

OVERVIEW

- **Milk drop and pyrexia in dairy herds infected with *Salmonella enterica* serotype Dublin**
- ***Histophilus somni* septicaemia resulting in meningoencephalitis and myocarditis in cattle and sheep**
- **Blackhead as a cause of losses in turkey poults**

GENERAL INTRODUCTION

November was the fourth mildest on record with temperatures 1.8 °C above average. Rainfall was well above average for the Western Isles and from Dundee to Aberdeen, but below average particularly the in north with a Scotland-wide figure of 121 per cent of average. Sunshine amounts were also regionally variable with the overall figure equating to 101 per cent of the long-term average.

DISEASE ALERTS

The following conditions were reported by SRUC VS disease surveillance centres in February 2022. Given similar climatic and production conditions, they could also be important this year.

- **Pregnancy toxæmia in late gestation ewes.** Elevated beta-hydroxybutyrate (BOHB) levels are an indicator of energy deficiency. The target mean BOHB result for a sampled group is less than 1.0 mmol/l where ewes have been scanned and less than 0.8 mmol/l where litter size is unknown. Results greater than 1.6 mmol/l suggest serious energy deficiency and levels above 3.0 mmol/l indicate pregnancy toxæmia. Where a deficiency exists the diet should be adjusted and the ewes re-sampled two weeks later to confirm that the problem has been resolved.
- **Septic arthritis due to *Streptococcus dysgalactiae* in neonatal lambs.** *S. dysgalactiae* is the most commonly diagnosed cause of septic arthritis in lambs and multiple limb joints are often affected. Infection of the atlanto-occipital joint can also occur and presents as paresis resulting in recumbency. Oxytetracyclines are not recommended to treat cases of *S. dysgalactiae* arthritis as the majority of isolates are resistant *in vitro*.

CATTLE

Generalised and systemic conditions

The carcass of a two-year-old in-calf Holstein heifer was submitted for investigation of possible salmonellosis after it deteriorated rapidly and died despite treatment with antibiotics and a non-steroidal anti-inflammatory. It was the second death in a group of 50 heifers at grass that had also experienced a small number of abortions and cases of diarrhoea. Postmortem examination detected a firm pale lesion in the liver, surrounded by a dark haemorrhagic zone. The fluorescent antibody test (FAT) for *Clostridium novyi* was positive, confirming a diagnosis of black disease. There was no visible evidence of infection with liver fluke, but histopathology identified haemorrhagic tracts filled with inflammatory cells, predominantly eosinophils. This was considered consistent with the migration of immature *Fasciola hepatica* which is recognised as a predisposing factor for black disease. Liver fluke challenge this autumn has been low and it was suggested that clostridial vaccination may be more appropriate than flukicide treatment for the remainder of the group.

Salmonellosis due to infection with *Salmonella enterica* serotype Dublin was diagnosed in five south-west herds following postmortem examination of four foetuses, one neonatal calf and one cow during November. Four of the herds reported milk drop and pyrexia with between three and 25 animals affected. Tachypnoea, diarrhoea and increased calf mortality were also variously described. Salmonellosis should be considered a differential diagnosis in cases of milk drop, even in the absence of diarrhoea. Investigation of any concurrent abortions and carrying out paired serology to check for seroconversion to *S. Dublin* will help to determine whether it is involved or not.

A six-month-old Aberdeen Angus calf was found dead at grass. The holding had a history of blackleg and the cows, but not the calves, were vaccinated. The carcass was autolysed, but several areas of black discoloration were found within the muscles of both hindlegs (Fig 1). These were not considered typical of blackleg as they did not have the characteristic dry appearance on section. FAT results were negative for both *Clostridium chauvoei* and *C. septicum*, but *C. septicum* was cultured from the liver, spleen and skeletal muscle. This organism can be a postmortem invader however histopathology confirmed the presence of very large numbers of bacilli in association with multifocal haemorrhage, protein-rich oedema, and acute degeneration of myofibres. A final diagnosis of pseudo-blackleg due to *C. septicum* was recorded.



Figure 1 - Areas of black discoloration in the hind limb muscles as a result of infection with *Clostridium septicum*

Thrombotic meningoencephalitis and acute purulent myocarditis due to *Histophilus somni* septicaemia were confirmed in housed, spring-born beef calves on two holdings. The first outbreak involved a group of 120 cattle that had been purchased one month earlier. Pyrexia, anorexia, lameness and recumbency were reported and four animals had died. Neurological signs had raised suspicion of cerebrocortical necrosis (CCN) in one case. No significant lesions were detected on postmortem examination of an autolysed carcass. Histopathology of the heart revealed changes typical of *H somni* myocarditis and PCR testing of lung proved positive for *H somni*. Subsequent PCR testing of the heart also proved positive for *H somni*. The second herd lost two calves from a group of 50 despite treating affected animals for suspected pneumonia. Postmortem findings included an excess of yellow synovial fluid within the stifle joints and a fibrinous meningitis. Significant lung consolidation was not detected. *H somni* was isolated from the brain in this case and histopathology confirmed meningoencephalitis and septicaemia. These cases illustrate that *H somni* should be considered as a potential differential diagnosis in a range of clinical presentations in housed beef youngstock.

Alimentary tract disorders

Postmortem examinations were carried out on a dairy farm that had recently suffered a 75 per cent mortality rate in calves up to five days of age. Deaths were sudden with no signs of ill health. Histopathology of small intestine identified multiple small coccobacilli on the villi. A non-haemolytic *Escherichia coli* was isolated on culture and was positive for shigatoxin type 2 by PCR. Salmonella cultures were negative and based on

the histological evidence attaching and effacing *E coli* was thought to be responsible for the death of this animal. Further investigation on the farm revealed poor hygiene in relation to feeding of colostrum and suboptimal passive transfer of immunity. The issues resolved following thorough disinfection of the equipment.

Nervous system disorders

Two, ten to twelve-week-old Friesian calves were submitted for investigation of blindness, head pressing and vocalisation. Three calves were affected from a pen of twenty that had been weaned onto ad lib straw and concentrates two weeks earlier. The brains of both calves fluoresced under ultraviolet light, and neuropathology confirmed CCN consistent with sulphur toxicity/thiamine deficiency. Kidney lead levels were below detectable limits in both calves excluding its involvement. One of the calves had frothy rumen contents and diarrhoea, 4150 coccidial oocysts per gram of faeces, and evidence of recent severe coccidiosis on histopathology. It was proposed that the abnormal rumen contents indicated a failure to adapt to the post-weaning diet, which in turn could have predisposed to CCN through alterations in the rumen microbiota.

SMALL RUMINANTS

Generalised and systemic conditions

The carcass of a six-year-old Suffolk-mule ewe was submitted to investigate the cause of neurological signs and death. Postmortem examination found cloudy meninges (Fig 2), a proliferative lesion on the left ventricular endocardium ventral to the aortic valve plus fibrosis and necrosis affecting the papillary muscles and interventricular septum (Fig 3). Histopathology confirmed severe suppurative meningitis and myocarditis with *Histophilus somni* the suspected cause of the latter. *H somni* DNA was subsequently detected from the brain and heart by PCR testing.



Figure 2 – Cloudy meninges in ewe with *Histophilus somni* meningitis



Figure 3 – Myocardial fibrosis and necrosis due to infection with *Histophilus somni*

Alimentary tract disorders

Two, eight-month-old Texel cross lambs from a group of 200 were submitted for investigation of sudden deaths. The lambs had been strip grazing a mix of chicory, plantain and grass without any issues for the past few months but 12 lambs had been found dead in the last three weeks. The group were clostridial vaccinated and reported to be thriving with no evidence of diarrhoea. No deaths had occurred in lambs stocked on turnips. Postmortem examination confirmed intestinal torsions as the cause of death, and it was noted that the rumen contents of both were soft and green. Intestinal torsions are often associated with a change of diet and rapid rumen transit times, but in this case the lambs were considered well adapted to their diet. It was postulated that weather conditions and plant growth characteristics may have altered the balance of species in the sward.

Nervous system disorders

450 ewe hoggs were moved to winter grazing in mid-October and received a *Mycobacterium avium paratuberculosis* vaccination by subcutaneous injection in the upper neck at the time of gathering. In the subsequent five weeks, 30 animals became ataxic on all four limbs with knuckling of the forelegs and progression to lateral recumbency. Affected hoggs remained bright and alert and nine animals were euthanased for postmortem examination. Swellings of varying size were found in the upper neck as a result of reaction within the muscle at the vaccine site. Purulent material tracked into the spinal canal at the level of C1/2 was visible in some cases. Histopathology confirmed granulomatous myositis and severe leucomyelopathy with chromatolytic neurons within the medulla and pons. These findings were consistent with ascending infection following incorrect administration of the vaccine. SRUC VS has previously reported similar issues following inadvertent intra-muscular administration of emulsion vaccines with a mineral oil adjuvant. The importance of following the instructions in the data sheet should be stressed to clients using these products.

PIGS

Severe ulcerative dermatitis associated with bacterial infection was diagnosed in four, 13 to 16-week-old large white cross landrace pigs submitted to investigate a problem with ear margin trauma progressing to severe necrosis in housed finishing pigs. Fifteen per cent of 1300 pigs were reported to be affected and response to treatment was poor. *Trueperella pyogenes* was isolated, but ear biting was likely to be the primary problem. Concurrent diagnoses of *Streptococcus suis* type 2 and *Actinobacillus pleuropneumoniae* septicaemia, pneumonia and pleurisy with involvement of *Mycoplasma hyopneumoniae* and *Glaesserella parasuis*, plus proliferative enteropathy due to *Lawsonia intracellularis* were also recorded. Ear biting is a vice and identification of potential triggers requires detailed assessment of management and the environment. Pigs that are compromised by disease can be selectively traumatised by others in the group.

POULTRY

Fifteen turkeys from a group of 60 poults were found dead during the three-to-four-week period following purchase. Mild, green diarrhoea was the only clinical sign reported in the remaining birds. A second farm reported that five, three-month-old turkey poults had become dull and died over the course of a week. On-farm postmortem examination revealed focal necrotic lesions in the intestine and pale liver lesions surrounded by areas of necrosis (Fig 4). Histopathology described multifocal granulomatous hepatitis consistent with histomonosis (blackhead) in both cases. Blackhead is most common in turkey poults up to 14 weeks of age. Infection with *Histomonas meleagridis* protozoa occurs via ingestion of *Heterakis* spp eggs or earthworms which act as paratenic hosts for *Heterakis* larvae. Rearing turkeys on ground previously used for chickens is a risk factor as *Heterakis* eggs can remain viable in soil for many months.

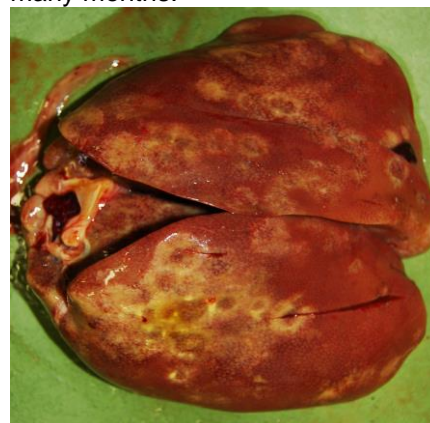


Figure 4 – Typical blackhead lesions in the liver of a turkey caused by infection with *Histomonas meleagridis*

Pre-Weaning Suckler Calf Mortality in Scotland

The death of a suckler calf represents a significant financial loss, carbon wastage and a welfare concern. Hyde *et al* (2020) estimated that 2.8 per cent of calves from non-dairy enterprises in the UK die in the first three months of life.¹ This accounts for 43 per cent of all on-farm deaths in animals aged less than 24 months on these holdings.

SRUC VS reviewed the postmortem examination findings from pre-weaned beef calves up to six months of age submitted between 2016 and 2020. This data is obtained by passive surveillance and therefore represents a biased population, but it does reflect common health issues.

During this five-year period 1662 postmortem examinations were carried out, from which 2096 diagnoses were obtained. This does not include predisposing factors, such as hypogammaglobulinaemia, or diagnoses not considered relevant to the death of the animal. The overall diagnostic rate was 94 per cent.

Fifty per cent of submitted calves were less than one month of age, with 25 per cent under one week of age. The bodyweights at any given age varied widely, particularly in older calves, reflecting a broad range of daily liveweight gains (Fig A).

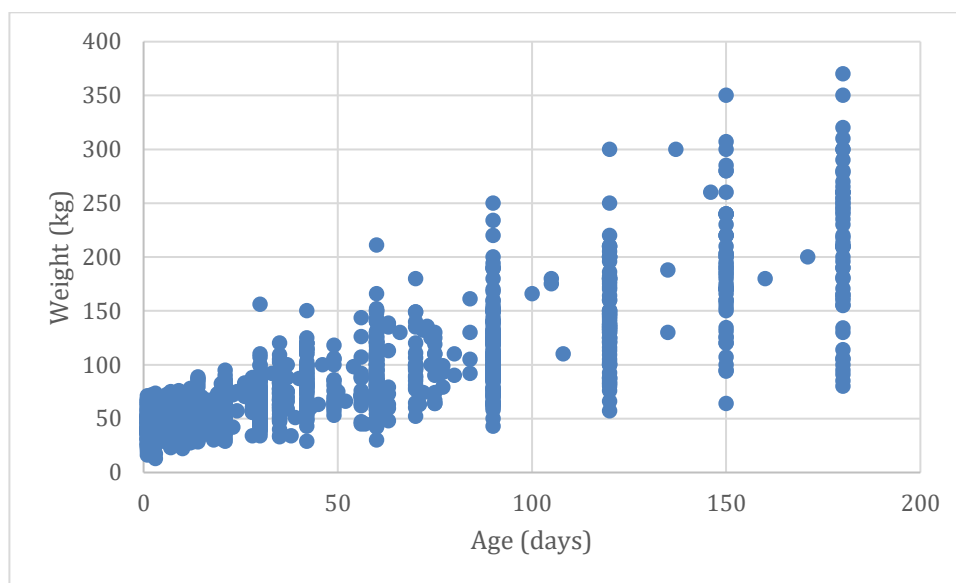


Figure A: A comparison of age and bodyweight of pre-weaned suckler calves submitted for postmortem examination

Across Scotland the ten conditions diagnosed most often (in order of frequency) were: colisepticaemia, navel ill, *Mannheimia haemolytica* pneumonia, cryptosporidiosis, *Pasteurella multocida* pneumonia, coccidiosis, abomasal ulceration=dystocia=joint ill, *Mycoplasma bovis* pneumonia. There were some striking geographical differences with several regional top ten diagnoses that were unique to a particular area. For example, salmonellosis due to *Salmonella enterica* serotype Dublin was the third most common cause of death in the south-west; *Histophilus somni* pneumonia took fourth place in the north; while central/south-east was the only region where bovine neonatal pancytopenia and clostridial enterotoxaemia type D (pulpy kidney) featured in the top ten.

Table 1 shows the most common diagnoses in calves with pneumonia or diarrhoea confirmed as the cause of death. It should be noted that this list may not reflect the situation in calves that survive an episode of pneumonia or diarrhoea.

Table 1: Top ten diagnoses in pre-weaned suckler calves dying as a result of pneumonia or diarrhoea

	Pneumonia	Diarrhoea
1	<i>Mannheimia haemolytica</i>	Cryptosporidiosis
2	<i>Pasteurella multocida</i>	Coccidiosis
3	<i>Mycoplasma bovis</i>	Idiopathic necrotising enteritis
4	<i>Histophilus somni</i>	Rotavirus
5	<i>Trueperella pyogenes</i>	Coronavirus
6	Inhalation	Attaching and effacing <i>E coli</i>
7	IBR	<i>E. coli</i> K99
8	RSV	<i>Salmonella</i> Dublin
9	<i>Salmonella</i> Dublin	Parasitic gastroenteritis
10	Fungal pneumonia	<i>Salmonella</i> Typhimurium

Zinc sulphate turbidity testing was carried out in 287 calves aged ten days or less and confirmed hypogammaglobulinaemia in 87 per cent (ZST <19 units) with absolute failure of colostrum absorption (ZST <5 units) in 46 per cent. For calves with postmortem evidence of dystocia, these figures rose to 91 and 64 per cent respectively.

Dystocia was identified as a top ten cause of mortality in all regions across Scotland. Findings consistent with bradytocia/acidosis/hypoxia were noted in 71 per cent of affected calves with the remaining 29 per cent showing signs of traumatocia. Fifty-seven per cent of dystocic calves had a history of assisted birth with a further 13 per cent delivered by caesarean section. The remaining 30 per cent were born following unassisted calvings highlighting that these can also be associated with prolonged or traumatic parturitions that compromise calf viability.

This review highlights that quality assured postmortem examination is a worthwhile exercise in pre-weaned suckler calves, with a high diagnostic rate. Some of the top ten diagnoses could have been predicted but others, particularly regionally, were more surprising and should be considered when considering calf disease and mortality in beef herds.

References

Hyde RM, Green MJ, Sherwin VE *et al* Quantitative analysis of calf mortality in Great Britain. *J Dairy Sci* 2020; 103(3): 2615-2623