Bracken poisoning in cattle: classic case description

Chlamydia abortus abortion in a cow

Klebsiella pneumoniae septicaemia in pigs

‘Spotty liver’

CATTLE

Systemic disease

Pica associated with hypophosphataemia was described by Carmarthen in a low input/low output dairy herd. Over the last three to four years the cows were reported to have eaten stones, starting six to eight weeks after calving. Blood phosphate analysis by the practice confirmed hypophosphataemia. The cows were block calved in February and then turned out. Nutrition is based on grazed grass with minimal concentrate feeding, initially 4kg per day, gradually reducing to 1kg per day by 8-10 weeks in milk. The dry cows were fed grass silage and whole-crop with no minerals. It was calculated that the phosphorus provision for the lactating cows was adequate when receiving 3 kg cake/day per day but deficient at 1kg/day. Cows are able to mobilise phosphorus from their bones, but this is only sustainable long-term if they are able to replenish stores during the dry period. The failure to feed dry cow minerals or concentrates was considered the cause of the problem. Phosphoric acid has been added to drinking water as a short to medium term measure. In the longer term analysis of soil, borehole water and forage was advised in order to inform more accurate calculations and, if indicated, to determine the most appropriate means of increasing dietary phosphorus provision.

Bracken poisoning was diagnosed as the cause of six deaths of fifteen-month-old cattle at Carmarthen VI Centre. The carcasse of one of the animals was received for postmortem examination. A further three animals were reported to be affected in the group of 26. The cattle had been at grass since mid-May with no supplementary feeding, initially on good pasture but about four weeks prior to the submission, they were moved onto a boggy area, which had plenty of grass but also bracken. Some of the animals died suddenly while others showed varied signs which included laboured breathing, pyrexia, bleeding from the nose or rectum, submandibular swelling...
and drooling. Attempted treatment with antibiotics and anti-inflammatory had resulted in a temporary improvement. Postmortem examination confirmed widespread haemorrhages, oedema of the larynx, hepatic infarcts, necrotic lesions in the mucosa of the trachea and proximal oesophagus and unclotted blood. EDTA blood samples subsequently received from three other mildly affected animals, had thrombocytopaenia present in two, further supporting the diagnosis of bracken poisoning. Clinical cases of bracken poisoning can occur several weeks after last exposure, due to the prolonged effect of bone marrow suppression, and recovery once clinical signs are seen is rare. Monitoring the neutrophil count can be a useful prognostic indicator in exposed animals. Cattle tend to eat bracken fern either when there is an excess of lush pasture and animals seek sufficient roughage, or when there is drought and inadequate grass growth.

Reproductive disease
**Chlamydia abortus** infection was confirmed as the cause of an abortion in a ‘flying herd’ of 400 dairy cows in north Wales. Pregnancy losses were regularly reported, occurring at around five per month; however, no foetuses had previously been obtained for examination. The calf had its placenta attached which showed marked diffuse necrosis especially of the non-pregnant horn area, with irregular yellow to brown thickening of the remainder and haemorrhagic and necrotic cotyledons. PCR testing ruled out *Coxiella burnetii* (the cause of ‘Q-fever’) and confirmed *C. abortus* infection. Histopathology identified characteristic necrotising placentitis with the organism labelled using immunohistochemistry. *C. abortus* is of course much more commonly recognised as a cause of abortion in sheep, but bovine abortions are also identified and occasionally in the past have been associated with herd outbreaks. In the last 10 years however, only 8 confirmed cases have been diagnosed in the APHA.
SMALL RUMINANTS

*Alimentary disease*

**Cobalt deficiency** (pine) was diagnosed in 17 submissions during August in post weaned lambs. Carmarthen diagnosed parasitic gastroenteritis (PGE) and ovine white liver disease in two 5-month-old lambs that were in poor condition. Both animals were presented with mild conjunctivitis and one had evidence of photosensitisation on the head. Postmortem findings included white liver, liquid intestinal contents and large numbers of worms were visible in abomasal contents. One of these lambs had been wormed recently, but in the other an abomasal worm count revealed 1700 *Ostertagia* worms. Cobalt is required by the ruminant for the synthesis of vitamin B12 – cobalamin – by the rumenal microflora. Deficiency in cobalt causes a secondary deficiency in B12 which is required for the metabolism of propionic acid by the liver for energy production. PGE will have contributed to the fatty degeneration of the liver and while PGE may be obvious it is worth considering cobalt deficiency in ill thriven lambs. In a second case five lambs from a group of 950 had presented with typical lesions of photosensitivity and no known photosensitising plants were identified. Liver vitamin B12 suggested a severe deficiency. Subsequently blood samples were submitted from six lambs and showed consistently low serum vitamin B12 between 97 and 154 (reference range >188 µmol/l) in spite of monthly cobalt sulphate crystal treatment. Photosensitisation and conjunctivitis are possible sequelae to white liver disease. Supplementation with cobalt and/or vitamin B12 and further monitoring of vitamin B12 in lambs was recommended with a review of flock health plans to address stocking density, parasite control and trace element deficiencies.

*Skin disease*

**Orf** (contagious pustular dermatitis) was diagnosed twice this month at Shrewsbury and Thirsk using electron microscopy on submitted skin samples. One practitioner shared images of lesions on the mouth of a lamb and the subsequent infection the practitioner contracted on their arm, a reminder of the zoonotic potential of this virus.

![Fig 2: Orf lesion on the forearm of a veterinarian](image)
Goats
A 6-month-old female Boer goat kid was submitted for examination to the University of Surrey site at Sutton Bonington following its sudden death on farm. There was evidence of scour two other kids on farm had mild diarrhoea. The herd had been wormed in recent months but not vaccinated.

Postmortem examination revealed the right lung was encased in fibrin and a fibrinous pleuritis and pericarditis and a serous pleural effusion. In addition the meningeal vessels were tortuous and engorged with a loss of sulci and gyri definition and there was mild haemorrhagic streaking of the colon. Interestingly, further testing revealed a heavy pure growth of non-haemolytic *Escherichia coli* from the brain and a lighter growth of *Mannheimia* spp. from the right lung. Furthermore the small intestinal contents tested positive for the presence of *Clostridium perfringens* epsilon toxin, implicating the involvement of *C. perfringens* type-D in this case.

The animal was suffering from bacterial meningitis, but a terminal episode of enterotoxaemia precipitated death.

On this occasion advice to the client was based around the implementation of a suitable vaccination regime and slow, phased dietary changes to avoid bacterial overgrowth.

PGE: An adult Angora goat was submitted to Thirsk following sudden death. The farm has a total of 30 goats with the affected goat from a group of nine that grazes outdoors in a woodland area. The goats were regularly wormed and vaccinated with a quadrivalent clostridial vaccine three times a year. The submitted goat was due to kid in March but aborted in February, following that she appeared to be losing weight and was brought inside and treated for lice infestation after which her condition improved and she was returned to the herd. Worming was carried out in May. The postmortem findings suggested the possibility of acute pneumonia and the mesenteric lymph nodes were enlarged and oedematous. The goat was not markedly scoured but laboratory testing revealed a worm egg count of 4000 Trichostrongyle-type eggs per gram indicating a significant worm burden. A moderate pure growth of non-haemolytic *Escherichia coli* was isolated from one of the lung swabs.
indicating terminal bacterial pneumonia secondary to the debilitating effect of the PGE.

PIGS

Alimentary Disease

Coccidiosis in young replacement boars following arrival on an outdoor unit: Three of eight young replacement breeding boars were affected with diarrhoea two weeks after arrival on an outdoor unit and entering a training paddock which had been used for previous batches of pigs. Salmonella or porcine epidemic diarrhoea virus were not detected but a high coccidial oocyst burden was present in the faeces sample submitted to Bury St Edmunds; the count was very high (630,000 oocysts per gram faeces) and speciation revealed a mix of Eimeria species (including E. suis, E. debliecki, E. perminuta, E. polita) which is typical of these cases. Clinical coccidiosis is unusual in post-weaned pigs but, when diagnosed at APHA in the last decade, it has been in similar scenarios to this incident; replacement gilts or boars born and reared indoors in likely hygienic environments, then moved and exposed to ground heavily contaminated with oocysts with disease occurring around two weeks later, sometimes concurrent with salmonellosis.

Respiratory disease

Pandemic H1N2 2009 swine influenza detected in weaners with acute respiratory disease: An outbreak of respiratory disease due to pandemic H1N1 2009 swine influenza was diagnosed when nasal swabs were submitted for the Defra-funded swine influenza surveillance and tested positive by PCR. Disease was characterised by acute sneezing, nasal discharges and coughing in pigs in the first week after weaning. The practitioner targeted acutely affected pigs for sampling which is important for swine influenza as the window of opportunity for virus detection by nasal swabbing is around seven days in individual pigs.

Growers with respiratory disease due to Glässer's disease: Glässer’s disease was confirmed as the cause of dyspnoea and coughing in 10 to 11-week-old outdoor pigs on an organic nursery-finisher. The pigs were vaccinated for Mycoplasma hyopneumoniae, PCV2 and PRRSv and none of these pathogens were detected in two typically-affected pigs euthanased for diagnostic investigation. Both pigs had pneumonia and polyserositis with Haemophilus parasuis (Hps) isolated from both confirming the diagnosis. There was a peak in the diagnostic rate of GB disease incidents due to Hps in the first six months of 2015, as illustrated in Figure 1 and serotyping of archived isolates from 2014-15 is to be undertaken to see if there has been any change compared to previous serotypes.
Systemic Disease

First 2015 cases of *Klebsiella pneumoniae* (Kpp) septicaemia diagnosed in East Anglia and Thirsk region: The first case of *Klebsiella pneumoniae* (Kpp) septicaemia of 2015 was diagnosed at Bury St Edmunds and was typical of outbreaks seen each summer in the East Anglian region since 2011. Preweaned piglets were found dead at two and a half-weeks-old on an outdoor breeding unit which had a Kpp outbreak in 2013. Pure growths of Kpp were obtained from multiple internal sites including joints which, less typically, showed lesions of suppurative polyarthritis. In this incident, the isolate showed greater antimicrobial resistance than most previous outbreak isolates and was resistant to lincomycin/spectinomycin, trimethoprim/sulphamethoxazole, tetracycline, doxycycline and apramycin. It may be of note that post-weaned pigs on the same unit have experienced significant disease problems in recent weeks necessitating group medication which could be influencing acquisition of resistance by the Kpp.

The first outbreak of Kpp septicaemia in the Thirsk VIC region since emergence of this disease four years ago was diagnosed in August. The outbreak was typical of those seen previously in East Anglia and in Devon (one outbreak) regions with rapid death of well grown preweaned pigs on an outdoor unit. Gross postmortem findings were consistent with bacterial septicaemia and included reddened carcases, fibrin stranding in peritoneal and pericardial cavities, generalised reddening of lymph nodes and pronounced reddened Peyer’s patches (see figure 5). A VIO farm visit was undertaken to obtain clinical and epidemiological details and investigate possible links with other affected farms.
Mulberry heart disease after weaning: Four five-week-old weaners were submitted to Shrewsbury for postmortem examination from a unit reporting a few sudden deaths and lameness affecting 30 pigs out of a group of 900. Two of the pigs had severe joint infections from which Trueperella pyogenes was isolated. The other two had copious amounts of fluid within the pericardium and haemorrhage on the surface of the heart raising suspicion of mulberry heart disease (MHD) which was supported by histopathology showing lesions consistent with this diagnosis. Histopathology also revealed hepatic necrosis supporting the additional diagnosis of hepatosis dietetica which is linked with MHD as a disease associated with an imbalance between free radicals and free radical (antioxidant – vitamin E and selenium in particular) scavengers resulting in oxidative damage of tissues. Borderline levels of vitamin E and selenium were found on biochemical analysis. As well as examining dietary factors, predisposing factors in pigs for MHD include rapid growth, activity, stress and intercurrent disease.

MISCELLANEOUS EXOTIC AND FARMED SPECIES

Deaths in deer: Following the death of seven Père David deer, particularly middle aged females, from a group of 470 over a period of a month, a typically affected animal was submitted for postmortem examination to the Royal Veterinary College. Postmortem findings included bilateral pyelonephritis, severe metritis and severe lung emphysema and oedema. Trueperella pyogenes was recovered from the kidney. It was suspected that the animal had retained foetal membranes resulting in endometritis and subsequent pyelonephritis via an ascending infection. A further case was submitted to establish whether the first submitted case was representative of the group problem. This case was euthanased when first noted to be unwell. Postmortem findings in this animal included peritonitis and a markedly thickened uterus and cervix containing a purulent exudate. T.pyogenes was again recovered from the cervix/uterus and E.coli from the heart. Again it was thought that the demise of the animal was associated with the uterine condition and as most of the affected animals were female it could account for
the increased number of deaths. Further investigation revealed that there had been more than double the number of dystocia cases this year. The good, possibly fat, condition of the animals and the good grazing were possible predisposing factors. There had been no change in the stags used.

**WILDLIFE**

*Investigation into Mute swan (*Cygnus olor*) mortalities on the River Wear:* Over an extended period including the latter half of the past winter a mortality of mute swans on the River Wear at Chester-le-Street was reported. There were an estimated 55 deaths from a flock of approximately 80 resident wild mute swans. No other bird species appeared to be affected. Since January 2015, postmortem examinations from several submissions have been performed at Thirsk VIC. Clinical signs in affected swans included inappetance, weakness and neurological signs; however, the majority of birds have been found dead without any known history of disease. Post mortem findings included air sacculitis, distended proventriculus, hepatomegaly, enlarged kidneys as well as carpal grazes, pododermatitis lesions and hock burns. Bacteriology and parasitological burdens were unremarkable. All submissions have been avian influenza virus (AIV) negative on PCR and virus isolation. Lead testing on kidney was performed on a sample of birds from each submission and the levels ranged from 229-3358µmol/kg DM consistent with a diagnosis of lead toxicosis. The source of the lead was unknown but may be related to the river sediment as the site was downstream from a lead ore field. The Environment Agency are performing extra sediment sampling as part of their water lead monitoring program in the area.

Over the winter, swan mortalities involving mute and whooper swans (*Cygnus cygnus*) were frequent and excluding the incident above, 22 carcasses from 6 incidents were examined. All were AIV negative, which is an important surveillance finding given the significant changes in AIV epidemiology in wild birds over the 2014-15 winter period in the Northern Hemisphere. Necrotic enteritis, emaciation associated with malnutrition and lead poisoning from ingested lead shot were diagnosed in these incidents.

**BIRDS**

*Commercial Layers*

“Spotty liver” was presumptively diagnosed in a flock of 14,000, 27-week-old free range layers with a history of a recent increase in mortality, and respiratory noises. Eighteen birds had been found dead the day prior to submission. Postmortem examination revealed slightly enlarged spleens and multiple small irregularly shaped pale foci in the livers. Routine bacterial cultures on the liver lesions were sterile and attempts to isolate *Campylobacter* sp were unsuccessful. Histopathological examination revealed a multifocal hepatitis suggestive of bacterial infection although as it is often the case no bacteria could be seen in the lesions in routinely stained sections. ‘Spotty liver’ is a disease of uncertain aetiology, although a novel *Campylobacter* species has recently been described following the
investigation of ten outbreaks, and appears to be a possible causative agent of ‘spotty liver’ (Crawshaw and others 2015).

**Suspect notifiable disease:** Avian influenza could not be ruled out following postmortem examination of two batches of 67-week-old layers, one batch free range and the other colony cage layers, from the same farm. The birds were submitted to investigate a sharp rise in mortality over the past two days and protracted mortality over a period of weeks. Most of the postmortem findings were nonspecific, with slight carcase dehydration, pale and friable livers, white speckling of the spleens and pallor of the kidneys in birds which were in lay or had been in lay until recently. However some unusual lesions including multiple pinpoint haemorrhages in the proventricular mucosa and discreet small areas of intestinal mucosa necrosis were seen in one of the carcases examined. This prompted not only ruling out bacterial, metabolic and environmental conditions but also consideration of possible notifiable disease. These findings coupled with the rising mortality led to the practitioner contacting the APHA field office, the farm was put under restrictions and Highly Pathogenic Avian Influenza Virus subsequently confirmed.

**Ducks and Geese**

**Duck Viral Enteritis:** Seven ducks had died in approximately the last three months out of a group of around ten ducks and ten geese. Typically they had been ill for two days, became inappetant and produced black diarrhoea before death. They were free range and outside all day. A 1.6kg Indian Runner duck was examined. Postmortem examination showed perihepatitis and some fibrin tags on the intestine. Three circular small white foci were present on the liver. There were six small 3mm areas of roughening on the oesophageal mucosa. The air sacs were slightly thickened. Histopathology showed multi-focal fibrin and necrotising hepatitis with inclusion bodies present in the liver consistent with a diagnosis of Duck Viral Enteritis. The virus of DVE is generally introduced into domestic ducks and geese following contact with wild waterfowl.

**Gamebirds**

**Rotavirus in pheasants and partridges:** Rotavirus infection was also diagnosed in ten postal submissions of intestinal content or faeces received at Bury. Nine cases were in pheasants and one in partridges. Mortality data was given for four submissions and ranged from 3% to 20%. The ages affected and presenting clinical signs are shown in the following figures (Figures 6 and 7).
Figure 6: Ages of birds in which rotavirus was diagnosed

![Pie chart showing ages of birds where rotavirus was diagnosed](image)

- 7 days
- 8 days
- 10 days
- 12 days
- 13 days
- 14 days

Figure 7: Clinical signs in reported in the birds

![Pie chart showing clinical signs](image)

- Found dead
- Poor growth
- Diarrhoea

References


This summary is produced by the APHA and is drawn from reports provided at the time of reporting by the APHA laboratories at Bury St Edmunds, Carmarthen, Lasswade, Penrith, Shrewsbury, Starcross and Thirsk, and partner external postmortem providers to APHA (University of Bristol School of Veterinary Sciences, Royal Veterinary College, SAC Consulting Veterinary Services St Boswells, University of Surrey, Wales Veterinary Science Centre). APHA laboratory services at Weybridge provide diagnostic testing for
surveillance. These providers contribute to the VIDA diagnoses recorded on the APHA FarmFile database and comply with standardised diagnostic criteria and laboratory testing requirements. APHA monthly reports are available online at https://www.gov.uk/government/publications/disease-surveillance-reports-2015