GB Emerging Threats
Quarterly Report
Cattle Diseases

Quarterly Report: Vol 21 : Q4 and annual
October-December 2017

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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, 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, Wales Veterinary Science Centre) from samples submitted in the fourth quarter of 2017 compared to the equivalent quarter of previous years. It aims to identify emerging cattle 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 and Trends

Meteorology

Fig 1: (left) 2017 mean temperature as anomaly of the 1981-2010 mean and (right) 2017 rainfall as % of the 1981-2010 average

Considering the year as a whole, mean temperature was between 0.5 and 1°C higher than the mean temperature for 1981 to 2010 consistently across the whole of GB. In contrast, the rainfall amount varied between approximately 75% and 125% of the average for 1981 to 2010 (fig 1). However, neither of these graphics illustrate the impact of the weather. This occurred in two ways.
Firstly, there was localised very heavy rain in certain areas, for example the Cornish peninsula which gave rise to localised flooding with some impact on local farms. Secondly, there were periods within the year where rainfall was particularly heavy, and this coincided with periods of low temperature and which also coincided with times of forage harvest, particularly in the north and west of England Wales and also areas of Scotland. The APHA Cattle Expert Group (CEG) highlighted the potential for shortage of forage for feed and for bedding, and these issues were raised to the UK Veterinary Risk Group for assessment of their impact. As a consequence of this, information notes on both were provided to industry (see section on Changes in disease patterns and risk factors below).

The meteorological picture in the fourth quarter of 2017 was somewhat unexceptional, with temperatures generally slightly above the 1981 to 2010 anomaly, and rainfall variably around the 1981 to 2010 average. There were periods of significant snowfall both in northern Scotland and in the Midlands. Therefore, the impact of any potential forage or bedding shortage is likely to be seen later during the housing period.

**Dairy**

Many of the main milk buyers dropped their milk prices slightly in February 2018. This is a continuation of a slight downward trend in price, although in general a severe milk price crash as experienced in 2015-16 is not expected at this stage. Feed prices have remained generally stable. The availability of forage and forage quality remains variable between farms and regions with more significant issues noted in the north of England and Scotland (see below). The overall picture will be one of tightening margins for dairy farmers as income falls and input costs rise overall. Against this background the need for high herd health and productivity is really important to maximise production efficiency.

**Beef**

Although still well above 5-year-averages, the prime cattle price drop that started in early October continued for the rest of the month, with averages dropping rapidly until prices stabilised and then increased a little in early November. Prices then rose until the Christmas kill was over in early December, when a slight drop is normal. The last few weeks of the year saw a slightly increasing price. By the close of 2017, prices remained 5p/Kg above the 5-year-average and 10p/Kg above the previous year. Cull cow prices also continued to trade well above 5-year-averages and 2016 prices. Store cattle prices were generally dropping over the final quarter, possibly partly due to the high cost (and low availability) of straw. Looking forwards, AHDB anticipate higher numbers of cattle being slaughtered in 2018 compared to 2017, and along with some recent heavier cattle this increased supply may put a downward pressure on price.
Diagnostic submission trends

Fig 2: Cattle carcase submissions, 2017 - annual (top) and Q4 (bottom)

Fig 3: Cattle fetus submissions, 2017 - annual (top) and Q4 (bottom)
In 2017 as a whole, both cattle carcase and cattle fetus submissions have remained fairly static at a level similar to 2015 to 2016. However, for Q4, there are encouraging trends upwards again for cattle carcase and to some extent fetal submissions (figs 2 and 3). The CEG will continue to monitor progress with carcase and other submissions.

![Graph showing diagnostic rates for cattle, 'other' (i.e. not carcase or fetus), 2017]

Fig 4: Diagnostic rates for cattle, 'other' (i.e. not carcase or fetus), 2017

Fig 4 illustrates a similar diagnostic rate to previous years (around 33%), there has been a decline in the overall numbers to 73% of those in 2016. This could in part have been driven by the cessation of biochemistry testing at APHA Shrewsbury Veterinary Investigation Centre (VIC), directly through fewer submission for biochemistry and also through the loss of other diagnostic testing on those and accompanying samples.
Fig 5: Percentage of cattle holdings submitting at least one cattle diagnostic sample in 2017, expressed as equal-sized hexagons.

The submission rate for cattle holdings (fig 5) broadly follows the areas of higher cattle density towards the south and west of England and Wales. However, there remain parts of the eastern Midlands and southeast of England that do not have any cattle submissions. This will be monitored by the CEG through 2018 to determine whether the enhanced carcase collection service introduced during 2017 has had a positive effect on submissions. Please note that data are not yet available for Scottish submissions.
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 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 infection 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)*

There was no evidence from DNR analysis in Q4 and the complete year, 2016, of new and emerging disease in cattle, including analysis by syndrome and presenting sign.

* When a VIDA diagnostic code is assigned to a specific submission, the decision has to be made if it meets the stated diagnostic criteria. If the criteria are not met, it is marked as “Diagnosis Not Reached” or DNR. If it is a DNR, the next step is then to decide if this was due to limited testing or if reasonable testing had been done. If it is deemed that reasonable testing had been done, there may be reasons why a diagnosis could not be reached and this should be recorded and can include inappropriate disease phase, treatment, inconclusive results, or other reasons. Typical examples of such submissions include; coccidiosis cases where speciation was not done and Johne’s cases in live sheep where the test results may be inconclusive. However, in some cases there is no apparent reason to explain why a diagnosis could not be reached and these are the submissions, if present in significant numbers, which may indicate new and emerging disease.

ONGOING NEW AND RE-EMERGING DISEASE INVESTIGATIONS

Schmallenberg virus

Schmallenberg virus (SBV) was first identified in Europe in 2011, and the virus has since spread throughout Europe to Finland in the North, Spain in the south and Turkey in the East. SBV was identified in Great Britain during 2012, principally in England, but also spreading as far west as the Welsh borders. Recrudescence of congenital disease was seen in 2016 from October, and continued through the calving and lambing seasons in 2017 (http://ahvla.defra.gov.uk/vet-
a wider area than previously. This included more widespread areas of Wales, of the north of England, and of the Scottish borders. This recrudescence and expansion of geographical range was likely due to a combination of factors. These include favourable weather conditions allowing spread via competent vector midges of the Culicoides genus into previously uninfected areas, and in the endemic areas, due to a decline in herd and flock immunity due to increasing levels of naïve replacement animals and low level of vaccine uptake. Focused serological surveys undertaken in Scotland through bulk milk surveillance (https://www.sruc.ac.uk/info/120144/farm_animal_diagnostics/1803/schmallenberg_-_confirming_a_diagnosis/2) and in sheep in England principally, suggest that immunity to SBV is more widespread following recrudescence than when the virus first appeared in teak. A vaccine is available that confers immunity to SBV in cattle and sheep, and which in sheep has a licence variation for a single-dose primary course. It is a matter for discussion between farmers and their private veterinarians as to the relative advantages of using the vaccine in their herds and flocks.

Vets and farmers should be aware that stocks of vaccine are very limited, and are short-dated (towards the end of July 2018).

Fig 6 shows the incidents of congenital abnormalities in cattle in 2017. This significant increase is predominantly due to SBV: it coincides with the recrudescence of SBV in late 2016/17 and mirrors a similar peak in 2012/13 which coincided with the first arrival of SBV in GB. This reflected an increased submission rate due to interest in SBV. No other cause of congenital abnormalities has been identified.
Jejunal haemorrhage syndrome

The University of Bristol Farm Animal Post-Mortem Service reported a case of suspect jejunal haemorrhage syndrome (JHS). The affected cow was five years of age and had shown sudden onset milk drop having produced 13500 litres of milk over a 290 day lactation. A segment of the jejunum had serosal thickening and haemorrhage, although characteristic large blood clots were absent (figure 7).

The CEG has been supporting the SAC’s investigation into JHS which has been ongoing for a number of years, aiming to build the evidence base for a likely cause. The SAC has built up a case series now sufficiently detailed in order to progress the investigation to the next phase. Therefore, although APHA are still interested to hear about cases and will continue to investigate them, the CEG is no longer supporting free postmortem examinations of suspect cases.

UNUSUAL DIAGNOSES

Abomasitis due to Klebsiella pneumoniae

APHA Carmarthen VIC identified an abomasitis (fig 8), from which a profuse pure growth of Klebsiella pneumoniae was isolated, as the cause of death in a one-day old Charolais calf submitted for postmortem examination. Deaths had occurred in this herd in calves less than 72 hours old following caesarean section. The owner gave electrolytes and 4-4.5l of colostrum by tube, in divided feeds, during the day. It was then reported that its abdomen became enlarged and it died overnight. On examination, linear haemorrhages were present along the oesophageal mucosa. The reticulum and omasal mucosa were covered in dark haemorrhages. The abomasum was bloated and the wall was thickened. Many abomasal folds were distended with yellow
oedema fluid and there were haemorrhages on the mucosal surface. *Klebsiella pneumoniae* was isolated in profuse pure growth. This bacterium is found in the intestinal tract of man and animals, soil and sawdust and is an opportunist pathogen. It is likely to have been introduced by the multiple tubing events. Ensuring a clean tubing technique was advised. There was no evidence of clostridial involvement in this lesion.

**Fig 8**: Abomasitis in a 1 day old calf due to *Klebsiella pneumoniae*

**Thromboembolic pneumonia**

An adult dairy cow was received for postmortem examination by APHA Shrewsbury VIC from a herd of 200. Around 12 cows were reported to have died or been euthanased since August, with nutritional management primarily suspected to be the underlying cause, and there had been a reduction in fertility. The cow which was presented had been treated for mastitis but had deteriorated and died. Marked enlargement and thickening of mammary tissue was present and a large abscess was present within the left fore quarter which had had its teat amputated during the last lactation. In addition there was extensive necrotising pathology affecting approximately 70% of the lungs, with widespread emphysema and oedema, and consolidation of anterior lobes (fig 9).
Fig 9: Multiple areas of necrosis randomly distributed throughout the lung caused by embolic bacterial infection

A necrotising metritis was also present (fig 10).

Fig 10: Necrotising metritis

*Trueperella pyogenes* and *Fusobacterium necrophorum* were isolated from the lung, uterus and mammary gland. The combination of lesions indicated likely embolic bacterial spread from the udder, or the uterus, to the lungs. A similar case was investigated by APHA Carmarthen VIC during Q3 of 2017. A six-year-old milking cow that was euthanased after a 10 day history of mastitis, pneumonia and weight loss with poor response to treatment. Postmortem examination revealed a severe clinical mastitis of the left fore quarter with abscessation that had burst out
medial to the teat. There was multifocal abscessation of the lung lobes and spread of infection from the primary udder lesion to the lungs by septic emboli was suspected. Histopathology was consistent with septicaemia, in this case caused by *Trueperella pyogenes*.

A series of similar cases of thrombo-embolic pneumonia was recently described by the University of Bristol occurring in cows which had lesions of udder cleft dermatitis (Millar and others 2017).

**Interstitial pneumonia associated with sweet potatoes**

Fixed lung tissue was submitted from an adult suckler cow that was frothing at the mouth and acutely dyspnoeic. It died despite treatment. Postmortem examination on farm identified severely emphysematous lungs; the emphysema extended to include the subcutaneous tissues over the ribs and lumbar spine. Histopathology identified a severe, diffuse, subacute, necrotising interstitial pneumonia with hyaline membrane formation, type 2 pneumocyte hyperplasia and emphysema. The herd were being fed sweet potatoes. Given this history the most likely aetiology for the changes described above was considered to be 4-ipomeanol toxicity produced by the fungus *Fusarium solani* found in contaminated mouldy sweet potatoes. Similar cases have been previously reported by APHA (Anon 2007; Mawhinney and others 2008; Anon 2009, Otter and others 2016).

**Suppurative pneumonia in year-round housed dairy cows**

An investigation by APHA Penrith VIC identified severe, chronic, suppurative pneumonia and pleurisy in two milking Holsteins in a largely zero-grazed herd. One was a homebred four-year-old cow and the other a first-calver imported as an in-calf heifer three months previously. In each case, the principal isolate was *Trueperella pyogenes*. No evidence of viral infection or lungworm was found and it was suspected that housing for prolonged periods in poorly ventilated, dusty and over-stocked sheds was an important contributing factor.

A similar incident was investigated by APHA Carmarthen VIC in a three-year-old milking cow that was euthanased after a two week history of respiratory disease, milk drop and condition loss with poor response to treatment. Postmortem examination revealed extensive lung consolidation (up to 70% of each lobe affected) with multifocal abscessation and pleural adhesions. Histopathology was suggestive of pneumonia of aerogenic origin. As this was the fourth similar presentation in this year-round housed herd, an advisory farm visit was carried out to investigate possible risk factors. The main cubicle shed was found to be poorly ventilated with inadequate ridge outlet area and orientation parallel to the prevailing wind direction factors in this. A very dusty, fine sawdust-based bedding material was used and this, along with frequent use of formalin foot-bathing, is likely to have contributed to poor air quality. Suppression of innate immune response secondary to sub-optimal nutrition and management of body condition score may also have been a factor in this case.

These cases highlight the importance of good air quality and avoidance of immune suppression (promoted by intercurrent disease, nutrition, and other managemental factors), particularly for year-round housed herds.
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.

Cryptosporidiosis

Fig 11: GB incidents of cryptosporidiosis as a percentage of diagnosable submissions (VIDA 2017)

There has been a significant decline in the number of incidents of cryptosporidiosis over the past three years (fig 11). This decline is not mirrored by other enteric pathogens of calves, and the CEG will investigate potential causes or biases.

Salmonella Typhimurium

Fig 12: GB incidents of Salmonella Typhimurium as a percentage of diagnosable submissions (VDIA 2017)

There was a significant increase in Salmonella Typhimurium incidents expressed as % of diagnosable submissions in 2017 (fig 12). Most of this increase is due to the DT104 outbreaks in cattle, and sheep and horses, seen predominantly in Wales and the western Midlands of England-23/30 were of this serotype. Further epidemiological work is being undertaken in order to fully understand this complex outbreak.
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Fig 13: All serovars (incidents) in GB - Cattle (Jan – Dec 2015 – 2017)

The table above in fig 13 illustrates the numbers and serovars of *Salmonella* isolated from cattle in 2017 and compared with the previous two years. *Salmonella* Typhimurium has increased largely driven by the DT104 outbreak, but the by far the most common serovar remains the cattle-adapted *S.* Dublin; numbers of incidents involving *S.* Dublin have not changed greatly over the past three years.

**Forage and bedding shortages**

The Cattle Expert Group identified through a number of sources that there was a potential for shortage of forage on farms for winter 2017-18 in Scotland, Northern Ireland and in the north west of England. Some of the forage which had been collected in the late summer and autumn is also of poorer quality, due to the lower temperatures and wetter conditions experienced in the latter half of the season. Although there may also be a lack of forage on a few farms in the remainder of England and Wales, the forecast is that forage is in good supply in these areas.

The potential for health, welfare and production problems in ruminants varies depending on the types of production, and will be associated with feeding insufficient forage of reasonable quality or poorer quality forage made with low metabolisable energy. There is also greater risk of infectious disease and lower resistance to parasites for animals on a lower plane of nutrition and an increased risk of diseases associated with feeding soil-contaminated forage. Further detail may be found at [http://apha.defra.gov.uk/documents/surveillance/diseases/winter17-forage-shortage.pdf](http://apha.defra.gov.uk/documents/surveillance/diseases/winter17-forage-shortage.pdf).

The forage information note also drew attention to the potential shortage of livestock bedding during the same period. A further information note was provided which gives details of alternative
Vitamin supply shortage

**Vitamin A, D and E**: due to a combination of circumstances towards the end of 2017, the global capacity to produce these vitamins has been reduced. Although this has had limited impact on UK livestock to date, there could be the potential for certain livestock groups (such as intensive bull beef, pigs and poultry) to be negatively impacted should inclusion rates for these vitamins be reduced significantly for a prolonged period as a consequence of the shortage. The CEG will monitor this closely, as the impact is likely to occur in spring 2018 prior to turnout and ongoing for housed animals.

**HORIZON SCANNING**

**Bluetongue**

France continued to report bluetongue virus (BTV)-8 and BTV-4 on the basis of surveillance rather than investigations of clinical signs (i.e. report cases). The large number of BTV-8 cases is likely to be a result of the surveillance for BTV-4, the presence of which the French authorities had confirmed since January 2017 following movement of infected animals from Corsica. France reported a further 600 outbreaks of BTV-8 on the mainland, mostly in regions around the centre of the country but also in the north, in Brittany. These cases all date back to late December 2017 and only 250 were reported for January 2018. However, France has not declared a vector free period during the winter of 2017-18. Regarding BTV-4, France has reported a further 12 cases in January in the Haute Savoie and Savoie regions. This means that disease is unlikely to be eradicated quickly, and instead a BTV-4 / BTV-8 restriction zone has been put in place across the whole of mainland France.

Trade of susceptible species may continue to other Member States, provided the animals are vaccinated or naturally immune against both BTV-4 and BTV-8, and transport vehicles have been treated with an insecticide. Livestock owners are reminded that 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 now means that animals must be correctly vaccinated against BTV-4 and BTV-8 or be naturally immune (i.e. seropositive) to both virus serotypes, prior to leaving the restriction zone.

BTV-3 has been detected in a sheep in the western part of the island of Sicily (Italy). This area is 150 km away from the peninsula of Cap Bon (Tunisia), where it is circulating.

Greece has reported a further outbreak of BTV-16 in a single animal in a herd of 51 cattle on the island of Samos near the Turkish coast. No clinical signs were observed; the animal was detected during serological surveillance.

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