subclinical mastitis and reproductive. Copper deficiency occurs when sheep graze pastures low in copper or high in iron, molybdenum, and sulphur, or a combination of these.

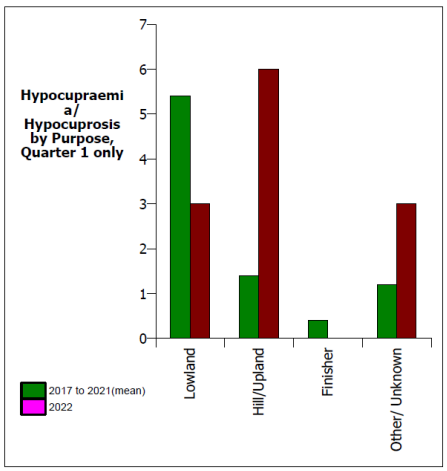

Figure 17: Diagnoses of hypocupraemia and hypocuprosis made in quarter 1 of 2022 by purpose.

Musculoskeletal disease

Arthritis due to *Streptococcus dysgalactiae* subsp *dysgalactiae*

Diagnoses of arthritis due to *Streptococcus dysgalactiae* subsp *dysgalactiae* were decreased this quarter (Figure 18) with 5 (0.75%) incidents recorded compared to 12 (1.50%) in 2021. A single case was recorded by SRUC with the other 4 cases diagnosed

by APHA. This may reflect the relatively good weather during this quarter allowing turnout of ewes and lambs, thus reducing the infection pressure within lambing sheds.

A focus article in the Vet Record provides a useful update (Swinson 2021).

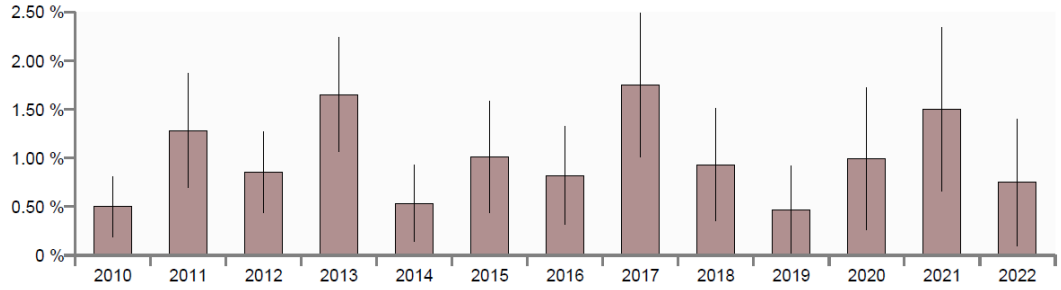

Figure 18: Incidents of arthritis due to Streptococcus dysgalactiae for Great Britain for quarter 1, as a percentage of diagnosable submissions 2010 to 2022.

Nervous disease, Circulatory disease, Skin disease, Urinary disease

No significant trends were identified this Quarter.

Poisoning

The most recent chemical food safety newsletter has been published on GOV.UK.

APHA chemical food safety reports (livestock) - GOV.UK (www.gov.uk)

Copper incidents

A very high liver copper concentration, consistent with copper toxicity was confirmed in two ewes from a commercial flock of 220, which included ewes, store lambs and finishing lambs. There had been four deaths in total, with two ewe carcases investigated. One ram had died in December 2021 after a 24-hour malaise and this death was not investigated. In January a Beltex ewe and a store lamb died in similar circumstances. An on-farm postmortem of the ewe identified a yellow liver raising the possibility of copper toxicity. Liver was sent for analysis and the copper concentration analysed to be 33,700µmol/kg DM (722mg/kg FT). A second Beltex ewe died a few days later and this was submitted to APHA for postmortem examination. The liver copper concentration was 17,600µmol/kg DM (319mg/kg FT), also confirming a very high exposure to copper. The Beltex ewes were bought onto the farm at the end of the summer of 2021 and had been housed since and were due to lamb in March 2022. They were being fed a concentrate ration which was sold as a copper free course mix for sheep and hay. There was no evidence of an error in

composition. The ewes received an oral dose of minerals with copper at tupping and 3 treatments of Closantel, a flukicide. The finishing and finished lambs were also fed the concentrate and remained unaffected. APHA concluded that there was likely no one source of contamination and that copper toxicity likely arose because of the earlier supplementation, the plane of nutrition and housed status in a copper sensitive breed.

Kerosene

APHA was notified of a case of kerosene poisoning causing the death of an adult ram. The ram was the only sheep in the field. Whilst not of direct food safety concern on this occasion the cause of the incident was considered of interest, presenting a potential new and emerging hazard. The tup was on his own in a field and presented with non-specific malaise. Bluebell poisoning was initially suspected. He died overnight. On postmortem examination the rumen contained large amounts of an oily yellow substance with a strong smell of kerosene. There was also some lung pathology in the form of cranio-ventral purple consolidation and oedema. There was a large amount of tracheal froth. On further investigation it turned out that in the field where the tup had been, there was an Intermediate Bulk Containers (IBC), used for the safe transportation and storage of liquids, fluids, and chemicals, containing heating oil. The farmer had used the cap for another IBC he was using to fill up with red diesel due to its in short supply. The kerosene was therefore able to leak out of this IBC and was ingested by the ram. APHA put out an endemic disease alert and included it as a news item in an edition of the Digest report that is circulated internally and to those working for AHPA under contract.

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.

Horizon scanning

Bluetongue (BTV) update

APHA no longer has access to the EU's Animal Disease Notification System (ADNS), hence we are now only using World Organisation for Animal Health (OIE) data (for mapping), and the weekly outbreak summary data published by the new EU Animal

Diseases Information System (ADIS). Areas of Europe remain under Restriction Zones shown on the map (Figure 19) , though this has not been updated by the European Commission since November 2021, due to the seasonally vector free periods over the winter months.

In December, Portugal reported ten outbreaks of BTV on sheep farms and a mixed farm of sheep, goats, and cattle. In total 109 animals were affected.

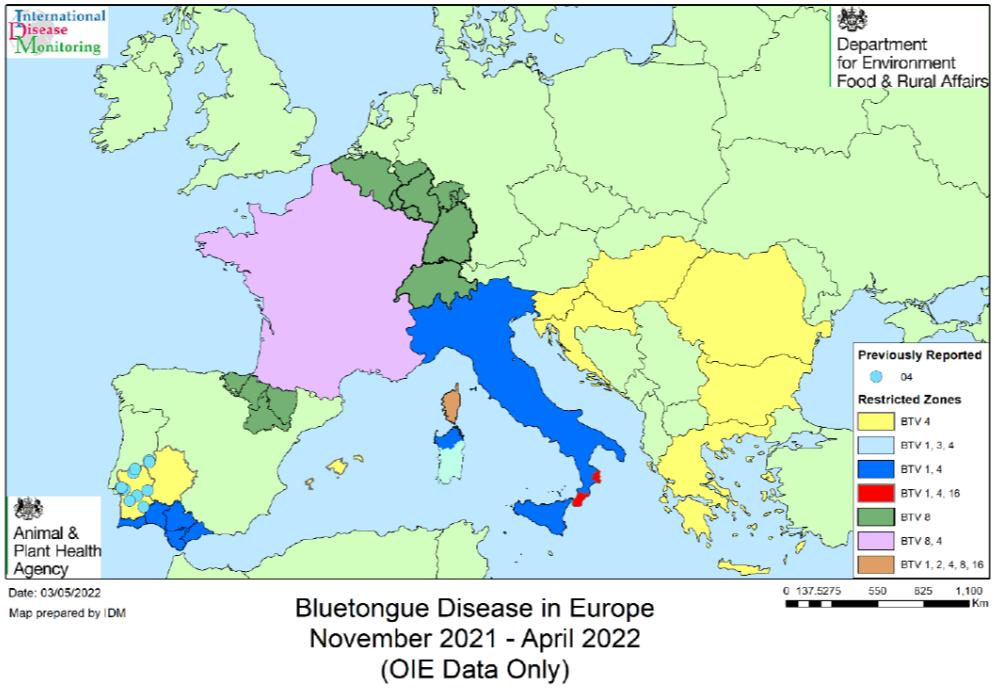

Figure 19: Map of Europe showing BTV restriction zones November 2021 to April 2022

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. https://www.facebook.com/APHAGov/

Peste de petit ruminants (PPR) and Sheep pox

In April, Mongolia reported three outbreaks of PPR. All outbreaks were on mixed farms premises with sheep and goats containing over 2,000 animals. Also, in April, Mongolia reported three outbreaks of Sheep Pox. All outbreaks were on farm premises with over 700 animals.

Foot and mouth disease

Outbreaks of Foot and Mouth disease November 2021 to April 2022 are shown in Figure 20.

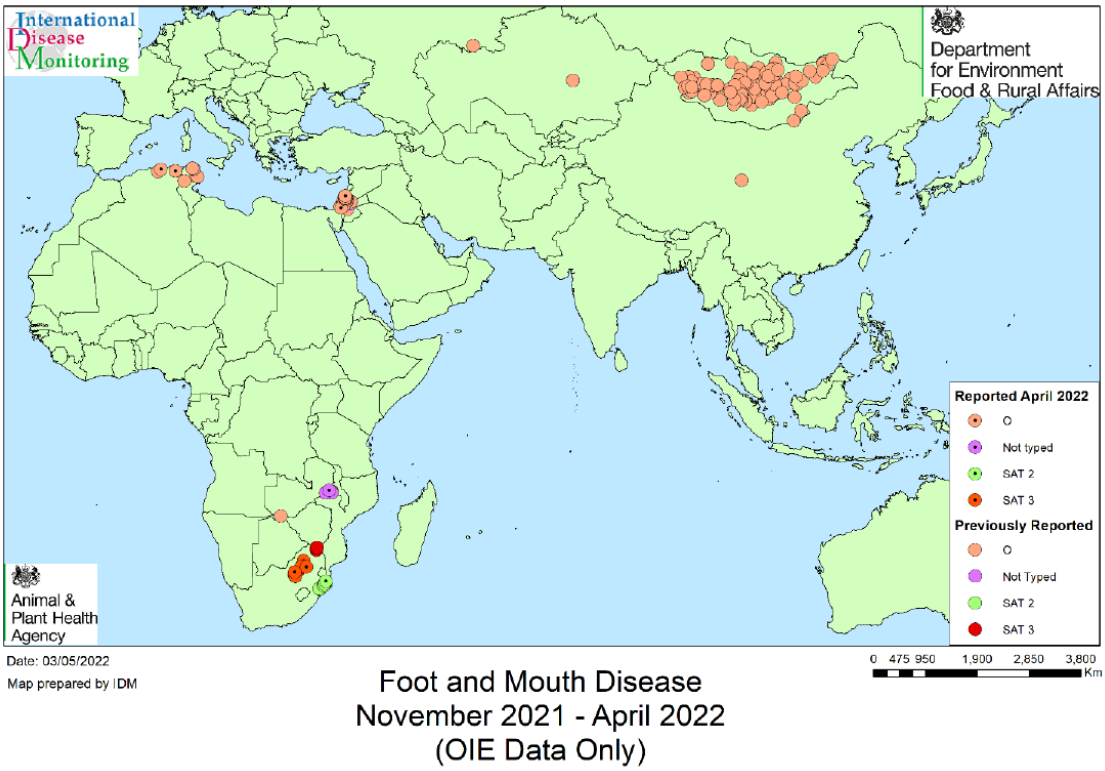

Figure 20: Outbreaks of Foot and mouth disease November 2021 to April 2022

In April, Israel reported 23 outbreaks of FMD serotype O. There were 18 outbreaks on commercial farm premises containing cattle, four of which had over 1,000 animals. One outbreak was on a commercial premises containing 4,000 sheep, one was on a commercial premises containing 12,500 pigs and one was on a commercial premises containing under 200 milking sheep and goats. One outbreak was on a mixed non-farm premises with cattle, goats and sheep containing over 200 animals, and one was on a non-farm premises containing 765 cattle.

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