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.

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**GB small ruminant quarterly report**
**Disease surveillance and emerging threats**

**Volume 22: Q1 – January – March 2019**

<table>
<thead>
<tr>
<th>Highlights</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse reaction following Injection of Moxidectin</td>
<td>2</td>
</tr>
<tr>
<td>Diaphragmatic lesions and fatal haemorrhage in Texel sheep</td>
<td>5</td>
</tr>
<tr>
<td>Hypogammaglobulinaemia in neonates</td>
<td>19</td>
</tr>
<tr>
<td>Sheep Scab project in Herdwick Sheep</td>
<td>22</td>
</tr>
</tbody>
</table>

**Contents**

- Introduction and overview.............................................................................................................. 1
- New and re-emerging diseases and threats ...................................................................................... 2
- Unusual diagnoses ............................................................................................................................. 2
- Changes in disease patterns and risk factors .................................................................................. 6
- Syndromic analysis.............................................................................................................................. 6
- Centre of Expertise for Extensively Managed Livestock ............................................................... 23
- Horizon scanning ............................................................................................................................... 25
- Publications .......................................................................................................................................... 26
- Annexe.................................................................................................................................................. 29
Introduction and overview

This quarterly report reviews disease trends and disease threats for the first quarter of 2019 January - March. It contains analyses carried out on disease data gathered from APHA, SRUC Veterinary Services division of Scotland’s Rural College (SRUC) and partner post-mortem 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.

Issues & Trends

Weather

The first part of the quarter was drier than average and in March was average or wetter in parts. This combined with a warmer spring has meant better conditions for lambing and has also helped to minimise the potential impact of lower forage stocks from last year.

Fig 1: Rainfall (left) and mean temperature (right) expressed as % and degree difference from the 1981-2010 average, respectively (Met Office)

Industry

During the first quarter, finished lamb prices have been at or above the five year average, although below last year’s record breaking highs. Brexit uncertainty weighed on prices, and Easter fell three weeks later this year, which would have added some more pressure.
Overall production was steady on quarter one 2018 levels at 71,000 tonnes. The number of lambs killed declined 7%, and despite a marginal rise in carcase weights lamb production lagged behind. With the lamb crop estimated to be smaller last year, a reduction in kill is not surprising.

Meanwhile, cull kill increased 10%, and coupled with a large increase in carcase weights this offset the lower lamb production. The increase in cull numbers supports reports that there has been an increase in the number of empty ewes this year, while the rise in weights suggest they were fed as if in-lamb. The lower production figure has continued to put pressure on exports, while imports also remain subdued.

Rebecca Oborne, AHDB

New and re-emerging diseases and threats

Unusual diagnoses

Adverse reaction following Injection of Moxidectin

A three year old ewe was presented for post-mortem examination (PME) to APHA Shrewsbury Veterinary Investigation Centre (VIC). The ewe was one of a group of recently lambed ewes that were undergoing routinely dosing prior to turnout.

A macrocyclic lactone injection had been administered into the neck and within 5 minutes of injection the ewe developed respiratory distress, became recumbent and died.

On PME the point of injection was not evident in the skin or muscles of the neck; however, mild to moderate subcutaneous haemorrhagic oedema was present ventrally in the neck region.

PME revealed that the cerebral vessels were slightly more prominent on the left side of the brain and histopathology of the cerebral cortex identified a multifocal cerebral vasculopathy with associated oedema. A haematoxylin and eosin (HE) stain of the cerebral cortex (Fig 2) illustrates blood vessels showing increased perivascular clear space (oedema) and hyaline droplet formation (red arrows) indicative of marked increase in vascular permeability. The endothelium is also activated. These areas of vasculopathy were randomly distributed and the presence of endothelial activation and necrosis along with peri-vascular hyaline droplet formation indicates marked increases in vascular permeability associated with local endothelial injury. While similar changes are seen with pulpy kidney disease the lesion distribution was very different and a key feature in this case is the history and the pathological pattern of change is identical to that seen previously found in animals collapsing and dying associated with inadvertent intra-vascular (arterial) macrocyclic lactone injection.
Macrocyclic lactones (ML) are generally very versatile, stable and safe molecules with a high margin of safety for labeled indications. The primary receptors for ML anthelmintics appear to be glutamate-gated chloride channels which occur in nematodes and some arthropods, but do not occur in mammals. Macrocyclic lactones also act on GABA-gated chloride channels and GABA receptors are found in the central nervous system of mammals. In mammals, there are ATP-binding cassette transporters located at the blood–brain barrier which normally exclude most MLs, from reaching the GABA receptors in the CNS at concentrations that would induce toxicity. Thus, there is the potential for mammalian toxicity only if moderately high levels of some MLs reach the brain.

It is unknown whether or not the active component of this anthelmintic results in vascular injury however high concentrations entering the carotid artery or other similar artery supplying the CNS results in local vascular injury and oedema. This inevitably would result in sudden onset clinical signs with collapse, depression and death.

The VMD provide a summary of the product characteristics with clear guidance on the route of injection as a single subcutaneous injection at the base of the ear and notes that intravascular injection may result in ataxia, paralysis, convulsions, collapse and death.

![HE stain of the cerebral cortex with blood vessels showing increased perivascular clear space (oedema) and hyaline droplet formation (red arrows)](image)

**Lambing ears**

APHA’s partner post-mortem provider University of Bristol Farm Animal Pathology Service received a query from a specialist dermatologist about a patient who for the last 5 years, some days after lambing starts, develops a papular/vesicular rash only on his hands and lesser extent on nose/ears.

“Lambing ears” has been described as a transient inflammation of the ear (Fig 3) with blister formation and crusting that occurs in an estimated 1-11% sheep farmers who carry out lambing. (Heathcote and others 2008)

Skin inflammation might arise from lambing through an allergic or irritant response to amniotic fluid, placental tissues or chemicals. Proteins in animal products of conception
can cause allergic dermatitis of the hands (Fig 4), and irritant contact dermatitis of the hands may be provoked by iodine solution used to dress navels and by repeated handwashing. Histopathological examination of skin biopsies from affected ears in sheep farmers has shown an unusual lymphohistiocytic infiltrate with an appearance that is distinct from that of a typical dermatitis and closer to that seen in juvenile spring eruption, a photosensitive dermatosis (Heathcote and others 2011).

There are many occupational skin disorders associated with sheep and those who handle them (Harries and Lear 2004). Most common perhaps is orf infection (Bergqvist and others 2017) salmonellas (Visser 1991) and less commonly Coxiella burnetii (Upile and others 2008).

Lambing ears maybe something to consider in veterinarians, students and farmers showing similar signs during the lambing period.

At Lambing time it is also relevant to remind farmers of other zoonotic infections associated with sheep abortions and Pregnancy: advice on contact with animals that are giving birth is available on Gov.uk [https://www.gov.uk/guidance/pregnancy-advice-on-contact-with-animals-that-are-giving-birth]

Fig 3 “Lambing Hands”  Fig 4 “Lambing Ears”

Images courtesy A Fityan University Hospital Southampton

Systemic Mannheimiosis with emphysematous abomasitis, a novel presentation

An emphysematous abomasitis (Fig 5 & 6) was found by APHA Thirsk VIC in a one-month-old lamb which also had fibrinous peritonitis and pneumonia. Mannheimia haemolytica was isolated from the lungs, peritoneum and the abomasum and histological examination confirmed M. haemolytica involvement in the abomasitis. Clostridium perfringens was also isolated and was likely contributing to the emphysema seen. Four one-month-old lambs had died in the flock. One lamb had respiratory signs and pneumonia was found on PM. An additional lamb had lung consolidation and a ruptured abomasum. A subsequent submission of material from a necropsy carried out by the submitting vet was also consistent with an abomasitis involving Mannheimia spp. Abomasitis is an occasional finding with
Mannheimiosis, and it was uncertain why this presentation was occurring in these particular lambs.

Diaphragmatic lesions and fatal haemorrhage in Texel sheep.
A published Veterinary Record case report (Waine and others 2019) involved a collaboration between five different post-mortem providers in England and Scotland (APHA Shrewsbury and Thirsk VICs; Farm Post Mortems Ltd, County Durham; Farm Animal Pathology Service, University of Bristol and SAC Disease Surveillance Centre, Edinburgh) who worked together on the publication based on twelve Texel sheep presented for PME between July 2015 and December 2017. All of the animals had diaphragmatic lesions, with or without thoracic haemorrhage. Nine were less than 12 months old. Seven died suddenly with no clinical signs displayed, four showed respiratory signs that included wheezing, inspiratory stertor or dyspnoea and one animal presented with general malaise before being found dead the following day. Quoting from the paper’s summary: “Gross post-mortem findings included focal areas of diaphragmatic haemorrhage, diaphragmatic musculature necrosis or diaphragmatic rupture with herniation of abdominal viscera into the thoracic cavity. In some cases, acute severe fatal haemorrhage from either thoracic vessels or the diaphragmatic lesions was observed. Histopathology confirmed an acute event leading to the sudden death of affected animals, but also suggested a pre-existing chronic degenerative lesion of unknown aetiology affecting the diaphragmatic muscle. This case report suggests diaphragmatic lesions, with or without fatal thoracic haemorrhage, as a differential for respiratory distress or sudden death in young Texel sheep.”
https://vetrecordcasereports.bmj.com/content/vetreccr/7/2/e000745.full.pdf

A similar case in a Beltex lamb is described below
Retroperitoneal haemorrhage and laryngeal chondritis in a Beltex ram lamb

Extensive haemorrhage into the retroperitoneal space was the likely cause of death of a 10-month-old Beltex ram lamb, one of four to die suddenly in a group of 23. PME at APHA Carmarthen VIC found extensive subcutaneous oedema along the left flank, increased peritoneal fluid with fibrin deposits and a very large retroperitoneal blood clot weighing 1.28kg adjacent to and involving the left kidney (Fig 7) and There were also chronic suppurative lesions in the arytenoid cartilages of the larynx (laryngeal chondritis (Fig 8)

![Fig 7. Retroperitoneal haemorrhage](image1)

![Fig 8. Suppurative lesion in the arytenoid cartilage of a Beltex lamb](image2)

Changes in disease patterns and risk factors

Syndromic analysis

Most common diagnoses Q1 2019

During Q1 2019 - 2057 diagnostic submissions were received in GB for sheep. 

During Q1 submissions by age (Fig 9) records the majority under adult. Abortion submissions are most common during Q1 and abortions are recorded under the age category adult.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>1,375</td>
</tr>
<tr>
<td>Mixed</td>
<td>29</td>
</tr>
<tr>
<td>Neonatal</td>
<td>90</td>
</tr>
<tr>
<td>Post wean</td>
<td>127</td>
</tr>
<tr>
<td>Prewean</td>
<td>103</td>
</tr>
<tr>
<td>Unknown</td>
<td>333</td>
</tr>
</tbody>
</table>

Fig 9 Age Group
Presenting signs of sheep from which samples/carcasses were submitted are shown in Fig 10.

Fig 10. Presenting sign of sheep from which submissions were sent.

During Q1 2019 the 10 most common VIDA diagnoses made (Fig 11) relate to abortions

Fig 11. Count of 10 most common Vida Diagnoses Q1 2019

VIDA analyses of ovine abortion submissions for Q1 the period January to March 2019 inclusive has provided diagnoses as illustrated in Fig 12 and are discussed in more detail under the Reproductive section.
Campylobacter includes both *Campylobacter fetus fetus* and *Campylobacter jejuni*. Listeria includes *Listeria monocytogenes* and *Listeria ivanovii*. Salmonella includes all detected salmonellae (includes *S. Montevideo*; *S. Typhimurium*; *S. Dublin*). Other include a range of pathogens, for example, *Trueperella pyogenes*, *Bacillus licheniformis*, *Yersinia* sp and one reported case of Schmallenberg virus.

**Fig 12. Diagnoses of ovine abortion as a % of all diagnoses Q1 2019**

Syndromic alerts were raised this quarter for the following diseases:
Trueperella pyogenes infection, Plant poisoning, *Bibersteinia trehalosi* septicaemia, parasitic gastroenteritis and sheep scab, Parasitic pneumonia, Fetopathy Chlamydia abortus, Fetopathy Campylobacter.

**Parasitology**

Parasitic gastro-enteritis (PGE) in finishing lambs (Fig 13) was a feature of the monthly reports in January and February 2019. This is likely a reflection of the mild winter following a dry summer meaning exposure was later in these animals and often farmers were unprepared for PGE at this time.
Liver fluke - The positive effect of reduced cases of liver fluke diagnosed following the prolonged dry spell in the summer of 2018 continues to have a positive impact on sheep health. Liver fluke continues to be of low clinical significance in quarter 1 with no cases of acute fluke (Fig 14) identified in GB and a much reduced diagnostic rate for chronic fluke (Fig 15) when compared to previous years.

NADIS and SCOPS issued advice to farmers that if animals are infected with liver fluke at this time of year, the majority will be egg-laying adults. Therefore, a straight forward composite faecal egg count (FEC) with samples taken from 10 animals within a management group will indicate if a fluke treatment is needed. A product that is specific for the treatment of liver fluke and only removes adults (such as oxyclozanide or albendazole) is normally recommended at this time of year. This will reduce infection on pastures and also reduces pressure on the other flukicides that are needed when immature liver fluke are an issue.
Sheep scab

Sheep scab is mainly a winter disease with most cases occurring between October and April. This disease has been diagnosed on 33 occasions by APHA and SRUC in the first quarter of this year. Typically affected animals were adult sheep (Fig 16) from both lowland & hill/upland flocks (Fig 17).

Pruritus, wool loss and extensive crusting lesions on the skin were the more common lesions described. In one occasion live *Psoroptes* sp. mites, the cause of sheep scab, were detected post moxidectin treatment. The case had been reported to the pharmaceutical company and VMD as a suspect lack of efficacy and further investigation is underway. Other potential issues such as under dosing or missing one or more animals from the group during the treatment programme were considered unlikely based on the history. Moxidectin resistance in *Psoroptes ovis* mites have been confirmed in England and Wales since 2018 (Doherty and others 2018) See also Centre of Expertise later.

Enteric disease

Dental disease in ewes with severe weight loss

APHA Carmarthen VIC investigated severe weight loss in three ewes, and diagnosed dental disease. The ewes were from a group of 20 thin ewes, within a flock of 1000, which had experienced a drop in lambing percentage over recent years. Abnormalities including premolar and molar disease, impacted feed in periodontal pockets, missing incisors and swollen mandibles were identified at PME (Fig 18).
Dental problems are a major cause of premature culling of ewes, with periodontal disease and excessive incisor tooth wear considered to be the most economically important presentations. Several possible causes and risk factors including diet quality, pasture management, conformation, mineral nutrition and dietary oestrogen levels have been considered over the years but evidence for any one cause is at best inconclusive. It seems likely that dental disease is multifactorial with risk factors specific to individual flocks. More information on dental disease in sheep can be found at this link: https://inpractice.bmj.com/content/inpract/8/4/128.full.pdf

Rotavirus

There has been a decrease in the number of submissions diagnosed with Rotavirus in this quarter (Fig 19). Over the previous years there has been increased disease in some areas. However this year has been generally dry leading to less favourable conditions for the persistence of the virus in the environment and enabled early turnout of lambs.
Respiratory disease

*Mannheimia* pneumonia

There has been an increasing trend in the annual diagnoses of *Mannheimia* pneumonia since 2016. During 2018 the increase in cases was particularly marked during the second and third quarters of the year. Diagnoses of *Mannheimia* pneumonia have increased again for both APHA (Fig 20) and SRUC (Fig 21) during quarter 1 of 2019, illustrating the continuing importance of this disease in sheep.
Half of the *Mannheimia* pneumonia cases during this quarter were diagnosed in adult sheep, and these infections were almost all diagnosed with another concurrent disease such as Ovine Pulmonary Adenocarcinoma, PGE, lungworm infection and dental disease, suggesting the pneumonia was occurring in an already debilitated or stressed animal. Increased numbers of other diseases in adult sheep therefore could have contributed to this increase in *Mannheimia* pneumonia diagnoses. Primary disease due to *Mannheimia* pneumonia is more likely to occur in lambs (sheep aged 11 months of age and under) rather than in adult sheep, the number of primary infections in lambs during this quarter was consistent with previous years.

**Lungworm infection (Dictyocaulus filaria)**

APHA saw a marked and statistically significant increase in the diagnoses of lungworm during this quarter (Fig 22), continuing on from increased numbers identified in quarter 4 of 2018. All but one of the diagnosed cases were adult sheep, and only one case did not have concurrent disease. In the majority of the cases the concurrent disease was PGE. High levels of lungworm pasture challenge, increased susceptibility due to concurrent infections and/or poor nutrition can result in an increased risk of infection. Wasting, recumbency and “found dead” were the usual described clinical signs.

![Fig 22. APHA incidents of parasitic pneumonia in sheep as a % of diagnosable submissions Q1 2019](image)

**Ovine pulmonary adenocarcinoma (OPA)**

SRUC VS recorded a significant increase in the number of diagnoses of OPA during this quarter (Fig 23), again continuing the trend of increased diagnoses from quarter 4 of 2018. There has been increased awareness about this disease with the introduction of new methods of screening within flocks using ultrasound, and an increase in diagnoses may reflect the success of these initiatives in Scotland.
Caseous lymphadenitis (CLA) in a goat seropositive for caprine arthritis encephalitis (CAE)

Caseous lymphadenitis was diagnosed by APHA Carmarthen VIC in a five-year-old dairy goat that died suddenly, the eighth to die in a group of 120 milking goats. The goat was also seropositive for caprine arthritis encephalitis (CAE). Typical CLA abscesses were detected in a number of lymph nodes on PME, from which *Corynebacterium pseudotuberculosis* was isolated. The precise cause of death was not established but it was thought a retropharyngeal abscess affected the goat’s ability to eat. CAE–seropositive goats are infected for life and are a source of virus to other goats, particularly via colostrum, milk and other body fluids.

Hypogammaglobulinaemia and ear-tagging infection in goat kids.

Two five-day-old goat kids were submitted to APHA Thirsk VIC to investigate weakness and sudden death. Twenty percent of kids aged between 5-7 days old had been affected over a ten day period. The kids were indoors on straw on a milk feeding system. The dams were vaccinated against clostridial disease and Johne’s disease. Post-mortem findings included purulent material and crusting around the ear tags in both, a swollen tarsal joint in kid 1, and absence of milk clot in the abomasum of both kids. Both kids had sub-optimal gammaglobulins and *Trueperella pyogenes* and a non-typable *Corynebacterium* species were isolated from the ear-tagging wound from kid 1 (Fig 24). Very heavy pure growth of *Streptococcus dysgalactiae dysgalactiae* was isolated from the affected tarsal joint from this kid. This result suggest that the joint infection may not necessarily be related to the ear-tag infection, but indicate that general hygiene and disinfection, and colostrum management need to be reviewed.
Nervous disease

Listerial encephalitis

Although the overall diagnoses of listerial encephalitis were relatively static this quarter although APHA cases were increased with 13 (2.08%) incidents reported in 2019 compared to 7 (0.88%) in 2018 (Fig 25).

Listeria encephalitis has been diagnosed this spring in both hill and lowland flocks. In some flocks several ewes were affected as detailed in the following table from APHA Penrith VIC which includes cases submitted from four separate farms in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Farm 1</th>
<th>Farm 2</th>
<th>Farm 3</th>
<th>Farm 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of flock</td>
<td>1,200 ewes</td>
<td>900 ewes</td>
<td>1,000 ewes</td>
<td>Unknown</td>
</tr>
<tr>
<td>Size of affected group</td>
<td>400</td>
<td>50</td>
<td>300</td>
<td>Unknown</td>
</tr>
<tr>
<td>Number with neurological signs</td>
<td>8</td>
<td>4</td>
<td>20</td>
<td>4</td>
</tr>
</tbody>
</table>
There is frequently little to see on PME. The following lists a summary of the PM findings of the submitted ewes from the above four farms:

- Cloudy meninges and engorged meningeal blood vessels, in two ewes from farm 1.
- Diffuse sticky opaque coating over the surface of the brain in the ewe from farm 2.
- Cloudy meninges, with a scant slightly sticky opaque coating over the cerebral hemispheres and cerebellum in the ewe from farm 3. The surface of the brain (and brain stem) had prominent vasculature.
- The brain was unremarkable in the ewe from farm 4.
- Worn molar arcades were present in the ewes from farms 2 and 3. One of these ewes had reddened retracted gums.

In the submitted ewes from farms 1, 2 and 3 *Listeria monocytogenes* was detected in the brain in listeria enrichment cultures. Histopathological examination of the brains of the ewes from all four farms confirmed listerial encephalitis - severe multifocal subacute suppurative necrotising encephalitis.

Sources of *L. monocytogenes* include soil contaminated feeds / forage, grazing and contaminated silage / haylage. The incubation period for Listerial encephalitis is commonly three-to-four weeks prior to clinical signs being observed. Once the affected sheep present with clinical signs the course of disease is rapid, and death may occur in 24 – 48 hours. Bacterial invasion usually occurs via oral lesions / wounds. *L. monocytogenes* produces a localised infection (via ascending the trigeminal nerve). Clinical signs may vary according to the function of the damaged neurons. Listerial encephalitis can prove difficult to treat and treatment must be prompt— *L. monocytogenes* is susceptible to penicillin. Heavily pregnant sheep often succumb to secondary problems - mineral imbalances and pregnancy toxaemia. *L. monocytogenes* is potentially zoonotic, however the risks from handling listeria abortions / stillbirths / listeria-infected placentae may be greater than any risk from neurological cases.
Reproductive disease

No *Salmonella* Typhimurium or *Coxiella burnetii* abortions were recorded for this first quarter. Following the cases of *Salmonella* Typhimurium in adult sheep last year, there was some concern that it may cause abortions this spring.

**Abortions Chlamydia abortus (EAE)**

There has been a significant increase in the number of abortion submissions diagnosed with *Chlamydia abortus* (EAE) in this quarter in comparison to the equivalent quarter the previous year (Fig 26). The reason for this increase is unknown. *Chlamydia abortus* is preventable by vaccination although in the early stages of an abortion storm antibiotics tetracyclines have been used to control outbreaks of Enzootic abortion of ewes. Responsible Use of Medicines in Agriculture (RUMA) have reported that only 36% of sheep flocks are vaccinating for enzootic abortion. Farmers and their vets need to develop strategies for reducing the need for whole flock antibiotic usage. [http://www.ruma.org.uk/](http://www.ruma.org.uk/).

![Fig 26. Incidents of Chlamydia fetopathy for GB for quarter 1, as a percentage of diagnosable submissions 2007-2019](image)

**Abortions Campylobacter spp.**

Cases of *Campylobacter* spp. abortion in ewes are thought to cyclically increase in frequency every three to five years (Fig 27). The reasons for this are uncertain however waning immunity of older ewes, buying in of naïve animals and climatic conditions may all play a part.

![Fig 27. Incidents of Campylobacter fetopathy Q1 GB, as a % of diagnosable submissions 2007-2019](image)
All centres reported cases with many having a history of feeding on stubble turnips or fodder beet. Some of the outbreaks involved large numbers as in the two cases from APHA VICS Thirsk and Bury reported here;

APHA Thirsk VIC investigated abortions in a 4000 breeding ewe that has had approximately 500 ewes abort over the previous four weeks, all from groups scanned with only singles and twins. Some affected ewes have shown signs of illness, with evidence of dark black scour, pyrexia, depression and hyper salivation. Aborted fetuses have been a mixture of fresh and rotten. The affected group are strip grazed on a field of fodder beet, and supplemented with ad lib silage. There are other groups that have not been affected which consist of both gimmers and mature ewes. The flock was vaccinated against toxoplasmosis. The flock has been closed for 10 years for replacement ewes; however, tups are bought in. Manure had also been bought in from other farms and spread on nearby fields. *Campylobacter fetus* subsp. *fetus* was isolated from submitted abortion material.

APHA Bury VIC investigated abortions from 1,100 ewe flock with a reported incidence of 7.5% in the shearling group. The affected dams were said to be clinically well and vaccinated against both EAE and Toxoplasmosis. The shearlings were purchased last year and were in three groups based on scanning results. Abortion incidents had been recorded in all groups. At PME all three carcasses were found to have diffuse, subcutaneous oedema and fibrinous pleuritis. There was profound hepatomegaly in each with diffuse, pale yellow foci throughout the liver parenchyma of one (Fig 28). Bacteriology recovered *Campylobacter fetus fetus* from the stomach contents and advice was provided.

![Fig 28. Hepatic lesions in an aborted fetus affected with Campylobacter fetus fetus](image)

Campylobacter was featured in the Veterinary Record Surveillance report and commented on the development of AMR in Campylobacter strains found the USA although currently not in GB. A link to this report can be found here: [https://veterinaryrecord.bmj.com/content/184/14/431.full?ijkey=UFN99w.ze0oKA&keytype=ref&siteid=bmjournals](https://veterinaryrecord.bmj.com/content/184/14/431.full?ijkey=UFN99w.ze0oKA&keytype=ref&siteid=bmjournals)
Abortions Toxoplasma

There has been a significant decrease in the number of abortion submissions diagnosed with Toxoplasma this quarter (Fig 30) in comparison to the equivalent quarter the previous year however the reason for this is not clear.

![Fig 30. Incidents of Toxoplasma fetopathy for Q1 GB, as a % of diagnosable submissions 2007-2019](image)

Schmallenberg virus (SBV) infection

The only recorded case was from fetuses submitted from Cornwall to APHA Starcross VIC. Four ovine fetuses together with two placentae were received as part of an abortion investigation with 5-6 abortions having occurred over the preceding week within a group of mixed bought-in and homebred shearlings.

Two of the foetuses showed marked arthrogryposis and overshot jaws, a third showed marked thinning of the spinal cord. The fourth lamb presented with anasarca and subcutaneous oedema. All four lambs showed major CNS abnormalities. *Campylobacter fetus fetus* was isolated from foetal stomach content of all four submitted aborted lambs as well as SBV from all four foetal brains.

It was reported to the SRSEG by a private veterinary laboratory that they had also identified two cases of SBV in Dorset and Hereford.

Bovine Viral Diarrhoea Type 1 virus

*Bovine Viral Diarrhoea Type 1 virus* was confirmed by PCR testing of heparinised blood samples from twin two-day-old lambs with tonic-clonic tremors of head, body and legs.

*Urinary disease, metabolic disease, musculoskeletal disease* – No trends identified this Quarter.
AMR related

Hypogammaglobulinaemia in neonates

The Responsible Use of Medicines in Agriculture (RUMA) was established in November 1997 to promote the highest standards of food safety, animal health and animal welfare in the British livestock industry. RUMA aims to produce a coordinated and integrated approach to best practice in animal medicine use with a particular focus on the responsible use of antimicrobials in livestock production.

A report summarising the progress against antibiotic use targets identified by the UK livestock industry’s Targets Task Force in October 2017 has been published [https://www.ruma.org.uk/wp-content/uploads/2018/11/RUMA-TTF-1-year-on-Full-Report-FINAL.pdf](https://www.ruma.org.uk/wp-content/uploads/2018/11/RUMA-TTF-1-year-on-Full-Report-FINAL.pdf). One of the targets for the sheep industry was the reduction of the use of oral antibiotics in neonatal lambs with the aim to decrease sales by 10% each year over the next five years.

Analysis of the VIDA data, collected from APHA, SRUC Veterinary Services and APHA partner post-mortem providers, for the most common causes for neonatal death (lambs 1 – 7 days) for the years 2014 - 2018 and excluding causes of abortion/fetopathy are shown in Fig 31.

![Fig 31. Count of 10 most common causes for neonatal death (lambs 1 – 7 days) for the years 2014 - 2018](image)

Hypogammaglobulinaemia is the second most common diagnosis. The criteria for this VIDA diagnosis is based on blood ZST values (<15 units relative failure, <4 absolute failure). Many of the other causes of neonatal death are predisposed by hypogammaglobulinaemia in lambs including Colisepticaemia and Watery Mouth.

Watery mouth is an endotoxaemia caused by multiplication and death of E. coli within the gastrointestinal tract with the release of endotoxins. There is often no evidence of diarrhoea and frequently it is secondary to hypogammaglobulinaemia. Our VIDA diagnosis for Watery mouth requires supportive post-mortem evidence (dehydration,
evidence of ptyalism, distended abomasum and small intestine without inflammation, sometimes the meconium may be retained). Watery mouth usually affects lambs within 72 hours of birth. This VIDA diagnostic code can overlap with Colisepticaemia which is defined as a systemic E. coli infection where lambs have a terminal bacteraemia again often predisposed by hypogammaglobulinaemia and affecting lambs less than 7 days old. Confirmation requires positive pure culture of E. coli from blood or tissues in addition to the gross pathological findings and history.

The Incidents of Colisepticaemia in Sheep as % of diagnosable submissions for England, Wales and Scotland 2014 -2018 is shown in Fig 32.

![Incidents of Colisepticaemia in Sheep as % of diagnosable submissions 2014 -2018 by country.](image)

Fig 32. Incidents of Colisepticaemia in Sheep as % of diagnosable submissions 2014 -2018 by country.

The relevance of a full PME is clearly demonstrated in this case report.

A lowland farm of 1000 sheep experienced a disease outbreak in a group of 475 two-to-three day old neonatal lambs. About 75% of new born lambs were affected and described as being born alive and well but then developed signs of bloat and salivation and many died. All the lambs had received spectinomycin oral solution and navel spray (oxytetracycline) as soon as possible after birth. The affected lambs were treated with a trimethoprim sulfadiazine injection. Three dead lambs were submitted for PME which revealed dry subcutaneous tissues (dehydration) in all three and evidence of enteritis in lambs 1 and 2 (one of which also had a secondary intussusception and torsion) and severe acute pneumonia in lamb 3. A blood sample obtained from lamb 3 revealed a gamma globulin level of 18.9 ZST units (reference range > 20). A heavy pure growth of *E. coli* was isolated from the intestinal contents of lambs 1 & 2 and from the liver of Lamb 1 and 3. Endotoxaemia (*E. coli*) or Watery mouth usually affects lambs within 72 hours of birth. The resistant / sensitivity pattern for the E. coli showed resistance to Spectinomycin, Trimethoprim / Sulphamethoxazole, Ampicillin and Tetracycline which highlights the
importance of understanding how accurate diagnoses can inform management practices and how over reliance on antimicrobials can increase the resistance selection of bacteria.

Last year RUMA coordinated a cross-sector initiative Colostrum Is Gold highlighting how the ‘liquid gold’ properties of colostrum can play a key role in reducing the need for antibiotics in farm animals and improving their lifetime performance. It promotes best practice, mainly based around achieving the three Qs – ‘quality, quantity and quickness’ – of colostrum delivery, and uses social media to help deliver the messages through the website www.colostrumisgold.org.uk and the use of #ColostrumIsGold.

Poisoning


Deaths in neonatal lambs due to incorrect use of a copper supplement

Two pedigree Suffolk lambs died of a severe haemorrhagic abomasitis very likely due inadvertent administration of a copper supplement. Five had died out of seven born from six ewes at the time of submission. The submitted lambs were tubed with colostrum and given what was thought to be oral antibiotic but which turned out to be a copper supplement for older lambs stored in an old bottle, without proper identification of the product. Due to the age of the lambs, there were no food safety risks associated with this incident.

Fig 33. Stomach of lamb containing red liquid and milk clot after inadvertent administration of mineral supplement.

Fig 34. Haemorrhagic abomasum in a lamb after inadvertent administration of mineral supplement.
Centre of Expertise for Extensively Managed Livestock

During Q1 2019 there were 402 diagnostic submissions for “Hill sheep” in GB and the top 10 VIDA diagnoses made for these are shown in Fig 35.

![Graph showing the top 10 diagnoses for Hill sheep in Q1 2019](image-url)

**Fig 35. Count of 10 most common diagnoses Q1 2019 – Hill/Upland sheep**

Sheep Scab project in Herdwick Sheep

During the autumn of 2018 seven farmers grazing their hefted Herdwick flocks on one common took part in a project to explore sheep scab on common land. This followed the report that sheep scab mites in some flocks in Great Britain had developed resistance to the injectable products (macrocyclic lactones or ML’s) used to treat sheep scab (Doherty and others 2018)

None of the seven flocks had any obvious signs of sheep scab and all the sheep were healthy and in good condition. However, some flocks had reported that some sheep were pulling wool in January and some of these sheep did have lice, so the farmers assumed that lice was the problem. However, sheep scab may also have been present at a very low level and thus while not showing signs associated with sheep scab, scab mites may have been present in low numbers and contributing to this wool pulling. If not checked, sheep scab would continue to circulate even if only at a low level. In addition, scab mites may have been passed contact at shows or from animals brought in from sales.

The Biobest sheep scab ELISA test was used on 12 sheep from each of the seven flocks on 16/10/2018. Following the test, the farmers agreed to use sheep dip and all the sheep were dipped between 16/10/2018 and 15/11/2018. Some farmers did not have access to sheep dips due to environmental limitations, but they brought in sheep dip contractors.
Low levels of exposure to sheep scab mites were detected in 5 of the 7 flocks. These sheep had NO obvious signs of sheep scab but clearly exposure to mites had occurred and no flocks had been treated with any agents during the preceding 4 months at least.

On 21/12/2018 the same sheep were ELISA tested again and the antibody levels had declined – the dipping had been successful.

A farmer meeting with representatives from pharmaceutical companies, Biobest and private vets was held in February 2019 and the flowing outcomes discussed:

- Sheep scab can be present in a flock at a very low level and therefore classical signs normally associated with sheep scab - intense itching, severe wool loss, raw oozing areas of skin may not be evident. The ELISA test was able to detect the presence of sheep scab at low levels. It was not possible to infer that Herdwicks are more resistant to sheep scab or that the thick Herdwick fleeces make it more difficult for the mites to multiply quickly or that Herdwicks have more immunity to scab.
- Know what you are treating. While lice were seen in some flocks, simply assuming that sheep pulling wool are affected by lice can lead to treating the wrong parasite which can be expensive. Getting the right diagnosis is paramount and this new blood test for sheep scab can detect scab before signs develop, allowing prompt action with the right treatments.
- Only one injectable product offers treatment AND long-lasting protection against sheep scab – 2% moxidectin. Scab mites can live in the environment for 17 days so for some injectable products the sheep can get re infected if they go back onto the same land they were on – which is an issue for fell going flocks. Doramectin can be given once for treatment but the sheep have to be kept apart from untreated (potentially infected) sheep for 14 days and can’t go back into the same area after treatment. Other injectable products have to be given on two occasions AND the sheep have to be isolated until after the second injection and not put back onto the same area after treatment. The injectable formulations do work but each product is different and the instructions have to be followed carefully. Injectables had been used in some of the flocks in this project but we can’t say from this study that there was any resistance. We also didn’t look into possible resistance of gut worms which can arise from inappropriate or overuse of MLs which is also increasing.
- All treatments give different time periods of protection. A correctly given treatment may well have worked, but when the protection period wears off, the sheep are vulnerable. So, it is important that sheep are all treated in the same time frame. On commons if flocks are treated at different times they risk getting re infected if another flock has mites and treats at a different time. This may explain why there was evidence of low levels of mites, it was simply continuing to circulate in the flocks.
- Those farmers who brought in dipping contractors found them to be efficient and effective. There are more and more contractors now offering dipping services and they can be a cost-effective way of controlling scab. Contractors are able to remove dip and work in such a way that they eliminate the health risks associated with dips. Dips control scab AND lice and flies and ticks - so a great advantage.
While the farmers on this common demonstrated that they could work cooperatively to deal with scab their flocks are still at risk from adjoining hefts unless there is wider cooperation and coordination.

Sheep scab has been around for centuries, a large outbreak was recorded during Henry VIII’s reign. It was finally eradicated from the UK in 1952 as a result of compulsory dipping that was carried out by coordinated dipping of all sheep flocks in the spring and autumn. Unfortunately, after it was eradicated, sheep scab was re-introduced in 1973 through imported animals and while it was almost eradicated again by 1983 with only 16 flocks in GB reporting scab, deregulation of scab control has meant that scab continues to be a frustrating disease. Coordination of appropriate treatment is key to controlling this disease.

**Horizon scanning**

**Bluetongue update**

Since mid-December 2018, France has reported calves that were born small, blind and which have died at a few days of age. The number reported has increased since January 2019. These animals have been positive by PCR test on blood and spleen for BTV-8, and negative for Schmallenberg virus, and this detection in calves of about a week of age during the *Culicoides* vector-free period suggests transplacental BTV-8 infection.

Since the first reports of cases, 418 samples from such calves have been reported as testing positive by PCR for BTV-8. Between 2-15% of new-born calves have been infected on some farms. Transplacental infection was described during the 2006-2009 BTV-8 outbreak but at notably lower rates than currently reported in France.

A study in France was published of estimates of vertical transmission in French cattle in 2016 for infections occurring late in gestation and allowing the birth of viable calves (Courtejoie and others 2019). The high probability of 56% highlights that this transmission route may be more widespread than expected, though its true epidemiological impact remains to be assessed.

This observation, and further studies using experimental midge infection (Flannery and others 2019), suggest that the current BTV-8 strain in France has reduced *Culicoides* vector competence, which reflects phenotypic changes in the re-emerging strain.

Livestock owners and field vets in the UK should note that the re-emerging BTV-8 strain in northern Europe may cause transplacental transmission and infection of foetuses in cattle, and they should consider BTV-8 as a possible cause of abortion of small, blind or malformed calves, in addition to Schmallenberg virus. How this relates to small ruminants is as yet unknown but should be borne in mind during abortion investigations.
Publications

APHA Staff

Kamaludeen J; Graham-Brown J; STEPHENS N; Miller J; Howell A; Beesley NJ; Hodgkinson J; Learmount J; Williams D 2019 Lack of efficacy of triclabendazole against Fasciola hepatica is present on sheep farms in three regions of England, and Wales. Veterinary Record 184 (16) 502.

Waine, K., Strugnell, B. W., Howie, F., SWINSON, V. & Millar, M. 2019 Diaphragmatic lesions and fatal haemorrhage in Texel sheep. Veterinary Record Case Reports 7, e000745


Parida S; Selvaraj M; Gubbins S; Pope R; BANYARD A; Mahapatra M 2019 Quantifying levels of peste des petits ruminants (PPR) virus in excretions from experimentally infected goats and its Importance for nascent PPR eradication programme. Viruses 11 (3) 249.

Other publications of interest


References


Annexe

VIDA diagnoses are recorded on the APHA FarmFile database and SRUC Veterinary Services LIMS database and comply with agreed diagnostic criteria against which regular validations and audits are undertaken.

The investigational expertise and comprehensive diagnostic laboratory facilities of both APHA and SRUC Veterinary Services are widely acknowledged, and unusual disease problems tend to be referred to either. However recognised conditions where there is either no diagnostic test, or for which a clinical diagnosis offers sufficient specificity to negate the need for laboratory investigation, are unlikely to be represented. The report may therefore be biased in favour of unusual incidents or those diseases that require laboratory investigation for confirmation.

APHA VICS have UKAS Accreditation and comply with ISO 17025 standard. SRUC Veterinary Services has UKAS accreditation at their central diagnostic laboratory and at the Aberdeen, Edinburgh, Perth, Ayr, Dumfries, Inverness, St Boswells and Thurso Disease Surveillance Centres which comply with ISO 17025 standard.

From September 2014 APHA contracted the services of partner post-mortem providers. From April 2015, these services were provided by the Royal Veterinary College, the University of Bristol, University of Surrey and SRUC Veterinary Services. These providers contribute to the VIDA diagnoses recorded on the APHA FarmFile database and comply with agreed diagnostic criteria. To achieve a VIDA diagnosis, all testing must be carried out by a laboratory with ISO 17025 accreditation.

This report contains analysis of disease data from APHA, SRUC Veterinary Services division of Scotland’s Rural College (SRUC) and partner post-mortem providers (SRUC Veterinary Services, University of Bristol Veterinary School, Royal Veterinary College, University of Surrey, Wales Veterinary Science Centre) from samples submitted in the first quarter of 2018 compared to the equivalent quarter of previous years. It aims to identify emerging small ruminant disease related threats. The production of the report is underpinned by a large quantity of surveillance data and information, compiled as part of the Defra Plant and Animal Health and Animal Health and Policy Implementation Directorates. Further information can be found at [http://apha.defra.gov.uk/vet-gateway/surveillance/index.htm](http://apha.defra.gov.uk/vet-gateway/surveillance/index.htm).

New and re-emerging diseases and threats

Monitoring the trends in diagnoses of known diseases cannot, by definition, detect either new diseases or changes in endemic diseases that would prevent a diagnosis from being reached (for example a change in the pathogen that compromised the usual diagnostic test). Such new or emerging diseases would probably first be detected by observation of increased numbers of submissions for clinical and/or pathological syndromes for which a diagnosis could not be reached in the normal way. Submissions for which no diagnosis is
reached (DNR) despite testing deemed to allow reasonable potential for a diagnosis to be
reached are regularly analysed to look for increases in undiagnosed disease which could
indicate the presence of a new or emerging disease. Undiagnosed disease submissions
are summarised broadly by the clinical presentation of disease and, once this has been
determined by further investigation, the body system affected. Both groups are
investigated and trends in the levels are compared over time.

Data recording by APHA and SRUC Veterinary Services was harmonised from 2007. The
Species Expert Group reviews trends in VIDA DNR data each quarter with the aim of
providing information on potential new or emerging diseases or syndromes. ‘Prior years’
refers to pooled data for 2008 - 2016 for GB VIDA data.

Supplementary analysis of APHA DNR data is also undertaken using an early detection
system (EDS). This uses a statistical algorithm to estimate an expected number of DNR
reports and a threshold value. If the current number of DNR reports exceeds the threshold
(i.e. exceedance score>1), this indicates that the number of reports is statistically higher
than expected. When this EDS identifies categories of submissions where the threshold
DNR has been exceeded, the Species Expert Group reviews the data to investigate
further. This review may involve assessment of individual DNR submissions. Where this
DNR analysis finds no evidence of a new and emerging threat or other issue, the detail of
these reviews in response to thresholds being exceeded may not be reported here.

**Changes in disease patterns and risk factors**

This section of the report gives information on occurrence of selected diseases. The data
originate from submissions and are summarised and presented according to the diagnosis
reached and assigned as a VIDA code. Our charts show the number of diagnoses
(numerator) as a proportion of the number of submissions in which that diagnosis was
possible (denominator), for all of GB, England & Wales and for Scotland. The bars
indicate the 95% confidence limits. Note that the y-axis of the charts varies and therefore
care must be taken when comparing individual charts.
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