GB small ruminant quarterly report
Disease surveillance and emerging threats

Volume 21: Q4 – October - December 2018

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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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Introduction and overview

This quarterly report reviews disease trends and disease threats for the fourth quarter of 2018 October - December. 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 Annex available on GOV.UK. https://www.gov.uk/government/publications/information-on-data-analysis

Issues & Trends

Weather

Autumn 2018 saw a mixture of weather. Following a long dry summer, the UK rainfall was 82% of the average for October and 110% for November (Fig 1). This caused alerts to be issued to farmers that while liver fluke burdens on some pastures might be lower, it would be dangerous to assume that this applied to all farms and continual monitoring is vital.

Forage continued to be made late in the year therefore there was less risk of the previously anticipated forage shortages.

Fig 1: Autumn 2018 mean temperature anomaly compared to 1981-2010 expressed as % of the average for 1981-2010 (left) and actual rainfall amount (right)
Industry report

During quarter four, farm gate prices for lamb have been much in line with last year’s price, and slightly above the five year average. Following seasonal trends, the price was at its lowest point for the year in October. However, it rose consistently after that up to the end of December. Retail demand remained under pressure however high prices resulted in an increase in spend on lamb in Quarter 4, despite declining volumes.

Clean sheep slaughterings in the quarter were around 4% lower when compared to 2017, totalling 3.7 million head. Clean sheep slaughterings remain under pressure primarily because of a reduced lamb crop for 2018. Adult sheep slaughterings for the quarter totalled 446,600 head, up 12% compared to the same quarter of 2017. Despite this, production for the quarter remains down by 1.4% to total 82,400 tonnes.

Limited domestic production continues to place pressure on exportable product. As such, exports in the quarter are down slightly year-on-year. Meanwhile imports are also down in the quarter compared to 2017. Increased demand for New Zealand and Australian sheep meat in Asia, along with limited supplies available to export from both countries is having an impact on imports. This is likely to continue going forward based on the respective countries’ production forecasts.

Tom Forshaw, AHDB Beef and Lamb

New and re-emerging diseases and threats

Please refer to the annex on GOV.UK for more information on the data and analysis.

Unusual strain of salmonella in sheep

The new strain of salmonella in sheep was reported in the last quarterly report: (http://apha.defra.gov.uk/documents/surveillance/diseases/salmonella-in-sheep-info-note.pdf) further information notes providing best practice biosecurity advice for salmonella and advice on disinfectants effective against salmonella have been issued on the Vet Gateway http://apha.defra.gov.uk/vet-gateway/index.htm

These provided guidance for best practice for biosecurity to avoid introduction of salmonella, and disinfectants to help stop the spread of Salmonella between different premises were highlighted.


Unusual diagnoses

Ovine Pulmonary Adenomatosis in young sheep

Ovine Pulmonary Adenomatosis (OPA) was diagnosed in a nine-month-old Beltex lamb at the Farm Animal Pathology Service of the University of Bristol. The lamb was one of three from a group of six to show weight loss and respiratory signs, with poor response to antibiotics before death. At postmortem examination there were areas of firm, patchy to diffuse red consolidation, particularly ventrally (Fig 2). Histological changes of multiple scattered areas with proliferation of cuboidal to low columnar epithelial cells lining branching tubular to papillary processes were consistent with a diagnosis of OPA.

APHA Carmarthen Veterinary Investigation Centre (VIC) also diagnosed OPA in a 7 month old Welsh Black lamb following an investigation of the cause of respiratory disease in a group of 30 lambs in which 6 had died in the past three months despite of treatment. Again OPA was confirmed on histopathological examination of the lungs which showed severe, chronic-active, haemorrhagic broncho-interstitial pneumonia with neoplastic masses.

OPA has been recorded worldwide in sheep as young as two months old, and as old as 11 years. There have been 330 cases of OPA in sheep recorded in the VIDA database over the past 10 years in England and Wales, with the youngest recorded in a 3 month old Lleyn ewe lamb. Although most clinical cases are seen in animals aged two to four years (Griffiths and others 2010; Hunter and Munro 1983), Fig 3 shows the age distribution in VIDA diagnoses where the age of the animal was given.

Fig 2: Firm, patchy to diffuse red consolidation of the ventral lung due to OPA
Nasal Lesions

There were two cases of nasal lesions investigated in sheep this quarter, with varying findings. There may be an as yet unidentified initial insult involved in these cases, with the following potentially representing the secondary stages of disease. Further investigation into the potential initiator has been considered:

University of Bristol investigated a 60 ewe Zwartbles flock with an 18 month history of a chronic and/or recurrent nasal discharge in ewes and lambs (from three months old). Initially cases presented with a serous bilateral nasal discharge which progressed to a mucopurulent discharge after 2 weeks. None of the affected sheep had pyrexia. The affected sheep would sneeze and appear unwell with ears drooped. Up to 75% of the flock had been affected. At postmortem examination an affected ewe had scant to moderate amounts of relatively thick mucopurulent material in the nasal cavities and in the periorbital sinuses. The nasal mucosa was normal and there was no deviation of the turbinates / nasal septum. *Mannheimia haemolytica* was isolated from the nasal cavities, and *Mycoplasma ovipneumoniae* was also detected by DGGE/PCR, but these were likely secondary. Histology identified a significant mucosal eosinophilic infiltrate and there was multifocal nasal epithelial metaplasia indicative of a more chronic insult. The pattern of findings suggested either an allergic/hypersensitivity reaction or parasitic infection. No nasal bots were seen and an allergic response was postulated as the possible cause.

SRUC Dumfries Disease Surveillance Centre received a two-year-old Beltex tup that had been found dead for postmortem examination. It had been running with ewes for three weeks but was reported to be lethargic. A green nasal discharge had been noted during the week before death. In the right side of the nasal cavity the mucosa of the nasal conchae was thickened and roughened over a 2 to 3 cm diameter area. A smaller 2 to 3 mm polyp was present rostral to this. *Salmonella enterica* serovar *diarizonae* was isolated from the nasal mucosa and histopathology confirmed a proliferative rhinitis typical of that described following epithelial colonisation by this bacteria. *Salmonella enterica* serovar *diarizonae* has been previously identified as a cause of this disease but the pathogenesis of this chronic proliferative rhinitis is not fully understood.
Spinal cord compression

Severe myositis and sub-meningeal abscessation led to nervous signs in approximately 20 lambs, following footrot vaccine vaccination. Approximately one month prior to submission the lambs had various degrees of lameness and were all vaccinated with footrot vaccine (right side of the neck, a couple of centimetres behind the ear) and given a formalin foot bath. Immediately following treatment the lameness improved, however approximately two weeks later some of the lambs started showing nervous signs including: abnormal neck carriage (extended forwards), looking “drunk”, stumbling and sometimes falling when chased. A lamb was submitted for post mortem examination which revealed a small abscess under the skin over the right neck muscles which. From behind the ear to C3, there was evidence of necrotic myositis with several micro abscesses scattered throughout the muscle fibres. One area of necrosis entered the atlanto-occipital joint and micro abscesses were found under the meninges (Fig 4). The right prescapular lymph node was enlarged and contained micro abscesses. No bacteria were isolated from the cultured areas of muscle. Histological examination confirmed severe myositis and focal, acute, wallerian degeneration, which was consistent with the time elapsed since injection. It was difficult to say whether the pyogranulomatous inflammatory process was the result of something being injected (e.g. response to adjuvant) or instilled at the same time (e.g. dirty needle). Special stains failed to identify any structures suggestive of bacteria or fungi. It was recommended to report this case to VMD as a suspected adverse reaction to medicine.

Fig 4 Abscessation at atlanto-occipital joint in a lamb

A similar case was investigated by the University of Bristol. Clinical signs of ataxia and recumbency were described in 15 lambs from a group of 200 approximately two weeks after vaccine administration. Again, a localised myositis leading to spinal cord compression as a result of inadvertent intramuscular injection of the vaccine (which was designed for subcutaneous use) was confirmed on post-mortem examination of a typically affected case.

Arthritis due to *Streptococcus dysgalactiae* subsp *dysgalactiae* in weaned lambs

An unusual case of *Streptococcus dysgalactiae* arthritis was reported in spring born lambs by APHA VIC Starcross. This organism is classically associated with joint ill in lambs.
during the neonatal period. From a group of 300 six-month-old lambs three presented with swollen joints, lameness and recumbency three weeks after movement onto rough pasture. Two were presented for post-mortem examination after euthanasia. A severe polyarthritis with watery purulent material in the affected joints was identified in both animals and from which *Streptococcus dysgalactiae* was isolated in pure growth. Also of interest was the finding of a tick in the axilla region of one of the submitted lambs. The exact predisposing factors for this condition are still unclear, however *Strep. dysgalactiae* is a recognised commensal of the skin so entry to the bloodstream following skin abrasions due to the rough grazing or following tick bites were suggested as possible risk factors. In addition, *Anaplasma phagocytophilum* DNA (the causative agent of Tick Borne Fever) was detected by PCR in the spleens of both lambs. It was therefore likely that the immunosuppression as a result of infection with this organism had contributed to the outbreak of joint ill and may explain why older lambs were affected in this case. Appropriate advice regarding control and treatment was provided.

### Changes in disease patterns and risk factors

#### Syndromic analysis

#### Most common diagnoses Q4 2018

During Q4 2018 1088 diagnostic submissions were received in GB.

During Q4 the presenting signs of sheep and age group from which samples/carcases were submitted are shown here, with found dead and wasting the most common signs.

<table>
<thead>
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<td>Prewean</td>
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During Q4 2018 the 10 most common VIDA diagnoses made and age group of sheep with presenting sign “found dead” are shown here

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<td>Prewean</td>
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During Q4 2018 the 10 most common VIDA diagnoses and age group of sheep with presenting sign “wasting” are shown here

<table>
<thead>
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<th>Count</th>
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</thead>
<tbody>
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<td>Mixed</td>
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<td>Post wean</td>
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<td>Prewean</td>
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<tr>
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<td>31</td>
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</table>

Syndromic alerts were raised this quarter for the following diseases:

Pneumonia dt *Mycoplasma ovipneumoniae*, *Cl. perfringens* D infection, *Bibersteinia trehalosi* septicaemia, parasitic gastroenteritis and sheep scab
Parasitology

Parasitic gastro-enteritis

There was a significant increase in the diagnoses of PGE in sheep in the last quarter of 2018 (Fig 5) compared to the same period in the previous three years in England, Wales and Scotland. PGE was diagnosed in 44% of diagnosable submissions (207 incidents) in lambs. This is highly likely to be due to the dry summer weather (which minimised exposure to parasites on pasture) being followed up by wet weather later. Animals were being exposed to high challenges of infective larvae which was shown in some cases with high gastro-intestinal parasite burdens, often with large numbers of immatures at post mortem examination and lower faecal egg counts. Also in a number of incidents, the keepers had not used anthelmintic since the summer.

Fig 5 GB Incidents of parasitic gastroenteritis as a % of diagnosable submissions Q4 2006-2018

Liver Fluke

The main highlight for liver fluke for this quarter is the same as for quarter 3 – absence of acute disease on farms across GB. This welcome relief for sheep farmers is probably as a result of the prolonged dry and hot spell during the early summer across the country leading to reduced survival of metacercariae on pasture and diminishing snail numbers due to drying up of the wet mud microhabitats preferred by *Galba truncatula*.

The graphs below represents the incidents of acute fluke for quarter 4 as a percentage of diagnosable submissions showing the lowest levels for several years. As a consequence of reduced levels of acute disease there seems to be reduced concern from farmers and PVS about the efficacy of Triclabendazole products however, it is vital that this should be established rather than assumed as Triclabendazole is an important drug in the management of liver fluke. There is also a reduction in the incidence of chronic fluke where adults are present within the liver resulting in the detection of eggs in faeces.
Sheep Scab

Sheep scab was diagnosed on 32 occasions in the four quarters of 2018 with 50% of cases in Wales. Diagnoses of sheep scab commonly peak from November to February at a time when full fleeces and management factors create conditions conducive to rapid expansion of mite numbers. For a correct diagnosis it is important to collect skin scrapings from the leading edge of the lesion, with wool-only samples often proving non diagnostic. The *Psoroptes ovis* antibody ELISA can be useful in cases where mites are difficult to detect.

Enteric disease

*Clostridium perfringens Type D*

There was a significant increase in the number of incidents diagnosed with this condition, increasing from 9 for the fourth quarter 2017 to 22 in 2018 (Fig 6). The distribution of
individual cases throughout the year is shown in Fig 7 and the age differentiation in Fig 8. Outbreaks are associated with sudden change in diet, such as introduction of creep feed for sucking lambs or concentrate feed to fatten older lambs. The disease is best prevented by vaccination.

Fig 6: Incidents of *Bibersteinia trehalosi* septicaemia for GB for quarter 4, as a percentage of diagnosable submissions 2006-2018

Fig 7: Distribution of cases diagnosed with *Clostridium Perfringens* Type D in 2018 in GB.

Fig 8: Age differentiation for *Clostridium Perfringens* type D cases in GB for 2018
Respiratory disease

Parasitic pneumonia

There were increased diagnoses of parasitic pneumonia made by APHA in England and Wales in Q 4 2018, with diagnoses representing 2.75% of the diagnoses, when numbers typically represent between 0.65% and 2.61% of the diagnosable submissions. Q 4 2017 also had unusually high numbers of diagnoses. There were increased numbers of cases in ewes, thus poor ewe immunity due to the lack of grass could have been a factor in addition to a lack of immunity in autumn lambs due to reduced lungworm exposure as a result of the dry summer is the likely reason for increased numbers this year.

*Mycoplasma ovipneumoniae*

There has also been a marked increase in the numbers of cases recorded with *Mycoplasma ovipneumoniae* during 2018, with increasing numbers diagnosed each quarter. In 2016 we diagnosed 19 cases, with the most cases diagnosed in quarter 3 (8 cases). In 2017 we diagnosed 15 cases, with a peak of 8 diagnoses, again in quarter 3. During 2018 we diagnosed 43 cases, 15 of these were diagnosed in quarter 4. There are a number of potential reasons for the increase in cases, and further investigation is needed to determine both the cause of the increase and the likely impact on sheep production of an increasing trend in this disease.

Lung tissue from 13 lambs was submitted from one group of lambs via an abattoir. The farm has experienced respiratory disease in their 2-5-month-old lambs for three years, which usually manifests as pronounced coughing, which can be so severe that rectal prolapses occur. In 2016 *Mycoplasma ovipneumoniae* was isolated, and this was used to produce an autogenous vaccine which is used to vaccinate both ewes and lambs. The incidence of signs is still high despite vaccination, and the disease is poorly responsive to antibiotics. The majority of the submitted lungs had cranioventral dark-red consolidation, which was suggestive of *Mycoplasma ovipneumoniae* pneumonia. No bacterial isolations were made from the lung swabs, and respiratory virus multiplex testing was negative. *Mycoplasma ovipneumoniae* was detected on all three samples, and an isolate has been stored for possible vaccine use. Histology testing demonstrated changes consistent with *Mycoplasma ovipneumoniae* pneumonia, and also evidence of chronic pleuritis, which was likely to represent a previous bacterial infection. The Small Ruminant Species Expert Group are looking into other possible co-infections and predisposing factors. The APHA Mycoplasma department have given advice and information to the private vet with regard to checking whether this is a different strain of *Mycoplasma ovipneumoniae* to the one currently used in the vaccine.

**Provision of Mycoplasma species isolates for autogenous vaccine production**

*Mycoplasma* species isolated from diagnostic submissions to APHA can be cultured and archived at APHA. A charge of £200 has to be levied for *Mycoplasma* species isolates to be cultured and provided for autogenous vaccine production as the diagnostic *Mycoplasma* DGGE-PCR test does not involve isolating pure *Mycoplasma* species.
Private veterinarians must contact the vaccine company to initiate the process, providing them with the APHA submission reference number and details of the bacterial isolate.

- The vaccine company contacts APHA’s commercial department by email at caps.commercial@apha.gov.uk to obtain a ‘Material Transfer Agreement’ (MTA) to enable isolate transfer from APHA to the vaccine company. The vaccine company will need to specify the submission number, and identity of the bacterial pathogen.
- Once an MTA has been issued the transfer of the isolate from the APHA laboratory to the vaccine company is initiated.
- There is currently no charge for provision of bacterial isolates for autogenous vaccine production, this is being kept under review. *Mycoplasma* isolate charges are detailed above.

**Metabolic disease**

**Malnutrition**

APHA Shrewsbury VIC reported a case of **frothy bloat** in two ewes. Thirty-two ewes were moved to a reseeded pasture containing red and white clover five days prior to submission of the ewe. Both ewes were markedly bloated, with extensive petechiation of the carcass and frothy grass and liquid filling the rumens and abomasums. The clinical signs ceased after moving the ewes onto a permanent /less lush pasture.

**Systemic disease**

*Bibersteinia trehalosi* **septicaemia**

This disease continued to be a common diagnosis reported by all the centres in GB in vaccinated, partly-vaccinated and unvaccinated lambs. See Fig 9. Reported mortality in affected groups range from 5-10% and the main presenting sign is “found dead”. Many cases had concurrent PGE that may have contributed to the severity of the outbreaks. Systemic pasteurellosis is common in six-to-nine-months-of-age lambs in the autumn in GB, with a peak in November. The onset of disease frequently follows changes of diet, the feeding of root crops, handling, mixing of groups and other stressors. In vaccinated cases it was advised to review the vaccination procedures and consider reporting as an adverse event to VMD.

There have been reports of cases with very similar history and pathology (including oesophageal ulceration) where *Mannheimia haemolytica* was isolated instead of *Bibersteinia trehalosi*. 
This is a typical case from November, reported by APHA VIC Shrewsby: From a batch of 700 store lambs purchased three weeks earlier, eight lambs died over a weekend. The lambs were at grass with mineral buckets, and had received a single Heptavac P vaccination and a combined fluke and worm drench 10 days before submission of carcases. Approximately 10% were reported to be scouring. Three lambs were submitted. They were in fair condition, moderately autolysed and showed signs of predation. The rumen contents were reduced and the intestinal contents were liquid. Oesophageal ulceration was present in one. There was patchy dark red discoloration of the cranial and middle lung lobes in two lambs, with diffuse reddening of the lungs in the third. There were subcutaneous haemorrhages along the ventral neck in two. There was no evidence of clostridial disease and a worm egg count was negative. Despite the autolysis bacterial cultures identified *Bibersteinia trehalosi* from multiple sites.

**Nervous disease**

**Listerial encephalitis**

There was an increase in the diagnoses of Listerial encephalitis this quarter with 7 (1.48%) incidents reported in 2018 compared to 3 (0.49%) in 2017. Increases were seen by both APHA and SAC.
reporting over twice the number of cases this year (33 cases) compared to 2017 (14 cases). APHA diagnoses remained static.

**Urinary disease, reproductive disease, musculoskeletal disease** – No trends identified this Quarter.

**Poisoning**

**Chemical Food Safety** quarterly report October to December 2018 has been published.


**Acorn poisoning**

The carcase of an 18-month-old ewe was submitted having been found dead with others in the group of 80 ewes looking listless and with dark faecal perineal staining. Post mortem examination revealed acorn kernels in the rumen, haemorrhagic intestinal content and haemorrhages over the surfaces of the kidneys. Although the faecal worm egg count was negative, gut washes showed large numbers of abomasal and small intestinal worms. However, an aqueous humour sample had a urea level of 129 mmol/l (reference interval 3-8mmol/l) typical of acorn poisoning.

**Centre of Expertise for Extensively Managed Livestock**

During Q4 2018 there were 245 diagnostic submissions for Hill sheep in GB and the top ten VIDA diagnoses made for these are shown in the graph below
The most common presenting sign for submissions from Hill sheep was wasting see below.

![Graph showing presenting signs in Hill sheep]

**TSE**

The latest statistics for Active TSE surveillance in Great Britain were published on Gov.UK website in January 2019. The statistics show that during 2018 under Scrapie Surveys (Sheep and Goats) and the Compulsory Scrapie Flock Scheme (Sheep & Goats) there were no cases of classical scrapie recorded in sheep or goats.


Goat TSE statistics are here

Sheep TSE statistics are here

**Horizon scanning**

**Bluetongue update**

Bluetongue (BTV) serotype 8 in cattle was reported in Germany in December. This is in addition to BTV 8 known to be present in France and Switzerland. The most recent assessment for Bluetongue (BTV) in Germany can be found at
Vaccination of cattle against BTV has been recommended in Germany since February 2016 on a voluntary basis, because of the BTV cases in neighbouring France and Switzerland. However, vaccination is not mandatory as it is in France and Switzerland, and according to the Competent Authority, only about 25% vaccine coverage has been achieved, which is not sufficient for the comprehensive prevention of outbreaks. For this purpose, at least 80% of susceptible animals must be vaccinated. Animals that have been vaccinated against BTV-8 are protected against reinfection. Duration of protection is limited, in some cases to one year, dependent on vaccine used.

The current BTV-8 seems to be less virulent than the virus which circulated in Germany from 2006, as there have been many reports of subclinical infection in France and Switzerland this year. However, there are reports from Switzerland indicating higher levels of virulence in sheep (including some deaths).

Since 19 September 2018 to 19th December 2018, TRACES has reported certificates for 37 consignments of live bovines being imported into the UK from Germany. This is a total of 750 live animals.

In September and December post import testing identified BTV in imported cattle. In both incidents the affected cattle were killed and no compensation was paid. Surveillance was carried out and no spread of BTV was found. The SRSEG provided an article on importing animals for the NSA Sheep Farmer magazine to highlight to livestock owners that they should source animals responsibly by working with their private veterinarians and livestock dealers to make sure animals are correctly vaccinated and protected prior to travel. This
means that animals must be correctly vaccinated against BTV-4 and/or BTV-8 or be naturally immune to both virus serotypes, prior to leaving the Restriction Zone.

In view of the latest disease intelligence, unsuitable weather in France, Germany and Switzerland, the reduced midge activity at this time of year and poor virus replication rates, the risk the UK remains LOW. Over the last three months there has been a non-negligible risk of importing BTV-8 positive animals from Germany, however, these would pose a low risk to GB cattle because of the low likelihood of vector transmission at this time of year. We will continue to keep this under review.

**Annual Analysis**

All diagnostic submissions for sheep by purpose for 2018 is shown below with submissions from lowland sheep comprising the greatest number of submissions:

**Sheep Diagnostic Submissions by Purpose 2018**

![Diagram of sheep diagnostic submissions by purpose 2018]

**Enteric disease**

The pie chart below provides a visualisation of the VIDA recorded diagnoses (England and Wales only) under the syndrome “enteric” for the whole of 2018 where a diagnostic rate of 89% and 8% recording limited testing. Where the % of diagnoses reached are less than 3% these are included in the category other. Disease due to internal parasites form the greatest number of diagnoses.
Respiratory Disease

The pie chart below provides a visualisation of the VIDA recorded diagnoses for GB under the syndrome “respiratory” for the whole of 2018 with a diagnostic rate of 89% and 8% recording limited testing.

The VIDA code Pneumonia other cause describes pneumonia not associated with any other listed agent (Mycoplasma, Mannheimia) or condition or by an unidentified infectious agent or some other cause. Cases are recorded in the comments field but if the cause not determined then it is recorded as Diagnosis not reached (DNR). This category is
monitored so that if a condition appears that warranted monitoring then a new VIDA code could be created.

Use of pneumonia NOS include some pathogens for example Trueperella pyogenes, Bibersteinia trehalosi and other bacterial agents. It also includes histological confirmation where a bacteria may not have been isolated on cultures.

**Goats Annual analysis**

During 2018 there were 457 diagnostic submissions. The regions the submission were received from are show in the map below along with the age of the animals from which submissions were received and the proportion of sample types submitted

![Map of regions and sample types](image)

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<th>Age of animal</th>
<th>Count</th>
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The most common VIDA diagnoses for goats in 2018 are shown below

![Diagram showing the number of diagnoses for different diseases]

### Publications

**APHA Staff**


CARSON A; DAVIES R 2018 Salmonellosis in sheep (letter). *Veterinary Record* 183 (17) 539.

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