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VIDA diagnoses are recorded on the APHA FarmFile database and SAC Consultancy: 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 SAC CVS 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. SAC CVS have 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, the Wales Veterinary Science Centre and SACCVS. 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.
INTRODUCTION

This report contains analysis of disease data from APHA, SAC Consulting: Veterinary Services (SAC CVS) division of Scotland’s Rural College (SRUC) and partner post-mortem providers (SAC CVS, University of Bristol Veterinary School, Royal Veterinary College, University of Surrey and Wales Veterinary Science Centre) from samples submitted in the first quarter of 2016 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://ahvla.defra.gov.uk/vet-gateway/surveillance/index.htm.

OVERVIEW

Issues & Trends

Weather

January was unsettled and dominated by low pressure. Generally a mild month in the south, with frosts, and some snow, mainly over high ground and in the north. Storm Gertrude caused widespread disruption near the end of the month, with damaging winds. Most of eastern Scotland and parts of north-east England had two to four times the normal rainfall which fell on already saturated ground and caused widespread flooding in Aberdeenshire.

Early February saw a continuation of the unsettled conditions with storms and rain impacting on the South West. The provisional UK mean temperature was 3.9 °C with a high of 16°C recorded in Exeter and a low of -14°C recorded in Aberdeen.

March continued the trend of low pressure and Atlantic storms but by the middle of the month high pressure brought dry, settled weather, often with plenty of sunshine for western areas.

In February the new Nematodirus forecast was launched http://www.scops.org.uk/nematodirus-forecast.html.

This new forecasting tool is the result of an initiative between the University of Bristol and SCOPS.

Temperature data from 140 weather stations throughout the UK are taken and loaded onto a map. The level of risk is indicated according to the colour of the ‘dot’ for the mapped weather stations (Fig 1). As the colours change from yellow to orange/red the risk increases. Farmers and vets can view the forecast temperatures and in combination with grazing history assess the risk of Nematodirus infection in lambs for their area. By clicking on the station more detailed information on the current risk level, guidance on what to do next, and information on when the forecast was last updated is also available. Lesley Stubbings from SCOPS advised that due to the variability in weather patterns farmers should not rely on routine Nematodirus worming treatment but monitor closely the developing temperature changes and target treatments according to risk.

Further guidance on Nematodirus is also available from the SCOPS site.
Fig 1. Nematodirus forecast map showing weather stations and Nematodirus risk (downloaded 26/04/2016)

The SCOPS web forum also provides updates to a Nematodirus reports map and by clicking on the icons further detail of the report is provided. SCOPS Alerts confirmed the first case of Nematodirosis causing deaths and scouring in lambs in the Hereford area (See fig 2).

Fig 2. Nematodirus and reports of cases map
Industry

The first quarter of 2016 saw the price of lamb increasing, following the trend seen at the end of 2015. The strongest rises were seen at the start of the period, with prices in February briefly moving above the five year average, before stabilising in March. There are a number of factors behind the rise in prices, including a tightening of supplies compared to the previous year. Production of sheep meat has been lower than the same period a year earlier since October 2015. While supplies were tighter in the first quarter of 2016, retail demand was higher than the same period in 2015, helping to push prices up. Demand also increased in the build up to the Easter period, normally the period of peak lamb consumption in the UK. Despite all this prices remained below year earlier levels. Skin prices continued to be at a low level. At the same time the pound as weakened against the euro, making UK exports more competitive on the EU market. However the pound remained stronger than the New Zealand dollar than the corresponding period in 2015. This, combined with high levels of production in New Zealand led to UK imports rising in the first quarter of the year.

Mark Koslowski AHDB Beef & Lamb

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 SACCVS 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 2010-2014 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.

Analysis of Diagnosis Not Reached (DNR)

Sheep & Goats

Analysis of cases with DNR is performed every quarter by the Small Ruminant Species Expert group. There are no indications of any new or emerging disease syndrome. There was no significant change in the overall %DNR and no significant increases for any of the presenting signs or syndromes.
ONGOING NEW AND RE-EMERGING DISEASE INVESTIGATIONS

UNUSUAL DIAGNOSES

Epidermolysis bullosa

Carmarthen was presented with two new born lambs with extensive and severe skin lesions from a flock of 70 ewes. These lambs were born approximately 3 weeks before lambing was due to start, but appeared full term. Bright red, smooth, non-haired tissue was present over the proximal half of both pinnae, around the nose, lower jaw, over the distal forelegs and distal hind legs (Fig 3.). This was attached to normal skin covered with wool or hair.

One normal claw was present on both forelegs. There was also ulceration of the gum and one lamb had a cleft of the hard palate.

Histopathological examination demonstrated epidermal clefting at the epidermal/dermal junction and is most typical of epidermolysis bullosa although a variety of histological forms can be demonstrated (Pérez and others 2011). This rare inherited disease (sometimes called Redfoot) is due to sub-epidermal bulla formation and lambs may be born normally with lesions beginning to appear from 1 – 2 days of age with oral lesions developing preventing normal feeding and ulcerative skin lesions and hoof horn separation causing severe lameness. Here the lambs were very severely affected and lesions were present at birth. Epidermolysis bullosa has been reported in a number of breeds including Scottish Blackface, Suffolk, Dorset Down and Welsh Mountain. In this case it was suspected that a Welsh Mountain Ram may have been the sire. While a full pedigree analysis would be required to establish the genetic aetiology it does allow the farmer to review his future breeding plans.

Fig 3 Lamb with extensive skin lesions

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.
Parasitology

Parasitic Gastroenteritis

PGE was diagnosed in 63 incidents (9.5% of diagnosable submission) in this quarter (January to March) of 2016 in GB. This is significantly less that the same quarter the previous year Fig 4. The reason(s) for this are not clear but the wet weather in 2015 may have led to greater exposure and therefore higher immunity in grazing lambs during that year. Disease was primarily diagnosed in older lambs and yearlings. *Nematodirus battus* was noted as being part of a multigenera infection in some incidents in January and February.

Fig 4: Incidents of PGE in Sheep as % of diagnosable submissions in Q1 2004 - 2016

*Psoroptes ovis* (sheep scab)

Sheep scab was diagnosed in 32 incidents in GB this quarter (6.7% of diagnosable submissions). This is significantly more than the same quarter in the previous year Fig 5. One incident reported a lack of efficacy of an macrocyclic lactone (ML) product initially used to treat the infestation in emaciated sheep. There have been other anecdotal reports of lack of efficacy of MLs to treat *Psoroptes ovis*, but no cases of resistance have been confirmed.

Fig 5: Incidents of Sheep Scab in Sheep as % of diagnosable submissions in Q1 2004 - 2016
Acute fasciolosis

The incidence of acute fasciolosis is usually low in the first quarter, as there are fewer infective metacercariae on the pasture at this time of year. Many sheep flocks are also housed for lambing, which could also reduce the incidence. Cases did occur in Scotland following on from a higher incidence in the autumn and early winter.

Chronic fasciolosis

The percentage diagnosis was significantly higher for Scotland (Fig 6), while there was no significant change for England and Wales. The reasons for the Scottish rise could again be similar to those given in the last report, a favourable wet spring and autumn last year that favoured the life cycle. Also, a late surge of infection after sheep flocks had been treated, and, according to a Scottish colleague, possible treatment failure with Triclabendazole.

![Incidents of Chronic Fasciolosis in Sheep as % of diagnosable submissions in Quarter 1](image)

Fig 6: Incidents of Chronic Fasciolosis in Sheep as % of diagnosable submissions in Q4 2004 - 2015

Reproductive & Mammary disease

Ovine abortions

The common causes of ovine abortions diagnosed in Great Britain (GB) based on analysis of Veterinary Investigation Diagnosis and Analysis (VIDA) data is presented. The VIDA database contains a record of every diagnostic submission made to the APHA's Veterinary Investigation Centres, to SAC Consulting: Veterinary Services Disease Surveillance Centres and to partner post-mortem providers in Great Britain; it has been operating since 1975.

Fig 7 illustrates the most common diagnoses in GB for the last five years. Enzootic Abortion of Ewes (EAE), caused by *Chlamydia abortus* infection, is the most commonly diagnosed cause of ovine abortion comprising 19% of diagnosable submissions in 2014 and 16% in 2015. In addition EAE represents approximately half of the diagnosed causes of abortions. Toxoplasmosis is the second most commonly diagnosed cause of abortion in GB, rose from 8% of diagnosable submissions in 2014 to 11% in 2015. Together these diseases represent 70 – 80% of the diagnosed causes of abortion.
Both EAE and toxoplasmosis are preventable by vaccination. Both have zoonotic implications and both can have a significant impact on flock production and profitability. A proportion of farmers continue to refer to flock performance based on scanning percentages. At this stage of the production cycle it is important to identify the cause of abortion. There is a wide range of potential causes of abortion which have been reviewed (Mears, 2007 a, b) and which also includes Schmallenberg virus (SBV). Veterinary investigation including submission of appropriate samples to a diagnostic laboratory is required to achieve a diagnosis, and to determine how disease may have entered the flock. This has been outlined recently in an APHA Surveillance Report (Anon 2016); also see the APHA online submission guidance booklet at http://ahvla.defra.gov.uk/vet-gateway/surveillance/diagnostic-support.htm. If initial investigations are unrewarding and abortions continue then further sampling should be undertaken.

Control measures should be implemented in the face of an abortion problem, including farm hygiene and management practices, and personal hygiene to minimize the risk of zoonotic infection. Veterinary flock health plans which must include protocols for the investigation of flock health problems including abortion, and which should consider subjects such as quarantine, biosecurity, vaccination and flock management, should be reviewed and/or implemented to improve flock performance and profitability.

**Chlamydia abortion**

There were significant increases for fetopathy caused by Chlamydia during Q1 2016 Fig 8. During the lambing season, APHA also receive enquiries relating to identification of EAE as the cause of abortion in flocks that have been vaccinated. These cases should be reported to the Veterinary Medicines Directorate (VMD) as suspected lack of efficacy on the VMD’s website at https://www.vmd.defra.gov.uk/adversereactionreporting.
A three-year investigation into the identification of the vaccinal strain in cases of abortion in sheep vaccinated with commercial live attenuated *Chlamydia abortus* vaccines has been reported (Sargison and others 2015) (Livingstone and others 2014).

![Incidents of Fetopathy dt Chlamydia for GB for quarter 1, as a % of diagnosable submissions 2004-2016](image)

**(Vertical bars represent 95% confidence limits)**

**Fig 8:** Incidents of Fetopathy dt *Chlamydia* for GB for quarter 1, as a % of diagnosable submissions 2004-2016

### Listeria abortion

*Listeria monocytogenes* was identified as the cause of abortion during January and February on 12 occasions Fig 10. In addition to these cases there have been 13 diagnoses of Listeriosis in adult sheep.

In one case twenty ewes died from a flock of 700 three days after a change from baled to clamp silage. The only clinical sign noted was dullness and diarrhoea. Postmortem examination found an abomasitis with multifocal coalescing ulcers (Fig 9).

*Listeria monocytogenes* was cultured from both large intestinal content and abomasum. In the same flock thirty five ewes had been affected by foetal deaths and a ewe with dead foetuses in the uterus and a partially opened cervix was examined and *Listeria monocytogenes* was isolated from foetal liver and amniotic fluid.

The differential diagnosis for sheep with depression, weakness and neurological signs at this time of year could include pregnancy toxaemia in heavily pregnant ewes during the last four weeks of pregnancy, hypocalcaemia, peripheral vestibular lesions, brain abscess or Gid (in younger ewes).

![Abomasitis due to *Listeria monocytogenes* in a ewe.](image)
If listeriosis is suspected aggressive treatment with high doses of antibiotics is necessary to achieve high concentrations in the brain. On farm investigation should include checking the silage to ensure that it is not spoiled; punctured bags should have been sealed and bags must not be left open for days; silage bags must be protected from vermin and farm stock; any spoiled silage should not be fed to sheep. Management of cleanliness is also important to avoid soil or manure contamination of feed and water troughs.

**Salmonella abortion**

*Salmonella* Montevideo, *Salmonella* Agama and *Salmonella* Dublin (Fig 11) have been diagnosed as causes of abortion. *Salmonella* Agama usually has a wildlife source. *Salmonella* Dublin causes illness in ewes and abortions typically occur when pregnant ewes are placed in buildings previously contaminated by cattle. *Salmonella* Montevideo is not usually associated with illness in the ewes (other than abortion) and it can be excreted and pass through a non-pregnant flock without causing any clinical signs.
Systemic disease

Botulism

A likely diagnosis of botulism was made by APHA Carmarthen following the recumbency and death of approximately 30 out of a group of 200 in-lamb ewes that had been allowed to graze a heap of broiler litter. Two ewes submitted for post-mortem examination were in good condition and both carrying twin foetuses. Metabolic disease was ruled out by analysis of aqueous humour. Access to the broiler litter was prevented and the food safety authorities informed. No clinically affected animals were to enter the food chain, nor for 18 days following recovery. It was possible that further cases could occur for up to 18 days following removal from the broiler litter.

Musculo-Skeletal disease

Rickets

Rickets was diagnosed in a 10-month-old lamb submitted to APHA Thirsk being the third animal from a group of 94 to become reluctant to move and unable to stand unless assisted. The group of lambs were at pasture and had been given a vitamin drench in September 2015 and wormed and vaccinated against clostridial disease in October 2015. It was noted on clinical examination that the hooves on all four legs were overgrown with a pronounced ridge evident midway down the horn on the front right lateral claw. On postmortem examination, the ribs were easily snapped and were pliable. The epiphyses of multiple long bones were reddened at both the distal and proximal ends. The cortices of the long bones appeared grossly normal. Histopathology revealed a moderate/severe, physeal osteochondropathy and tentative osteoporosis. These findings would be consistent with a diagnosis of rickets. In grazing animals this is a condition that is seen in mid to late winter following a relatively warm autumn in which there has been lush grass growth. The lack of sunlight over the winter period results in decrease vitamin D synthesis (particularly in black faced sheep) and the presence of competitors within the grass (high carotenoid pigments) are thought to suppress vitamin D production and activity within the animals leading to growth abnormalities, limb deformity, reluctance to move, and joint and bone pain. Bone remodelling may also occur, leading to thinning of the cortical bone which predisposes to fractures.

Nervous disease

Hypoglycaemia encephalopathy in lambs

Neurological signs of shaking with an inability to stand and small lamb size were investigated by the submission of a typically affected neonatal lamb to both APHA Thirsk and Penrith. Post-mortem examination was unremarkable in both cases. Although Border disease was a top differential given the presenting clinical signs, PCR tests were negative. Histopathology of the brain revealed a severe, multifocal, sub acute, necrotising cerebrocortical necrosis. The nature and pattern of the changes in both lambs was suggestive of an in utero insult, most likely the result of hypoglycaemia associated with twin lamb disease within the ewes (Scholes and others 2009).

Cerebellar Abiotrophy

Cerebellar abiotrophy was diagnosed at APHA Carmarthen as the cause of failure to stand from birth where four of the lambs in a crossbred 40-ewe flock had been affected. Some were also showing breathing difficulties from birth. The affected lambs had all been one of multiple births with the other lambs clinically normal. All the ewes were homebred and there was a range of ages of ewes that had produced affected lambs. The lambs appeared to be progeny of one ram. No gross abnormality was
detected on post-mortem examination. Histologically, lesions were confined to the cerebellum with evidence of Purkinje cell necrosis. There is thought to be a genetic basis for cerebellar abiotrophy so it was advised not to repeat the same ram/ewe matings in the future.

**Focal Cerebellar Dysplasia**

An unusual case of focal cerebellar dysplasia was seen in a lamb submitted for post mortem examination to APHA Penrith. This was one of two Texel-cross lambs (12-hours-old) affected, unable to stand, with tilted heads, looking blind, unable to suck and with an obvious nodding head movement. Post-mortem examination revealed the left lateral hemisphere of the cerebellum was completely separated from the vermis and right lateral hemisphere (which were joined together). No other significant lesions were noted. BDV PCR was negative and histological examination could not identify a specific cause and attributed the changes to a developmental abnormality of unknown aetiology.

**Respiratory disease**

There were nine cases of OPA diagnosed by APHA during quarter one. Two of these cases were in unusually young lambs, aged only 10 months. Cases are typically at least a year old, but are usually older. The youngest ever recorded case was 2 months, however high levels of infection within a flock are considered necessary before very young cases are seen. Both of these current cases were from pedigree flocks producing breeds of ram that are popular within commercial flocks. This infection is particularly damaging when in ram breeding flocks as it then has the potential to spread to many other widely dispersed flocks following ram sales.

**Enteric disease, Urinary disease, Skin disease, Metabolic disease**

No statistical significant increases for any of the diseases monitored

**Toxicity**

**Nitroxynil toxicity:** Nitroxynil toxicity was diagnosed in a flock where 120 ewes were injected with nitroxynil, and within 24 hours 12 had died and others looked unwell. The clinically affected ewes had an increased respiratory rate and polydipsia. Histologically there was acute renal tubular necrosis, which is consistent with nitroxynil toxicity, along with pulmonary oedema. It was thought likely that the necropsied animal had received approximately twice the recommended dose and directly into a blood vessel. The case was reported to VMD as a possible adverse reaction.

**Adverse reactions**

**Suspect adverse reaction to combined vaccination:** Six out of 29 ewes had become ill within an hour of vaccination, with clinical signs of pyrexia, depression, lethargy, hyperpnoea and recumbency, followed by death. The ewes had been given Footrot vaccine followed by Clostridial vaccine, with less than 12 hours between the vaccinations. Gross post-mortem findings included marked haemorrhage and oedema of the subcutis over part of the neck; an excess of serosanguinous thoracic fluid and engorged lymphatic tissues. Biochemistry testing of ocular fluids identified low calcium. Histopathology of the lung tissue showed disseminated intravascular coagulation. This is a non-specific change and could be due to endotoxaemia, anaphylaxis, cardiac, neurogenic and hypovolaemic shock, but the close association with the timing of vaccination made vaccination anaphylaxis the most probable diagnosis.
HORIZON SCANNING

International Disease Monitoring

Blue tongue

France continues to report BTV-8 from the results of the winter surveillance campaign Fig 12. Only cattle are tested and no clinical signs have been observed. The new cases reported have resulted in an increase in the restriction zones towards the West and the South. In addition, there has been vector surveillance carried out to implement seasonally free zones in certain regions. An updated outbreak assessment has been produced, with more details.

![Map of BTV-8 in France](image)

Fig 12: BTV8 Outbreaks reported in France

Recently France has reported more outbreaks, all but one in cattle and the other in a goat but all as a result of surveillance not as clinical reports of disease. The restriction zone has been extended but has still not reached the north coast, but when it does, our risk level will likely change. Recent cold weather may have slowed the spread but it is not expected to last long and warmer weather will mean an increase in vector activity.

To date there have been 272 outbreaks detected by surveillance activities, with only 12 reports of clinical disease in animals (cattle, sheep and goats). Under the French national surveillance programme, nearly 40,000 cattle on over 1,300 farms in 89 departments were tested in September and October 2015, designed to detect with 95% confidence, within-herd prevalence of <10% and regional prevalence threshold (between-herd) of 5%. This continues to support the evidence that BTV-8 presents with few clinical signs in cattle. The “seasonally free zone” status of several regions has now been lifted as vector activity has increased or as cases are detected.

The UK does not have agreement with France to accept unvaccinated animals under any sort of bilateral agreement from seasonally free zones.
Going forward, we will continue to identify any changes in daily temperatures which may signal increase in vectors and therefore spread of disease. Clearly the infection has overwintered and vaccination is too limited in France to prevent spread in 2016.

Italy has reported four outbreaks of BTV-1 and one of BTV-4, in cattle in various regions. Disease control measures are in place, including vaccination. The Portuguese authorities have somewhat belatedly reported 10 outbreaks of BTV-1 which occurred in the south of the country in December 2015.

**BTV videos produced by APHA and the Pirbright Institute**

Find out about the risk of bluetongue disease spreading into the UK in our video [http://bit.ly/1T24Nfo](http://bit.ly/1T24Nfo) in collab. with [Pirbright.Inst](http://www.pirbright.ac.uk)


Bluetongue is a notifiable disease which can affect ruminant animals. Find out more on GOV.UK [http://bit.ly/1WdzthR](http://bit.ly/1WdzthR) in collab. with [Pirbright.Inst](http://www.pirbright.ac.uk)

**Other useful sources of Information**

In 2007-2008 APHA investigated cases reported as BTV, but subsequently negated, to establish a diagnosis. Andy Holliman Letter The Veterinary Record, Investigating suspect bluetongue disease incidents August 2, 2008


**Peste de Petite Ruminants (PPR)**

Turkey has (belatedly) reported several outbreaks this month which were confirmed in March. To date, this year there have been 25 outbreaks in various regions See Fig 13

The FAO has commented that the appearance of PPR in new countries, such as the Maldives and Georgia recently, is sign that not even island states are protected from disease incursion. Seventy six countries around the World report PPR and it causes up to $2 billion in losses every year. Therefore it is a target for global eradication. [http://www.fao.org/news/story/en/item/411738/icode](http://www.fao.org/news/story/en/item/411738/icode)

**Sheep and Goat Pox (SPGP)**

There have been very few reports from Turkey of SPGP this year and none in Greece since October 2015. One reason could be the additional trade restrictions in place since Lumpy Skin Disease was detected.
During 2015 there were 2 cases of classical scrapie and 15 cases of atypical scrapie in sheep identified in England through active surveillance. During the first three months of 2016 there have been 5 cases of atypical scrapie. The full statistics can be accessed by the following link:


In goats 4 cases of classical scrapie were identified in England in 2015 from passive surveillance. During the first three months of 2016 there have been 2 cases of classical scrapie. The full statistics can be accessed by the following link:


**TB in Sheep**

The recently created online TB Hub is the ‘go-to’ place for British beef and dairy farmers to find practical advice on dealing with bovine TB on their farm, covering everything from biosecurity measures to understanding trading rules. The hub is a joint industry initiative, supported by the Agriculture and Horticulture Development Board (AHDB), the Animal & Plant Health Agency (APHA), the British Cattle Veterinary Association (BCVA), the Department for Environment, Food and Rural Affairs (Defra), Landex and the National Farmers Union (NFU).

This website also includes information pages on other species including sheep

http://www.tbhub.co.uk/non-bovines/sheep/

**Diagnostic submission trend**

Contributors of diagnostic submission data include APHA VI Centres, SAC C VS Disease Surveillance Centres and partner post-mortem providers. Annual diagnostic submissions are provided for sheep Fig
14 and goats Fig 15. It is worth noting that a submission may be comprised of a number of carcases submitted for examination, therefore these do not represent a count of carcases received.

![Goat Diagnostic Submissions yearly summaries until 2015](image1)

![Sheep Diagnostic Submissions yearly summaries until 2015](image2)

**Fig 14: 2015 Annual Sheep diagnostic submissions**  **Fig 15: 2015 Annual Goat diagnostic submissions**

A map of the APHA Veterinary Investigations Centres, SAC Disease Surveillance Centres and Non APHA PME providers are shown in Fig 16. The dark green areas represent one hour access to APHA VICs and pale green areas where free carcase collection service are provided by APHA. The Dark blue areas represent one hour access to our partner provider sites with the pale blue denoting the area serviced by the University of Surrey. Yellow show areas which are outside the one hour access to a PME site and where there is no free carcase collection service.
Fig 16 Surveillance Network

A new format has been developed to show submission throughput by type a country, submissions by syndrome and submissions by mapped regions.

**Throughput**

**Sheep Diagnostic Submissions Throughput**

Table 1 describes the sheep submissions by Carcase, Fetus and other submission by Country for Q1 2016. A comparison is made to show the percentage of submissions as compared to the average of the
equivalent quarters for the previous 2 years and average of the equivalent quarters for the previous 5 years.

For carcase submissions in England the trend is to a reducing number 50% compared to the previous 5 years and 81% compared to the previous 2 years. Carcase submissions in Scotland and Wales remains relatively stable and above 80% compared to the average of previous years.

For fetus submissions the trend is for a decreasing number of submissions from England although increasing for Wales 179% compared to the previous 2 years. In Scotland the number of fetus submissions is relatively stable.

For other submissions the number from England is 78 – 83% in comparison to the average of previous years. In Scotland the comparison to the previous 5 years average is 80%.

In England the reductions in carcase and fetus submissions may reflect the changes to the network of centres offering post-mortems and the UK farming sector is currently facing “the worst recession in living memory” with profitability falling by 29% in 2015 which may influence farmers decisions to invest in post mortem examinations. We will continue to monitor these trends as the new providers in England and Wales develop their services.

Table 1. Submissions by Country for Q1 2016

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<tr>
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<th>Carcase</th>
<th>Fetus/Stillborn</th>
<th>Other</th>
<th>Total</th>
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<td>England</td>
<td>166</td>
<td>81 %</td>
<td>50 %</td>
<td>362</td>
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<tr>
<td>Wales</td>
<td>103</td>
<td>193 %</td>
<td>126 %</td>
<td>108</td>
</tr>
<tr>
<td>Scotland</td>
<td>204</td>
<td>104 %</td>
<td>96 %</td>
<td>258</td>
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<td>Unknown/Non-GB</td>
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<td></td>
<td>479</td>
<td>103 %</td>
<td>76 %</td>
<td>803</td>
</tr>
</tbody>
</table>

Goat Diagnostic submissions throughput

Table 3 describes the goat submissions by Carcase, Fetus and other submission by Country for Q4 2015. A comparison is made to show the percentage of submissions as compared to the average of the equivalent quarters for the previous 2 years and average of the equivalent quarters for the previous 5 years.

The number of goat submissions for carcase, fetus and other is relatively small and comparisons may be inflated by this small number of submissions.
Table 3. Submissions by Country for Q 4 2015

<table>
<thead>
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<th>GOAT</th>
<th>Carcase</th>
<th>Foetus/Stillborn</th>
<th>Other</th>
<th>Total</th>
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<tr>
<td>England</td>
<td>10</td>
<td>57%</td>
<td>42%</td>
<td>11</td>
</tr>
<tr>
<td>Wales</td>
<td>5</td>
<td>333%</td>
<td>250%</td>
<td>4</td>
</tr>
<tr>
<td>Scotland</td>
<td>3</td>
<td>86%</td>
<td>83%</td>
<td>3</td>
</tr>
<tr>
<td>Unknown/Non-GB</td>
<td>1</td>
<td>#DIV/0</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Diagnostic Sheep & Goat submissions by syndrome

Fig 17 shows the profile of syndromes for all sheep diagnostic submissions for each year and Fig 18 for goats, to show up if the mix is changing over time. The syndrome comes entirely from the classification to which the VIDA diagnosis code belongs, for unknown these represent all diagnostic codes where the disease type is unknown or the diagnosis is not applicable.

As expected the highest number of submissions relate to reproductive disease making up a quarter of all submissions on 2015. The increase of reproductive submissions in 2012 is likely to reflect the arrival of Schmallenberg virus in the UK.
Maps
The map Fig 19 showing submissions for sheep has been developed in collaboration with the Data Systems Group GIS team at APHA Weybridge, who generate the outputs to support the work of the SIU in evaluating the coverage of scanning surveillance activities in England and Wales.
Submission data was extracted from the VIDA database in order to include submissions to the diagnostic laboratories of the Scottish Agricultural College (SAC) from holdings in England and Wales and are limited to those holdings that could be georeferenced.
Demographic data on the underlying population of holdings by species is based on the work of the Livestock and Demographic Data Groups and derived from Sheep and Goats: Agricultural Survey extracts as at December 2014.
The submission ratio for each species is the proportion of holdings that submitted at least one carcase or diagnostic sample in the reference period over all holdings of that species in the spatial unit county.
The 2015 maps are the first draft of the coverage outputs incorporating underlying population data. Future enhancements are planned to incorporate data on other sources of surveillance information, from within and external to APHA, such as statutory disease notifications, inspection visits or submissions to other diagnostic laboratories.

Fig 19: Spatial distribution of Small Ruminant submissions Q1 2016
Publications of interest

Sheep and goats papers published by APHA staff January - March 2016

Douet J-Y; Lacroux C; Litaise C; Lugan S; Corbiere F; ARNOLD M; SIMMONS H; Aron N; Costes P; Tillier C; Cassard H; Andreoletti O 2016 Mononucleated blood cell populations display different abilities to transmit prion disease by the transfusion route. Journal of Virology 90 (7) 3439-3445.

GALE P; KELLY L; SNARY EL 2016 Qualitative assessment of the entry of Capri poxviruses into Great Britain from the European Union through importation of ruminant hides, skins and wool. Microbial Risk Analysis 1, 13-18.

Goldmann W; MARIER E; Stewart P; KONOLD T; STREET S; WINDL O; ORTIZ-PELAEZ A; Langeveld J 2016 Prion protein genotype survey confirms low frequency of scrapie-resistant K222 allele in British goat herds. Veterinary Record 178 (7): 168.

GONZALEZ L; Chianini F; Hunter N; Hamilton S; Gibbard L; MARTIN S; Dagleish MP; SISO S; Eaton SL; Chong A; Algar L; JEFFREY M 2015 Stability of murine scrapie strain 87V after passage in sheep and comparison with the CH1641 ovine strain. Journal of General Virology 96 (12) 3703-3714.

HATELEY G 2014 Joint sheep and beef CPD - The BCA view. Proceedings of the Sheep Veterinary Society (38) 41-44.


MANSFIELD KL; JOHNSON N; BANYARD AC; NUNEZ A; Baylis M; Solomon T; FOOKS AR. 2016 Innate and adaptive immune responses to tick-borne flavivirus infection in sheep. Veterinary Microbiology 185, 20-28.

MCGOVERN G; MARTIN S; JEFFREY M; DEXTER G; HAWKINS SAC; BELLWORTHY SJ; THURSTON L; ALGAR L; GONZALEZ L 2016 Minimum effective dose of cattle and sheep BSE for oral sheep infection. PLoS ONE 11 (3): e0151440.

Other publications of interest

Anderson A; Szymanski T; Emery M; Kohrs P; Bjork AC; Marsden-Haug N; Nett RJ; Woodhall D; Self J; Fitzpatrick K; Priestley RA; Kersh G (2015) Epizootiological investigation of a Q fever outbreak and implications for future control strategies. Journal of the American Veterinary Medical Association 247 (12) 1379-1386


Bond KA; Vincent G; Wilks CR; Franklin L; Sutton B; Stenos J; Cowan R; Lim K; Athan E; Harris O; Macfarlane-Berry L; Segal Y; Firestone SM (2016) One health approach to controlling a Q fever outbreak on an Australian goat farm. Epidemiology & Infection 144 (06) 1129-1141

Castaño P; Fuertes M; Regidor-Cerrillo J; Ferre I; Fernández M; Ferreras MC; Moreno-Gonzalo J; González-Lanza C; Pereira-Buono J; Katzer F; Ortega-Mora LM; Pérez V; Benavides J (2016) Experimental ovine toxoplasmosis: influence of the gestational stage on the clinical course, lesion development and parasite distribution. Veterinary Research 47 (1) 1-14

Crilly JP; Nunn F; Marr E; Burgess S; Jennings A; Sargison N (2014) Investigation and treatment of an outbreak of ovine psoroptic otoacariasis. Proceedings of the Sheep Veterinary Society (38) 45-50


Thompson C; Rutherford K; Conington J; Williams J; Zanella A (2014) Farmers’ and veterinarians’ perceptions of lameness and pain in sheep. Proceedings of the Sheep Veterinary Society (38) 61-63


References


