SRUC Veterinary Services Monthly Report for June 2021

OVERVIEW

- **Coccidiosis due to infection with *Eimeria alabamensis* in dairy heifers.**
- **Outbreaks of nematodirosis causing diarrhoea and deaths in lambs across Scotland.**
- **Oedema disease as a cause of sudden death in weaned pigs.**

GENERAL INTRODUCTION

The mean temperature for June was 1.2 °C above the long-term average, and maximum temperatures in the north-east were 2 °C above average. It was a dry month with only 44 per cent of average rainfall. Sunshine hours were correspondingly good with an overall figure of 112 per cent of average. Only the Western Isles had a duller month than average.

DISEASE ALERTS

The following conditions were reported by SRUC VS disease surveillance centres in September 2020. Given similar climatic and production conditions, they could also be important this year.

- **Systemic pasteurellosis in lambs**
  The stress associated with weaning, movements and mixing of groups can predispose to outbreaks of systemic pasteurellosis due to *Bibersteinia trehalosi.* Affected lambs may have concurrent cobalt deficiency or parasitic gastroenteritis. A booster dose of a pasteurella vaccine may be useful to reduce the risk of losses.

- **Ill thrift in ewes**
  Ewes identified as thin at weaning that fail to gain body condition over the next six to eight weeks are commonly presented for postmortem examination at this time of year. The primary motive is often to screen for evidence of iceberg diseases in the flock. Ewes with an alternative explanation for weight loss, for example broken mouthed or chronically lame, should not be selected for investigation. The submission of a batch of two to four ewes for euthanasia and postmortem examination offers a cost-effective approach to screening.

CATTLE

Nutritional and metabolic disorders

A three-day old bull calf was submitted to investigate the cause of increased calf mortality in a herd of twenty cows. Four calves had been lost with calves reported as being lethargic, slow to get up and suck, with others being bloated. Postmortem examination of one revealed dehydration with liquid intestinal contents and some haemorrhagic diarrhoea around the tail. There was no evidence of hypogammaglobulinaemia (Zinc turbidity test 29 units; reference range > 20 units) and testing for enteric disease pathogens was negative. Postmortem autolysis hampered histological examination of the intestines. The most notable finding on histopathological examination was evidence of hyperplastic goitre. Liver selenium levels were low at 0.58 mg/kg dry matter (DM) (reference range 0.9 to 1.75 mg/kg DM) and analysis of the thyroid confirmed Iodine deficiency with a result of 310 mg/kg DM (reference range ≥ 1200 mg/kg DM). It was considered that both iodine and selenium deficiency would have made a significant contribution to the problem. The cause of the diarrhoea remained undiagnosed.

An eight-week-old Limousin cross suckled calf developed a slow, pottery gait leading rapidly to recumbency and death. Postmortem examination found white streaking on the surface of the epicardium and similar irregular white lesions on the diaphragm raising suspicions of white muscle disease. Liver analysis confirmed vitamin E and selenium deficiency with results of 2.41 umol/kg fresh tissue (FT) (reference range >5 umol/kg FT) and 0.2 mg/kg DM (reference range 0.9 to 1.75 mg/kg DM) respectively. Histopathology revealed polyphasic myocardial necrosis and skeletal myopathy with mineralisation confirming a diagnosis of nutritional myopathy. Two other calves were reported to have been similarly affected but a good response to treatment with antibiotics and NSAIDs suggested a different aetiology in their case.

Parasitic diseases

A group of twenty-four yearling Ayrshire heifers were moved to a new field and one animal became diarrhoeic and died approximately two weeks later. A second animal died and the carcase was found to be thin and dehydrated. The caecal content was liquid and the coccidial oocyst count was 15,700 oocysts per gram (opg). Speciation showed that 88 per cent of the oocysts were *Eimeria alabamensis* which has been associated with clinical coccidiosis in calves following turn out[1] and has a short pre patent period of six to eight days. A coccidial oocyst count carried out on faeces collected the previous day returned a count of almost 1.5 million opg illustrating the high counts that can be associated with

this species and a rapid reduction in oocyst numbers following peak shedding.[2]

Generalised and systemic conditions

A nine-week-old Aberdeen Angus cross calf was euthanased due to unresponsive diarrhoea, pyrexia and weakness. It had been treated with NSAIDs and a ten-day course of antibiotics. It was the third to present similarly from a herd of 90 cows that had experienced high calf mortality the previous year with losses of 27 per cent. Postmortem examination identified laryngitis, patchy tracheitis and necrotic consolidation of the cranial lung lobes. There was a mild pericarditis and focal necrotic lesions in the liver. The kidneys were pale, and there were a small number of abomasal ulcerations. There was a devitalised area of omentum, and the lymph node adjacent to the ileum was haemorrhagic with a necrotic focus. Necrotic foci were also observed in the ileum and jejunum. *Fusobacterium necrophorum* was isolated from the lung and *Salmonella enterica* serovar Dublin from the intestine on enrichment culture only. Histopathology detected multisystemic thrombosis associated with fungal infection with the mycotic laryngitis and tracheitis being remarkably severe. SRUC VS commented that recognised predisposing factors for systemic mycotic infection are prolonged antibiotic treatment, neutropenia and immunosuppression / immunodeficiency. Although bone marrow cellularity was reduced, this involved absence of maturing granulocytes and erythroid series cells and was considered to be secondary rather than primary. Despite the absence of typical intestinal lesions SRUC VS considered that an unusual variant of idiopathic necrotising enteritis (INE) was a possibility as fungal infections, occasionally of the respiratory tract, can be a feature of INE.

A three-week-old Aberdeen Angus cross calf became the third to die in a group of 30 cows and calves. Lethargy and diarrhoea had been noted with opisthotonus and seizures prior to death. It had been treated with hyoscine butylbromide, antibiotic and NSAIDs. Postmortem examination revealed a fibrinous peritonitis plus necrotic enteritis in the distal jejunum and ileum. Screening for coccidiosis, salmonellosis and mucosal disease proved negative. Histopathology confirmed a necrotising enteritis but also detected changes in the bone marrow indicative of reduced haematopoiesis. The age of the calf and the chronicity of the bone marrow depletion were consistent with bovine neonatal pancytopenia (BNP). Historically, most cases of BNP have been associated with maternal Pregsure vaccination, however, the dam had been born after the vaccine had been withdrawn from sale. The underlying trigger for cases of BNP that have no association with Pregsure administration remains unknown but are likely to be the result of spontaneous alloantibody production.[3] Multicentric juvenile lymphoma was confirmed by histopathology of masses from a three-month-old salers calf that died following a week long history of digestive upset and recumbency. The carcase was slightly jaundiced and multiple individual to coalescing variably sized tumours were found within the abdominal cavity (Fig 1) and invading the liver and kidney parenchyma. Histopathology confirmed an infiltrative round cell neoplasm most likely juvenile multicentric lymphoma.

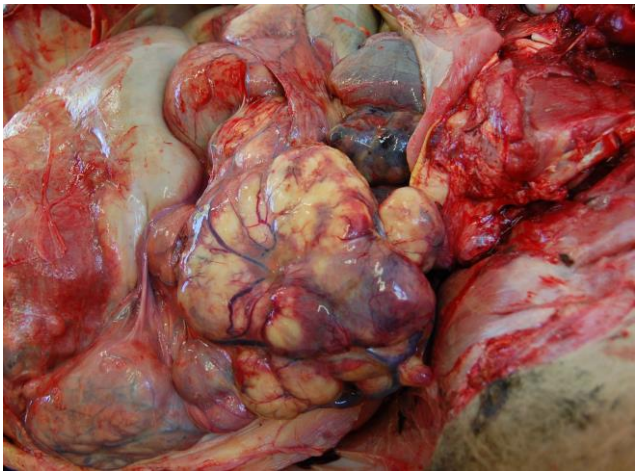

Figure 1 – Abdominal masses in a case of multicentric lymphosarcoma

Alimentary tract disorders

A six-year-old Simmental bull was noted to be stiff and failing to thrive. Treatment with antibiotics and NSAIDs resulted in a transient improvement before a rapid deterioration and it appeared to be in pain before it died. Postmortem examination found a loop of jejunum entrapped within the right inguinal ring. The entrapped intestine had ruptured with a secondary peritonitis and dilation of the small intestine proximal to the obstruction. The cause was not clear but trauma was suggested as a possible predisposing factor. Over conditioned bulls are thought to be at increased risk due to the presence of inguinal fat pads that can dilate the inguinal ring.

Musculo-Skeletal conditions

A one-month-old Holstein cross shorthorn calf was treated for pneumonia before developing a swollen hock, which failed to respond to antibiotic treatment. One other calf was similarly affected and there were grumbling pneumonia issues in the group. The left hock was found to contain watery cloudy yellow fluid and the articular cartilages were severely eroded. There was an excess of synovial fluid in the right shoulder. The right cranial lung lobe was consolidated and there were adhesions between the myocardium and pericardium. Routine cultures remained sterile, but *Mycoplasma bovis* was detected on PCR screening of lung and synovial membrane from both the hock and shoulder joints.

Histopathology confirmed that the arthritis was consistent with chronic *Mycoplasmsa bovis* infection and that the pneumonia was end-stage and multifactorial, but with *Mycoplasma bovis* involvement. The herd was considering introducing mycoplasma vaccination and the findings supported this option as a control measure.

Circulatory system disorders
Acute cardiac arrhythmia was suspected as a diagnosis of exclusion in a two-week-old male Limousin calf. The calf presented with diarrhoea at seven days-of-age, appeared to recover but then collapsed and died while being tagged one week later. Postmortem examination revealed blood tinged abdominal, thoracic and pericardial effusions and a large, well demarcated pale area on the epicardium of the right ventricle. Diffuse lung congestion and marked interlobular oedema were also noted. No cardiac lesions were evident on histopathology and no other cause of death was identified. Peracute cardiac events such as fatal arrhythmias do not usually present with microscopically detectable lesions.

SMALL RUMINANTS

Parasitic diseases
Lamb deaths due to nematodirosis were recorded across Scotland during June. A carcase was submitted from a group of 80 lambs where four had died over a 48-hour period. Grass was in short supply and a small number of lambs were reported to be faecal stained. Approximately 77,500 mainly immature *Nematodirus battus* worms were recovered from the small intestines and anthelmintic treatment was advised. The presence of very few adult worms was reflected in the low *N battus* egg count of 200 eggs per gram. Concurrent high coccidial oocyst counts were detected in some cases but sometimes proved to be an incidental finding with neither *Eimeria crandallis* nor *E ovinoidalis* detected. Evidence of treatment failure was seen with 1700 *N battus epg* and uncountable numbers of *N battus* detected in a lamb that had been dosed with a benzimidazole anthelmintic ten days earlier (Fig 2). It was advised to check that the dosing gun was accurate and that the correct dose had been given. Benzimidazole resistant *N battus* have been recognised and it is likely that reduced efficacy will be more clinically apparent in high challenge years.

Figure 2 – *Nematodirus battus* worms recovered from the small intestine of a lamb

Mammary diseases
A Ryeland ewe that had lambed twins eight weeks previously became anorexic and was found dead the next day. It was the only animal affected from a group of five ewes with lambs at foot. The right half of the udder was enlarged and the parenchyma dark purple with fibrin present. Fibrinous pleurisy and peritonitis, haemorrhagic lungs and diarrhoea were also noted on postmortem examination. *Staphylococcus aureus* was isolated from mammary tissue and histopathology confirmed a severe acute mastitis with secondary changes in the other tissues. *S aureus* has previously been shown to be the most common cause of acute mastitis in sheep.[4]

Nervous system disorders
No diagnosis was reached in a flock where artificially reared crossbred lambs were developing a range of signs prior to death including poor growth, tremor, swollen joints, recumbency and scoliosis. Progressive neurological signs developed from ten days-of-age and 15 to 20 lambs from a group of 40 died. Routine investigations were unrewarding. Neuropathology of two cases indicated extensive, severe ventral motor neuronopathy, for which the differential diagnosis includes copper deficiency. However, the histopathology was not typical and liver copper results were within the reference range. Other differential diagnoses included mycotoxicosis, heavy metal toxicity (other than lead), or other unidentified toxin. The farmer noted that lambs fed a specific batch of milk powder had been affected and that cases appeared to stop when this feed was withdrawn however, no similar cases were reported to SRUC VS. The farmer was advised to contact the milk powder manufacturer for a sample of powder for further analysis.

Five Scottish blackface tups were found dead and the following day four others displayed clinical signs including trembling, ataxia and recumbency. The animals were two to three years-of-age and all bar one was homebred. Antibodies to louping ill virus, including a significant proportion of IgM consistent with recent exposure, were detected in all four tups with neurological signs. Losses due to louping ill in endemic areas are most common in young sheep and bought in animals. It is possible that these tups had previously been preferentially grazed in bye with lower tick challenge.

PIGS

Generalised systemic diseases

Oedema disease was confirmed in two, six-week-old pigs from a herd with an ongoing problem of intermittent sudden death in recently weaned pigs. Findings in both carcases included marked interlobular lung oedema, pericardial effusion and congestion of the intestinal mucosa and serosa. Histopathology also identified sub-mucosal oedema in the colon. Haemolytic *Escherichia coli* was isolated from the large colon of both animals, and tested positive for virulence factors F18, heat stable toxins (STaP, STb) and shigatoxin (Stx2) confirming its ability to cause oedema disease. Vaccination was recommended.

Circulatory system disorders

The second five-month-old Oxford sandy and black pig to die in a 10-day period was submitted for postmortem examination. A group of five pigs had been purchased in March and were grazing an area of beech woodland with some supplementary feeding. The submitted pig was reported to have a reduced appetite prior to death but had remained bright. Body condition was good. There was a moderate serous pleural effusion containing fibrin strands and an increased volume of pericardial fluid. Fluid oozed from the cut surface of the lung and the myocardium had a slightly mottled appearance. The differential diagnoses included bracken toxicity and mulberry heart disease. Histopathology confirmed the latter despite adequate liver selenium and vitamin E results. This finding is not uncommon in cases of nutritional cardiomyopathy in pigs. Supplementation of the remaining three pigs was advised.

BIRDS

Game birds

2500 day-old mallard ducklings were split into three groups on arrival and housed in new sheds. No dead birds were noted and they appeared to be eating and drinking normally. The following day 72 birds were found dead and small numbers were dull. Ten carcases were examined ranging in weight from 21.5 to 34 g. The expected average weight for day old mallard ducklings is 32.4 g. In all cases the livers were pale and the gall bladders enlarged suggestive of poor food intakes and the gizzards were empty in nine of the ten birds. The navel of one bird had not healed and the yolk sacs measured between 1 and 1.5 cm diameter with dirty yellow to slightly brown/green contents. The yolk sac contents of two birds were congealed. *Escherichia coli* was isolated from all yolk sacs cultured and considered to be significant. A final diagnosis of starve outs plus yolk sac infection was reached and it was advised that the mortality rate should peak early on and then drop quite quickly.

References:

1 Marshall RN, Catchpole J, Green JA, Webster KA. Bovine coccidiosis in calves following turn out. *Vet Rec* 1998; 143(13): 366-7

2 Svensson C, Uggla A, Pehrson B. *Eimeria alabamensis* infection as a cause of diarrhoea in calves at pasture. *Vet Parasit* 1994; 53: 33-43

3 Millar M, Scholes S, Bazeley K, Floyd T, Holmes P, Hately G. Bleeding disorders in calves. *Vet Rec* 2016;179(24), 632-633

4 Jones JET, Watkins GH. Studies on mastitis in sheep at the Royal Veterinary College. *Proceeding of the Sheep Veterinary Society* 1998;22:83-90

Diagnoses of Louping Ill and Babesiosis in Scottish Cattle

The total number of louping ill and babesiosis diagnoses in cattle is relatively small but plotting their distribution allows higher risk areas to be identified (Fig A). Local knowledge is important as clinical cases may be seen infrequently and veterinary surgeons who are new to an area should be made aware of the possibility of encountering these conditions. Climate change may alter the distribution of ticks or increase disease risk if the period of tick activity or the grazing season become extended.

Although both are tick borne diseases the age of affected cattle (Fig B) and the seasonal distributions differ (Fig C). The scarcity of babesiosis diagnoses in youngstock is due to innate immunity in calves less than nine to twelve months-of-age. Louping ill has been diagnosed in every month apart from January with a peak of cases in September. Babesiosis diagnoses were confined to the period between May and November with a peak in June. A history of issues in recently introduced purchased animals was only recorded in a small minority of cases.

The predominant clinical signs reported in cases of louping ill were ataxia, trembling and hyperaesthesia. The presentation of babesiosis was more varied and included cases with pyrexia, normal, or subnormal temperature. Some animals were found dead and others were described as dull, anorexic, and/or anaemic with tachycardia, weakness or recumbency. Weight loss, nervous signs and a starey eyed appearance were also recorded. Ticks and dark red urine were not always observed. Analysis of pre-mortem blood samples returned packed cell volume (PCV) results of between 0.06 and 0.18 l/l (reference range 0.25 to 0.45 l/l), with two thirds being 0.10 l/l or less.

Confirming a diagnosis of louping ill in a live animal relies on serological detection of antibodies to the virus with a predominance of IgM indicating recent infection. Postmortem diagnosis requires brain histopathology supported by immunohistochemistry. EDTA samples should be collected from live cases of suspected babesiosis and blood smears made soon after collection for submission with the blood sample for laboratory confirmation. Identification of characteristic *Babesia divergens* inclusions within erythrocytes is diagnostic. Blood smears made after death can be difficult to interpret but a PCR test is also available and can be carried out on EDTA blood or spleen. Postmortem findings can resemble copper toxicity with icterus, dark kidneys and haemoglobinuria.

It should be remembered that both conditions are potentially zoonotic but human cases are thankfully rare.

Further Reading

Jeffries CL, Masnfield KL, Phipps LP *et al.* Louping ill virus: and endemic tick-borne disease of Great Britain. *J of Gen Vir* 2014;95:1005-14

Zintl A, Mulcahy G, Skerrett HE, Taylor SM, Gray JS *Babesia divergens*, a bovine blood parasite of veterinary and zoonotic importance. *Clin Microbiol Rev* 2003;16(4):622-36

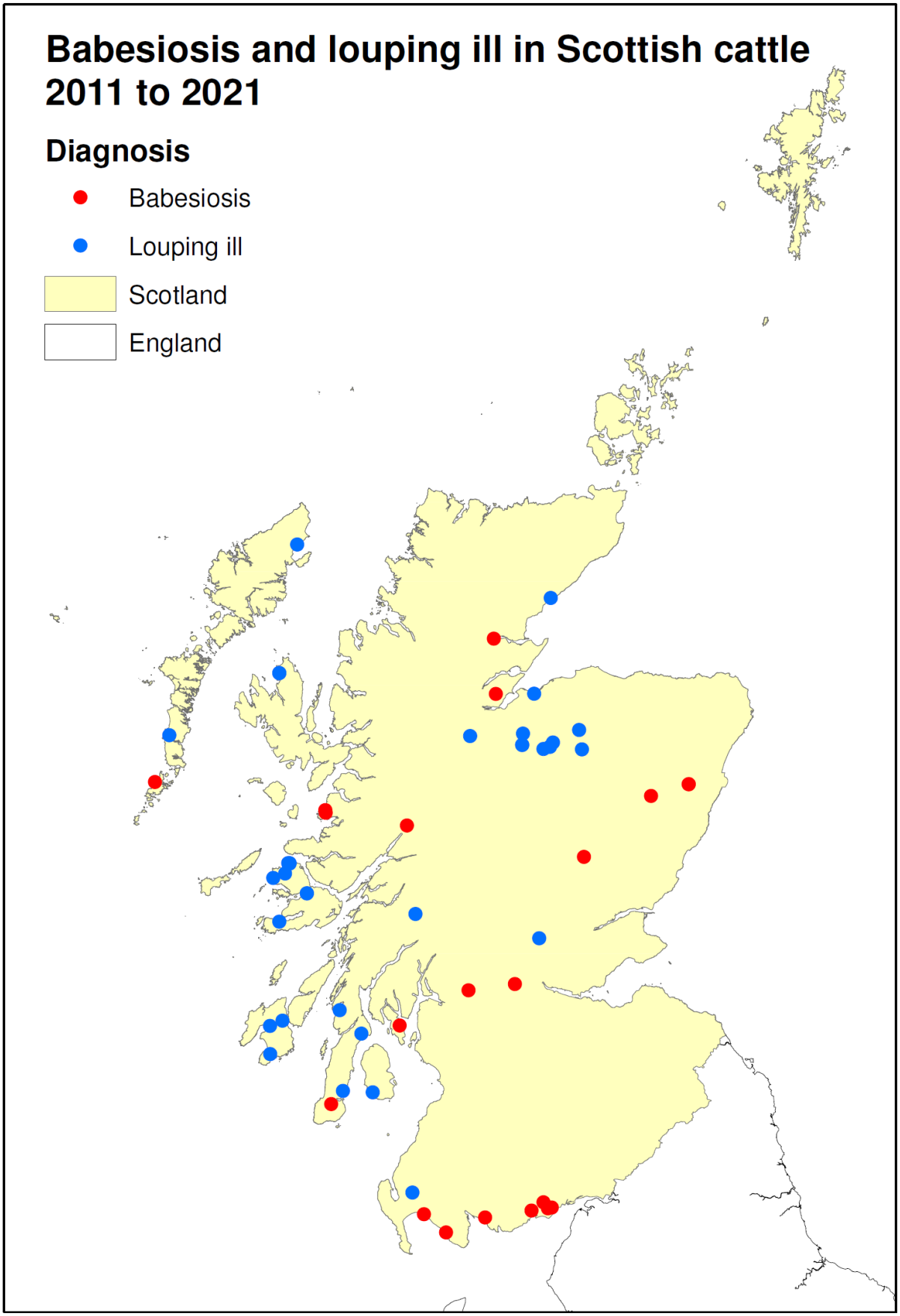

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Figure B: Age of cattle diagnosed with Louping ill or Babesiosis

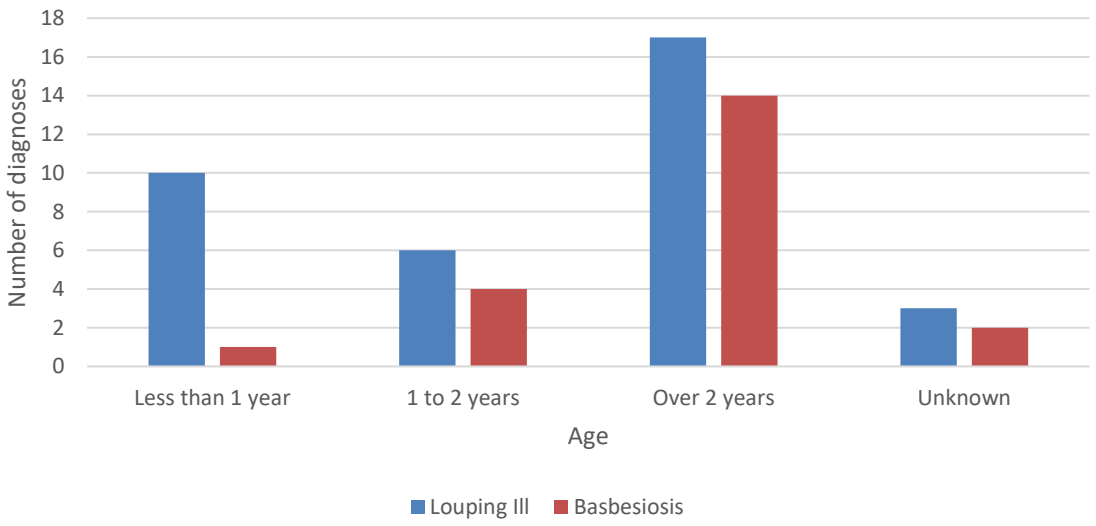

Figure C: Diagnoses of Louping ill and Babesiosis by month 2011-2021