Bibersteinia trehalosi infections in cattle and sheep
APHA Disease Surveillance Report
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- Bracken poisoning in cattle
- Congenital deformities in outdoor piglets
- Avian spirochaetosis

CATTLE

Systemic disease
Bracken poisoning was diagnosed at Shrewsbury, Penrith and Starcross. The latter case was initially thought to be babesiosis, with a clinical signs of red urine associated with a tick infestation, but despite treatment with imidocarb and moving the animals, cases continued with signs of spontaneous bleeding from the nose and injection sites. At postmortem examination, numerous haemorrhages were found throughout the body systems including petechial haemorrhages on the mucous membranes of the oral cavity, haemorrhages throughout the gastrointestinal tract including large blood clots within the small intestine and haemorrhage into both lungs. Thrombocytopenia associated with acute bracken poisoning was suspected. This was confirmed on histopathological examination of the sternum. Further evidence was provided on haematological analysis of a cohort animal which revealed a platelet count of 18 (reference interval 100-800).
Botulism was suspected as the cause of death of several two-year-old replacement Holstein heifers in two separate fields (in groups of 20 and 13.) In total five animals died and one was euthanased. Four were found dead and two presented with recumbency. The first carcase submitted to Penrith was too autolysed for meaningful investigation and the second carcase was unremarkable on gross necropsy other than some congestion of the abomasal and intestinal mucosa consistent with reduced gut motility or recumbency. Hypocalcaemia and hypomagnesaemia were ruled out using aqueous humour samples. Poultry litter had been spread on another nearby field during the last seven to ten days. The animals had not had direct access to litter, although it is recognised that wildlife such as foxes, rats and crows may move litter or carcases for some distance (up to 500 metres). The clinical presentation and history of association with poultry litter was suggestive of botulism. Advice was given regarding protection of the food chain such that voluntary restrictions were placed on clinically affected animals for 18 days following the cessation of clinical signs.

Bibersteinia trehalosi infection: An unusual outbreak of disease associated with Bibersteinia trehalosi infection was reported by Shrewsbury in a group of 20 market-bought calves which were at pasture. The group had initially grown well, but two weeks before the first case, the calves were considered to be less well thriven and were wormed using a pour-on. Over the following two weeks six of the calves developed acute onset malaise and died despite various treatments, with two exhibiting skin and mucous membrane bleeding (Fig 4). Postmortem examination of one revealed widespread haemorrhages, most notably on the epicardium and within the muscle of the heart (Fig 5) and in the lungs. The liver was enlarged, and the lymph nodes and the spleen were haemorrhagic. Yellow fluid was present in the abdomen. The gross pathology was similar to that seen in neonatal calves with bovine neonatal
pancytopenia (BNP). *B. trehalosi* was isolated in septicaemic distribution. No other infectious agent was identified. Histopathology confirmed septicaemic pathology. Additionally there was evidence of bone marrow depletion, which was considered likely to have contributed to the haemorrhages, although the cause of this pathology could not be explained. Prompt antibiotic treatment of a few of the remaining calves was undertaken when early signs of malaise were suspected, and no further losses occurred.

![Image](image1.jpg)

Figure 4: Haemorrhage from conjunctiva of a weaned calf

![Image](image2.jpg)

Figure 5: Widespread severe myocardial haemorrhage associated with *Bibersteinia trehalosi* septicaemia

**Respiratory disease**

*Mycoplasma bovis pneumonia*: Investigation of a pneumonia outbreak in dairy cows on a farm with 280 milking cows, where *Mycoplasma bovis* infection was identified causing mastitis in dry cows in late spring, confirmed *Mycoplasma bovis* infection of the lung samples from two cows examined postmortem by the practitioner. One of the animals was also reported to have bilateral septic stifle arthritis. *Pasteurella multocida* was also isolated from one of the two lungs.
Circulatory disease

Babesiosis was confirmed by Penrith in an adult Belgian Blue suckler cow at grass. She appeared profoundly dull and was seen to be passing bloody urine. Mucous membranes were very pale and she died despite a blood transfusion. Typical parasites were noted on blood smear. PCV was measured at 0.12 (reference range 0.24-0.46). This disease has a very localised distribution in Cumbria despite widespread presence of ticks.

Reproductive disease

An unusual diagnosis of multicentric neoplasia was made as the cause of an abortion in a dairy herd. Postmortem examination of a full term calf which was delivered dead revealed disseminated soft tissue masses throughout the liver, lung and heart (Fig 2). There was also distortion and swelling of the right side of the skull including the eyeocket although the brain was unaffected (Fig 3). No infectious agents were identified and on histopathology a disseminated neoplasm was confirmed. The calf was the fourth from a recently-purchased Shorthorn bull and a previous calf aborted at seven months exhibited a domed skull. A set of normal twins and a single normal calf had also been born. Neoplastic pathology is a rare sporadic finding in foetuses and in this case was considered probably to be sporadic and unlikely to affect herd health.

Figure 2: Multiple soft pale masses of varying size throughout the liver of an aborted foetus
SMALL RUMINANTS

Systemic disease

Systemic Bibersteinia trehalosi infection: Carmarthen investigated the death of a seven- eight month old cross lamb. Three lambs had died over the two days out of a group of 80 lambs. The lambs had not been vaccinated and were reported to be in good condition with plenty of grass available. The lamb submitted for post mortem examination was seen reluctant to move and died within half an hour. At necropsy there were large haemorrhages throughout the carcass, especially subcutaneously of the neck and over the thorax. There were numerous small grey focal lesions in the liver (Fig 4.). There was a pale area of necrosis of the pharyngeal mucosa around the tonsils and the spleen was enlarged. The findings were consistent with a systemic infection with Bibersteinia trehalosi which was isolated in systemic distribution.

Figure 3: Marked distortion and swelling of the right side of the skull of an aborted foetus

Figure 4: Pleural haemorrhages and grey focal necrotic lesions in the liver of a lamb with systemic Bibersteinia trehalosi infection.
Shrewsbury also investigated an incident following the death of 20/30 homebred lambs in two weeks. The group had been wormed every seven weeks during the summer with a white drench and had received moxidectin four days prior to submission. Although the lambs were a good weight they were in poor body condition. The gross postmortem findings in lamb one were of splash haemorrhages in the subcutaneous tissue of the throat and neck, with dark red consolidation of the ventral third of the lungs, splenic haemorrhage and enlarged thoracic lymph nodes. Lamb 2 had multi-focal abscessation and necrosis throughout the liver and lungs (Figure 5.), haemorrhagic liquid in the abomasum with splenic haemorrhage and enlarged thoracic lymph nodes. *Bibersteinia trehalosi* was cultured from the liver and lung tissue from both lambs, confirming septicaemia.

![Image of necrotic foci](image)

Figure 5: Multiple pale necrotic foci randomly distributed throughout the lungs of a sheep with *Bibersteinia trehalosi* septicaemia

Systemic *Bibersteinia trehalosi* infections typically affect six- to nine-month-old lambs with outbreaks usually occurring between October and December. Control is best achieved by vaccination; however, PGE, stress and/or poor nutrition can cause animals to become susceptible despite appropriate vaccination.

*Musculoskeletal disease*

Penrith investigated chronic lameness in spring born lambs which commenced pre-weaning and showed little response to antibiotic therapy. There had been similar problems the previous year and assessment of trace
element status was unremarkable. The affected lambs were at grass and received no supplementary concentrates. All sheep were homebred and vaccinated with a 7-in-1 clostridial vaccine and had been wormed three times since spring. The lame lambs became progressively worse, ill thriven and unwilling to walk. Two live lambs were submitted for post mortem examination which were small for age and preferred to lie down. Both lambs had palpable heat and periarticular swelling of the carpus and stifle joints. When encouraged to move they moved slowly with a cow-hocked gait (hocks together). Postmortem examination revealed turbid excess fluid within multiple joints of one lamb, with pannus formation within the larger joints. There was marked peri-articular thickening around elbow and stifle joints. The atlantooccipital joint also contained turbid red-tinged fluid. The second lamb had similar pathological findings. The left stifle joint had shallow trochlear groove and eburnation of the cartilage. Both lambs had enlarged oedematous prescapular lymph nodes. Bacteriological cultures identified *Erysipleothrix rhusiopathiae* in pure growth from samples of joint fluid from multiple sites. In addition serological testing on blood tests taken prior to euthanasia found very high antibody titres by SAT (high positive; 1/20480). The gross findings were typical of severe septic polyarthritis. *E.rhusiopathiae* is a soil borne organism and may gain access through any open wound / abrasion; however, it is currently a much less commonly diagnosed cause of inflammatory joint disease in sheep, as many flocks no longer dip and dips contain bactericidal agents. The flock history, specifically timing of tagging, tailing, castration and nature of the grazing, provided no insight into why this flock was affected.

*Enteric disease*

Sutton Bonington was presented with a case in which 5 weaned lambs of variable condition had been found dead two weeks after their group of 220 were moved onto a field of volunteer rape. Prior to moving, the lambs were given clostridial vaccine, wormed with a ‘white drench’ and received a selenium/cobalt bolus. Two lambs were submitted for postmortem examination. The gross findings in one lamb were of pallor, with black coloured kidneys suggesting a haemolytic anaemia. In light of the husbandry of the group the involvement of *S*-methylcysteine sulfoxide (SMCSO) was proposed. This is known to cause haemolysis, anaemia, pallor, jaundice and tachycardia. Hypocalcaemia was also detected, again potentially associated with the feeding of brassicas. Large numbers of trichostrongyle eggs (24300 eggs per gramme) were also identified in the second lamb with 70% of these being *Haemonchus* spp. No abomasal worms were observed. However, the lambs had been wormed regularly throughout the summer and were moved to a rape field which should have been ‘clean’. Concerns were raised regarding anthelmintic resistance and advice given to investigate this possibility.
PIGS

MAIN DIAGNOSES OF ENTERIC DISEASES IN PREWEANED AND NEONATAL PIGS

The diagnoses of enteric disease in neonatal and preweaned pigs in the 12 months to the end of September 2014 are shown in figure 6. Rotavirus, clostridial disease and *E. coli* are relatively equally represented and mainly affect neonatal pigs in the first week of life. Coccidiosis was not often diagnosed. This may, in part, be due to the fact that when samples are submitted rather than pigs, coccidial oocysts may not be detected in the faeces in the first few days of disease. Coccidiosis due to *Isospora suis* can occur from five-days-old and is mainly seen from 7-20 days of age. The ideal material for diagnosis of coccidiosis is live untreated affected piglets for post-mortem examination including rapid fixation of the intestines, allowing intestinal histopathology and detection of *Isospora suis*. No porcine epidemic diarrhoea virus was detected.

![Figure 6: Enteric disease diagnoses in neonatal and preweaned pigs over the 12 months to end September 2014 at AHVLA (now APHA)](image)

Systemic disease

Haemorrhage associated with copper deficiency in pigs on milk-based diet
An unusual diagnosis of copper deficiency was diagnosed in a small herd of four-month-old pigs. Two were found dead and post-mortem examination was undertaken at the fallen stock premises in the North of England where an EBLEX-funded initiative is in place. Fatal haemorrhage into the mediastinum and pericardium was found as illustrated in Figure 7 and the vet recalled previous reports in the literature of this pathology due to copper deficiency (Steenmetz and others, 2004, Pig Journal volume 53).
As in the past case, the pigs were being reared on a dairy farm on a predominantly milk-based diet. Profound copper deficiency was confirmed when the livers were submitted (concentrations were <87 μmol/kg DM, reference range 300-5000) and, perhaps not surprisingly, one pig was also iron deficient. Cases like this highlight the need to assess the diets of rapidly-growing pigs fed home-mix rations to ensure they are suitable.

*Alimentary disease*

**Further incidents of neonatal diarrhoea due to clostridial enterotoxaemia:** Further to similar incidents reported recently, another outbreak of clostridial enterotoxaemia was diagnosed in neonatal piglets which were affected between one and seven-days-old with yellow watery diarrhoea. The problem had been going on for several weeks when mortality spiked to 20%, prompting submission of live affected one-day-old piglets to Bury St Edmunds for investigation. The piglets were diarrhoeic but quite bright and post mortem examination revealed watery small intestinal contents. *Clostridium perfringens* alpha toxin was detected in one piglet and histopathological lesions in the intestines supported type A enterotoxaemia.

**Unusual Brachyspira species isolated from pigs with mucoid diarrhoea:** *Brachyspira hyodysenteriae* was isolated from two faecal samples from 14-week-old pigs with mucoid diarrhoea and wasting in the Thirsk region. These faeces gave anomalous results in the *Brachyspira* PCR and further investigation is in progress at APHA and SAC CVS to determine the identity of the organism and whether the *Brachyspira* species isolated are similar to atypical *B. hyodysenteriae* strains that were detected in the late 1990s which have not been seen in recent years. In the light of these unusual results, further faecal samples from untreated pigs on the affected farm were requested and this organism has not been detected again.
Reproductive disease

Piglet deformities over a short period on an outdoor breeding unit: The occurrence of 40 deformed piglets across about 25 litters in a batch of farrowing sows on an outdoor unit was investigated when two were submitted to Bury St Edmunds. One to two piglets were deformed in each of the affected litters which were from any parity of sow. A few deformed piglets had also been seen in each of the previous two farrowing batches. The two submitted piglets had different deformities as illustrated in Figures 8 and 9.

Figure 8: Piglet with holoprosencephaly

Figure 9: Piglet with abdominal and skeletal deformity

The findings in the piglet with cyclopia and a proboscis represent a severe form of holoprosencephaly (malformations of midline of prosencephalon and related facial/ocular anomalies) which is a recognised malformation syndrome in mammals and has been recorded previously in pigs as far back as 1908. It is usually a sporadic event in pigs. The malformation in this piglet will have occurred prior to day 16 of gestation. The timing is not suggestive of involvement of an infectious agent. Teratogenic effects are recorded in the foetuses of ewes that have grazed on *Veratrum californicum* (California corn lily, white or California false hellebore) in North America, and exposure to certain teratogenic drugs and inherited genetic abnormalities can also be involved in holoprosencephaly. Histopathology on the piglet with abdominal and musculoskeletal deformity again does not suggest involvement of an infectious agent and further examinations are in progress to evaluate the exact timing of the insult. Investigations into this transient event continue. The unit reported that only two litters had deformed piglets in the subsequent batch of sows to farrow.

APHA comments: If practitioners are aware of other farms experiencing
similar problems, we are interested to hear about these and discuss their submission for investigation. It is also useful if images of the range of deformities seen can be provided.

BIRDS

Broilers

Endocarditis: Enterococcus hirae was isolated in profuse, pure growth from a swab of a heart valve lesion from a 20-day-old broiler bird. Over 37,000 birds were present in the flock and losses reported to be running at 15-20 per day. E. hirae infection is recognised as a cause of endocarditis in broilers of this age; the origin of these organisms is uncertain but is likely to relate to hygiene issues on the farm.

Commercial layers

Avian intestinal spirochaetosis: Avian intestinal spirochaetosis was diagnosed in a flock of 9,000 30-week-old free range layer chickens. The birds had failed to come to peak lay in one house, and were experiencing a further drop in egg production to 73% of expected. Postmortem examination of culled birds revealed that most of them were in lay but had abnormal pale coloured caecal contents from which Brachyspira pilosicoli and B. innocens were isolated. Spirochaetosis due to infections with B. pilosicoli and B.intermedia is often a problem of young flocks in the early part of lay, where it can be associated with drops in egg production, failure to reach peak production, faecal stained egg-shells and failure to gain bodyweight.

Intestinal dilatation: Dilation of the mid small intestine was seen in a batch of 33-week-old free range layers submitted to investigate a drop in egg production. Postmortem examination revealed that the birds were in moderate to poor body condition, with almost completely regressed ovaries. There were areas of intestinal dilation/bloating with fluid contents in the lumen and mixed tapeworm and ascarid worm burdens. In addition there were abnormal, caramel coloured caecal contents from which Brachyspira intermedia was isolated in one bird. Intestinal dilation with or without torsion is a new syndrome seen in brown feathered layers often associated with ovarian regression and a drop in production. The cause of the syndrome is uncertain but it may be a reaction to internal parasites; the tapeworm burden in this case may have contributed to the presentation. Avian intestinal spirochaetosis associated with B. intermedia may also have contributed to reduced egg production.

Intestinal volvulus: Approximately twenty 54-week old layers were dying each week in a flock of 8000 free range birds. Egg production was slightly down and the quality of the eggs had decreased with approximately 250 ‘seconds’ a day. Postmortem examinations at the practice had shown egg
peritonitis in some, and two had distention of the small intestine. Histological examination of the intestine showed marked chronic enteropathy and enteritis consistent with what is commonly found following intermittent or partial torsion/strangulation of the intestine, probably as a result of ischemia. Intestinal torsion (volvulus) is an occasional finding in layer chickens and is often, but not always, fatal and often seen in birds not in lay. The cause is not known.

**Backyard flocks**

**Histomonosis in Peafowl:** The death of a four-month-old peafowl was due to helminthiasis and histomonosis. Four peafowl chicks had been reared this year as well as chickens and deaths had occurred in both species. In previous years, at about this age, peafowl have been affected with weight loss and diarrhoea. The peafowl were raised indoors on concrete floored building with sawdust bedding. At postmortem examination, the peafowl examined was emaciated and there were a few large ascarid worms visible in the proximal small intestine. The caeca were enlarged, reddened and ulcerated with a necrotic mucosa and brown liquid and soft content (Figure 10). Moderate numbers of *Capillaria* spp eggs were seen in mucosal scrapes of the mid small intestinal mucosa. Both ascarid and *Capillaria* spp. worms have a direct lifecycle and can occur in housed birds; *Capillaria* spp. can be highly pathogenic in young birds. It was recommended the remainder of the birds were treated with an anthelmintic as soon as possible. The caecal lesions were considered typical of histomonosis (blackhead) and peafowl are highly susceptible to this disease. The most important route of transmission of the causative organism *Histomonas meleagridis* is within the egg of the caecal nematode *Heterakis gallinarum*, and the organism can also be transmitted by earthworms acting as a transport host. It is important that good biosecurity is practised between chickens and more susceptible species such as peafowl to minimise the risk of transmission of *H. meleagridis* via its intermediate hosts.

![Fig 10: Caecum of a peafowl showing abnormal content and mucosal ulceration typical of histomonosis (blackhead).](image-url)
MISCELLANEOUS AND EXOTIC FARmed SPECIES

Haemonchosis, gastric ulceration and coccidiosis in alpacas:
Haemonchosis was diagnosed in alpacas by examination of both faecal samples and carcases at Veterinary Investigation Centres located at APHA Thirsk, Sutton Bonington and Shrewsbury. One case involved the death of two adults over five days from a unit with 130 alpacas comprising 70 adult females and youngstock. An adult female alpaca that had not shown any obvious signs of illness prior to being found recumbent and which had died whilst being moved was submitted for post mortem examination. Findings included carcase pallor and subcutaneous oedema. A large number of red worms were observed in compartment 3; the mucosa of which was red and haemorrhagic. The small intestines were markedly reddened with liquid green/brown contents. The adult worms were identified as Haemonchus species and the faecal trichostrogyle worm count was 5810 eggs per gram. The animals had received a moxidectin product two weeks earlier. Advice was given to re-worm the group and carry out post worming faecal egg monitoring to establish efficacy. It was unknown whether this animal had missed the previous treatment or if there was another reason for the anthelmintic failure and as such it was suggested that an investigation be carried out. Unfortunately faecal egg counts, and the degree of anaemia and hypoproteinaemia cannot be used to assess the severity of this condition.

A full depth penetrating ulcer of compartment 1 with subsequent peritonitis and concurrent coccidiosis was detected on post mortem examination of a ten-week-old alpaca. Histopathology failed to identify a predisposing cause for the gastric ulceration. Gastric ulceration is a relatively common disorder in camels and can affect any of the compartments. The cause of the ulcers is unknown as is the part played by stress. The quality of the diet and level of parasitism has not been shown to influence the occurrence of the condition. A coccidial oocyst count of 49000 oocysts per gram was also identified and although the oocysts could not be to be sporulated their morphology was consistent with Eimeria lamae which is one of the five Eimeria species associated with severe intestinal disease in South American camelids in the Americas and Australia (A.Schock and others 2007). In the UK, E. macusaniensis and E. punoensis are most commonly identified with the former being associated with the greatest severity of disease.

References


This summary is produced by the APHA and is drawn from reports provided at the time of reporting by APHA laboratories at Bury St Edmunds, Carmarthen, Lasswade, Leahurst, Penrith, Shrewsbury, Starcross, Sutton Bonington, Thirsk and Weybridge, and third party external postmortem providers to APHA (University of Bristol School of Veterinary Sciences, Royal Veterinary College, SAC Consulting Veterinary Services St Boswells). APHA monthly reports are available online at https://www.gov.uk/government/publications/disease-surveillance-reports-2014