

Quarterly review of diagnostic cases – April to June 2009

Gribbles Veterinary Pathology

Cattle

A two-and-a-half-year-old beef animal from the West Coast was killed for home consumption. It was noticed that many of the prepared cuts of meat had 2–5-mm foci of greenish discoloration. Histologically, these were areas of intense eosinophilic inflammation with necrosis of muscle. Sarcocysts were not seen in the surrounding muscle, but were detected in some of the inflammatory foci, indicating the possibility that they were a factor in the development of **eosinophilic myositis**.

In mid-June, four young cattle in a large mob on a Southland dairy farm showed severe lameness and swollen lower limbs. The mob was stocked in a fairly muddy paddock and was being fed late-cut baleage grown on the farm. Closer examination of the baleage showed it contained ergotised ryegrass seeds. Luckily the farmer had alternative baleage that had been grown on another farm, and as this did not contain seeded pasture it was fed out instead. The home-grown baleage was discarded. One or two small outbreaks of **ergotism** are seen every winter in Southland. It was initially identified in this area in 2003, when relatively large numbers of farms were affected.

Two 10-month-old calves in a mob of 100 on a North Canterbury farm died within 48 hours of being given injections of copper, selenium, vitamin B12 and an anthelmintic. One animal was examined histologically and had lesions of massive acute hepatic necrosis typical of acute **copper poisoning**.

A farm on the Hauraki Plains had five cows die shortly after they were dried off. The first cow that was necropsied had been dead for more than 24 hours, so limited samples were collected. The liver had evidence of chronic damage from sporidesmin (**facial eczema**) as well as severe generalised acute hepatic necrosis. Blood from a sick herdmate had markedly elevated liver enzymes: AST 6,233 IU/l (normal range 40–190), GDH 3,684 IU/l (normal range 0–50), GGT 317 IU/l (normal range 0–40). **Copper toxicity** was suspected and the serum level in the sick cow was found to be elevated, at 101 $\mu\text{mol/l}$ (normal range 8–20). This sick cow died and the kidney copper level was 410 $\mu\text{mol/kg}$ ($>157 = \text{toxic}$) confirming copper toxicity. Another dead cow had liver copper of 6,200 $\mu\text{mol/kg}$ and kidney copper 160 $\mu\text{mol/kg}$. There was massive liver necrosis and severe haemoglobinuric nephrosis. Chronic copper poisoning was suspected but the source of the copper was not determined.

Two cows died on a farm near Rotorua. Findings included massive liver necrosis and mild haemoglobinuric nephrosis. The kidney copper levels were 650 and 2,200 $\mu\text{mol/kg}$, indicating copper

toxicity. These cows had been fed 10–12 kg DM of palm kernel extract per head daily, so would have been ingesting 200–240 mg of copper per day from that source. A maintenance level of 54 mg/day is recommended.

Yersinia can be a primary pathogen or may co-infect young cattle along with other diseases. In one Taranaki case, eight dairy yearlings developed chronic diarrhoea and *Yersinia pseudotuberculosis* was cultured from the faeces of three of them. In addition there were increased numbers of strongyle eggs present. In another case from Taranaki, 50 yearling Jersey cross heifers were ill thriven with diarrhoea. *Y. pseudotuberculosis* was cultured from the faeces and there were also low serum selenium concentrations (mean of six animals = 54 nmol/l, range 45–70; normal range 140–1,000).

Selenium deficiency was diagnosed in yearling cattle on a number of occasions. On a Manawatu property, five yearling Friesian cross heifers from a mob of 40 on an organic farm were growing poorly. In serum from four of the heifers, selenium concentration was <37 nmol/l and in the fifth animal 45 nmol/l (normal range 140–1,000). In a separate case from the Wairarapa, two yearling Hereford cattle were sick and four dead from a mob growing poorly. Serum selenium concentrations were low, ranging from 30–45 nmol/l. In addition, two of six animals tested were persistently infected with **bovine viral diarrhoea virus**.

Twenty-eight yearling dairy heifers in Nelson died from a mob of 70 over a two-week period. Since the mob had access to acorns and 2–3 were dying per day, **acorn toxicity** was suspected. There were no deaths for 10 days, then four more died, and three were in poor condition. Serum samples taken from these three revealed creatinine concentrations of 1,611, 1,227, and 1,444 $\mu\text{mol/l}$ (normal range 80–249) and urea concentrations of 111, 97, and 93 mmol/l (normal range 4.5–10), consistent with severe azotaemia. The effects of the acorn gallotoxins had resulted in chronic renal disease in these cattle.

Another case from the Wairarapa was unusual, where two-year-old cattle were grazing pin oak (*Quercus palustris*) regrowth rather than acorns. Two cattle had died, and autopsy revealed oral and caecal ulceration. Histopathology confirmed nephrosis typical of gallotoxin ingestion. Serum sampling of other ill-thriven animals confirmed additional cases of azotaemia.

Neospora is the most commonly diagnosed cause of **bovine abortion**. In one outbreak in Taranaki, seven Friesian cows had aborted in three weeks. Sera collected from all of them revealed *Neospora* IFAT titres of $>1:2,000$, consistent with recent infection.

In another Taranaki case, 11 mixed-breed dairy cows had aborted in the previous few weeks. Nine had *Neospora* IFAT titres of $>1:2,000$ and the remaining two had titres of 1:1,000. Histopathological lesions typical of *Neospora* infection were seen in foetal tissues.

Another case, from Hawke's Bay, involved eight Friesian cows. After a single cow aborted, others were seen sniffing the foetus and

membranes. Subsequently seven more cows aborted, and serum samples from all had IFAT titres of >1:2,000.

There were four abortions over a month on a relatively new Otago dairy farm. The herd had been put together using cows from many sources. The foetus from the last abortion was necropsied and no gross lesions were found, but a fresh skin sample was positive to a BVD-antigen ELISA test and the foetal heart blood demonstrated a 1:200 titre to *Neospora caninum* by IFAT. The dam was blood-tested two weeks after aborting and a high *N. caninum* titre of >1:2,000 was found, confirming that the cause of the abortion was **neosporosis**. This animal may have been persistently infected with BVD but this was not checked.

Bacterial infections can result in **abortion**. After eight dairy cows aborted on a Taranaki farm, tissues collected from one aborted foetus revealed a necrotising **placentitis** associated with numerous bacteria, and *Streptococcus bovis* was cultured from the stomach contents.

A small mob of wild beef cows was brought on to an Otago beef farm and pastured separately. About two weeks later one cow aborted. A range of tests performed on the foetus gave mostly negative results but the foetal stomach contents were positive to *Leptospira* by PCR. The cow was identified and blood-tested a few days later for antibodies to this bacterium. The MAT test for serovars *pomona* and *hardjo* were negative. No other cows in this group aborted.

Neoplasia is an uncommon cause of **abortion**. A 200-day-old aborted Friesian heifer foetus from Taranaki was presented for post mortem. The abdomen was distended with blood leaking from a soft red friable 10 x 7 x 7-cm mass in the retroperitoneum caudal to the right kidney. Histopathological examination confirmed this was a congenital **nephroblastoma**. Rupture and haemorrhage of the lesion had led to the death and abortion of the foetus.

Pigs

A Canterbury pig farmer had 10% of his weaner pigs losing condition and having increased respiratory effort. Tissues from two were examined. Both spleens had elevated numbers of neutrophils in the red pulp, and generalised depletion of lymphoid tissue. One had scattered markedly enlarged reticuloendothelial (RE) cells with large central nuclei with prominent, often multiple nucleoli. Rare cells contained botryoid basophilic inclusions. Both lungs had generalised granulomatous peribronchial inflammation accompanied by diffuse macrophages within alveoli. The lymph nodes had marked generalised lymphoid depletion and moderate fibrosis. The RE tissue was hyperplastic and the sinusoids contained moderate numbers of neutrophils. Scattered markedly enlarged RE cells were present. These had large central nuclei with prominent, often multiple nucleoli.

These findings were consistent with **porcine circovirus disease** and suggestive of a clinical diagnosis of **post-weaning multisystemic wasting syndrome**.

Sheep

Two occurrences of **enterotoxemia** were diagnosed in mobs of lambs on a Marlborough and a South Canterbury farm. On one farm there were 10 cases of sudden death in a mob of 1,100, and in the other there were five sudden deaths in a mob of 1,300. In both cases typical lesions of **perivascular oedema** and **white matter oedema** were present in the brain.

In Southland during late April and early May there were about ten outbreaks of acute **bacterial gastroenteritis** in mature ewes. *Salmonella Hindmarsh* was isolated from affected ewes in all outbreaks, which usually began after very well-conditioned ewes were placed onto breaks after mating. Early in most outbreaks affected ewes were found dead and showed rapid post-mortem decomposition without signs of diarrhoea. In later cases, diarrhoea before death was noted and necropsy often revealed a severe **ulcerative abomasitis** and fluid-filled congested intestines. The numbers affected were relatively low, although on several farms more than a hundred ewes died over a period of two to three weeks. *Salmonella* vaccination, where used, appeared to rapidly halt the progression of most outbreaks.

Outbreaks of enteric salmonellosis in adult ewes in late autumn/early winter have been a rare occurrence in this area over the last 10 years, probably because vaccination to prevent *Salmonella Brandenburg* abortions (with a vaccine that also includes *S. Hindmarsh*) has been widely used. In the last two to three years numbers of *S. Brandenburg* abortion outbreaks have declined, and so has the use of vaccination as a preventative. This, coupled with the probable natural decline in immunity of sheep flocks in this area to *S. Hindmarsh*, may have added to the sudden appearance of these outbreaks this season.

Twelve Romney hoggets from a mob of 750 in the Manawatu died and two were noted with haemoglobinuria, pale mucous membranes and elevated rectal temperatures. Serum from an affected hogget was tested by *Leptospira* MAT. Titres to *L. pomona* were 1:200, and *L. hardjo* >1:1,600, confirming **leptospirosis**.

Six Manawatu ram hoggets from a mob of 200 had **orchitis**. Swabs taken from suppurative material collected from one animal grew gram-negative bacilli most closely resembling the *Histophilus somnus/Histophilus ovis* group of organisms.

Deer

Two weeks after weaning in late April deaths began in a large mob of 600 weaners on a Southland deer farm. Two weaners found dead were necropsied. Sections of the intestinal tract from both deer showed on histopathological examination a severe multifocal necrotising enteritis with associated bacterial colonies. *Yersinia pseudotuberculosis* was isolated from the intestinal contents of both animals. During this outbreak about 36 weaners died over a short period. They had not been vaccinated against yersiniosis. The deaths began after the weather suddenly became extremely cold with snow then rain.

Dogs

A two-month-old boxer pup from Hamilton had slight weight loss and was sleepy over a weekend. It was fed on Monday at 9am but did not eat and died three-quarters of an hour later. At post-mortem examination there was foam present in the nostrils and throughout the trachea and bronchioles, and the lungs were markedly oedematous and congested. The heart was enlarged and had extensive pallor of the ventricular muscle. Muscle pallor was also evident on both sides of the ventricular septum. Histologically all sections of both ventricles, atria and the median septum were extensively infiltrated with large numbers of mononuclear cells and spindle-shaped cells, and lesser numbers of polymorphs. There were scattered degenerate muscle fibres within this. Some areas had mild to moderate fibrosis. The sections of septum and left ventricular free wall had large suppurative foci. The diagnosis was **myocarditis**, but although lesions suggested a bacterial infection, no bacteria were detected in gram-stained sections.

Two of three working dogs from Marlborough presented with acute oral ulceration. Full screening with an in-clinic blood analyser showed no abnormal clinical pathology, but one dog was hypersalivating, pyrexia, lethargic and so severely injured that she was briefly hospitalised and biopsies taken. The other dog was only mildly affected. Biopsies were non-specific, revealing only an acute severe extensive necro-ulcerative stomatitis. On further questioning to identify any environmental poison to which the dogs might have had access, the farmer said he had used weed killer in recent days, and also noted there was a problem with iron in the water supply and new troughs had recently been installed. The more severely injured dog died a few days after returning home and unfortunately no necropsy was performed. The other dog appeared to recover. Given the oral ulceration and later death of one animal, and since the weed killer used was paraquat-based, the suspected cause of the illness was **paraquat poisoning**. No site of access to the poison was found.

Camelids

Three adult alpacas in the Auckland region suddenly became ill over four days. They were all weak, recumbent, hypothermic, anorexic and had "cow-pat" faeces. Two died, and at post-mortem examination no specific lesions were identified. Histopathology of the lung revealed an aspiration pneumonia (intra-bronchiolar plant material, mixed bacteria and fungal hyphae) and a neutrophilic pneumonia. A PAS stain demonstrated numerous PAS-positive 4–7-micron-diameter round or crescent-shaped intracellular fungal bodies in the alveolar spaces, often associated with neutrophils. This led to a presumptive diagnosis of **fungal pneumonia** caused by *Pneumocystis jiroveci* (formerly *Pneumocystis carinii*). This fungus is common in the environment but does not usually cause disease unless there is concurrent immunosuppression, usually from viral infection, corticosteroids or bacterial infection.

A two-year-old alpaca from Napier had slowly progressive nervous signs over 3–4 months, which at first looked like ryegrass staggers.

But she would then go into spastic rigidity. She became unable to stand on her front legs. Examination of the brain revealed severe **demyelination** in the dorsal and ventral spinocerebellar tracts in the obex. There were distended myelin sheaths, some of which contained swollen axons and occasional macrophages. The cervical spinal cord also had severe demyelination in the fasciculus gracilis and the dorsal and lateral spinocerebellar tracts.

Ataxia and spinal-cord degeneration has been described in camelids, possibly associated with copper deficiency. This alpaca had a serum copper level in the normal range a month prior to her death, but copper levels at the time of onset of the neurological disorder could not be determined.

A year-old alpaca from a Hawke's Bay farm was reported to have never thrived. Two days prior to death it was pyrexia and dyspnoeic, then deteriorated rapidly with neurological signs. On post-mortem examination the alpaca had no fat reserves. Histopathology revealed chronic atrophic enteritis associated with large numbers of coccidia in the enterocytes. There is a form of **coccidiosis** associated with neurological signs reported in cattle.

Poultry

Four 31-week-old laying hens from Hawke's Bay were presented for post-mortem examination with a history of declining egg production and excessive head-shaking. There were no gross lesions but histopathology revealed a mild lymphoplasmacytic laryngitis, tracheitis, pneumonia, hepatitis and peritonitis, all suspicious of **infectious bronchitis**. This was confirmed by serology of other affected birds, which showed a four-fold increase in titres to infectious bronchitis.

A layer flock of four thousand 50-week-old chickens in Horowhenua was losing five birds per day. Examination of dead birds revealed peritoneal inflammation and swollen ovaries. Further post-mortems revealed retained eggs, oviduct inflammation and vent necrosis. Histopathology confirmed that bacterial-associated oophoritis, salpingitis and peritonitis was the problem. Culture isolated *Pasteurella* (not *P. multocida*) and a diagnosis of **oviduct pasturellosis** was made.

From two days of age, newly delivered chicks began dying on a layer-poultry farm. Fifteen hundred birds from a batch of 5,000 died over a four-day period. Post-mortem examination of 11 birds did not reveal any gross abnormalities. **Renal mineralisation** was apparent on histopathology. When the chicks were weighed, they were found to be underweight for their age. Once the feed was changed to a new batch, deaths stopped and the chicks began to grow, indicating a **feed-associated problem** was likely. Subsequent analysis of the original mash revealed the **sodium** concentration was too high.

Rabbits

Two-week-old rabbit kits were dying in a Wellington hutch. The kits appeared well and feeding, then would be found dead next day.

Histopathology revealed a necrosuppurative bronchopneumonia with gram-negative coccobacilli visible. These were confirmed as *Pasteurella* (not *P. multocida*) by microbiology and **pasturellosis** was diagnosed.

Cases of **rabbit haemorrhagic disease** continue to be diagnosed in pet rabbits in the Christchurch area. Some of these cases occur well within the city limits.

New Zealand Veterinary Pathology

Cattle

The autumn quarter saw a number of cases of clinical **ostertagiosis** in weaners and rising one-year-olds at pasture. Interestingly, ostertagiosis was sometimes accompanied by low selenium levels and **yersiniosis**. In a typical case in Canterbury, about 20% of a mob of rising one-year-old dairy heifers with chronic ill-thrift had high serum pepsinogen activity despite oral anthelmintic therapy two weeks previously. In addition, serum selenium levels were low and *Yersinia pseudotuberculosis* was isolated from the faeces of two of five animals.

There was a case from Northland where eight of 200 weaner bull calves died despite a history of regular oral anthelmintic therapy. At the time of submission there was no evidence of parasitism, but the mob had low serum selenium levels and *Yersinia pseudotuberculosis* was cultured from four of six animals.

A herd of about 650 mixed-age dairy cows in the Waikato had been supplemented with about 4 kg of maize silage daily per cow for the last month of lactation. At drying-off the allowance of grass was decreased dramatically. Twelve cows became depressed and anorexic, and a few became recumbent. There were varied responses to infusions of metabolic solutions, and two died. Serum biochemistry showed that the affected cows had moderate to marked **hypocalcaemia**.

Over a one-week period eight Waikato dairy cows lost a lot of condition, developed submandibular oedema and died. **Zinc poisoning** was suspected and four animals in the herd had a serum zinc concentration between 70 and 205 mol/l (reference range 11–20, with therapeutic/prophylactic levels up to 35).

S-methyl-L-cysteine sulphoxide (SMCO) toxicosis was diagnosed in yearling cattle in the King Country. One hundred yearlings had been grazing a kale crop for several weeks with no apparent ill effects. On being driven to the yards 2 km away one became recumbent and refused to move, and two others collapsed at the yards. All three subsequently died. Tests of aqueous humour and the plants for toxic levels of nitrate were negative. Complete blood counts on other cattle from the mob demonstrated moderate anaemia with high numbers of Heinz bodies, characteristic of oxidative damage to erythrocyte membranes caused by SMCO. Onset of the acute form of SMCO poisoning may be so rapid that collapse and death are the first clinical signs. More typically

there is haemolytic anaemia with secondary haemoglobinuria, pallor, jaundice, tachycardia and increased respiratory rate. Blood haemoglobin levels return to normal about three weeks after removal from SMCO-containing feedstuffs.

Autumn brought a number of cases of **acorn toxicosis**. Seven animals from a mob of 25 grazing a paddock heavily contaminated with acorns in the Manawatu were clinically affected. They had blood in the faeces, decreased gut sounds and were severely dehydrated. Four animals had serum urea >300 mmol/l (reference range 2.7–12.3). It is reported that serum urea >50 mmol/l indicates a poor prognosis. Six animals subsequently died, including those sampled. Post-mortem examination findings included haemorrhage in the colon and kidneys. Histologically the renal lesions were characteristic of acorn toxicosis. In the cortex there were groups of tubules with segmental epithelial degeneration, necrosis and loss. In the renal medulla scattered tubules were dilated and contained intraluminal granular casts.

Cows in Otago developed photosensitivity after grazing turnips. Serum gamma-glutamyl transferase (GGT) activities were >1500 IU/l (reference range 0–36). Serum GGT levels this high are consistent with **hepatogenous photosensitisation**. Toxicity is attributed to glucosinolates that reach high levels in the leaves of turnip crops under drought stress. The pathogenesis of the liver damage remains unknown.

Two weeks after drying off a nine-year-old dairy cow in the Bay of Plenty was noticed to be falling behind the mob, and had a stiff unco-ordinated gait. The following morning the cow had bilateral hyphema (haemorrhage into the anterior chamber of the eye). In addition she was blind, distressed and anorexic. A complete blood count showed severe **thrombocytopenia**, which explained the hyphema. Five days later the hyphema had resolved. The platelet numbers had rebounded and overshot the upper end of the reference range, meaning there had been a strong regenerative response. Transient thrombocytopenia is diagnosed sporadically in cattle, but the cause is unknown. Speculation of an immune-mediated process has provided justification for treatment with corticosteroids, but affected cows may recover spontaneously without treatment.

Sheep

On a King Country farm 800 two-tooth ewes were shorn and drenched, and separated into two mobs of 500 and 300. Between one and two weeks later eight animals died from among the mob of 500. *Salmonella Hindmarsh* was cultured from the faeces of one of the dead animals. Interestingly, there were no deaths in the other mob.

There was a classic case of chronic **copper toxicosis** in a sheep from Horowhenua, but unusually, the affected sheep presented alive. The attending veterinarian reported lethargy, anaemia, icterus and haematuria. The sheep was euthanased and a post-mortem

examination carried out. Gross findings were icterus of all body fat and gunmetal-black discoloration of the kidneys. The liver copper level was 5,200 mol/kg (reference range 95–2,000) and the kidney copper level was 1,500 mol/kg (reference range 0–157).

Microscopic findings included filling of the renal tubules with brightly eosinophilic homogeneous to granular material consistent with haemoglobin. The liver had mild to moderate dissecting biliary proliferation and portal fibroplasia, consistent with subacute to chronic **ragwort poisoning** (*Senecio jacobaea*). There were mild hepatocellular changes consistent with increased hepatocyte turnover, and marked biliary stasis. A copper-specific histochemical stain demonstrated copper within hepatocytes and macrophages.

Sheep efficiently absorb dietary copper and can store excess amounts in the liver. As this approaches toxic levels there is increased hepatocyte turnover. So-called chronic copper poisoning occurs when further insult, such as pyrrolizidine alkaloids from ragwort, injures the hepatocytes. The injured hepatocytes release copper into the bloodstream, causing an acute haemolytic crisis which is rapidly fatal.

Camelids

In the Auckland region four of six adult llamas presented with severe unilateral or bilateral **corneal oedema**. All affected animals exhibited blepharospasm (excessive blinking) exacerbated by direct sunlight, and variable epiphora (increased tear production). None of the affected animals appeared to have significant visual impairment. They were otherwise in good health and body condition, and had normal appetite. A mixture of bacterial contaminants was cultured from conjunctival swabs, but not *Moraxella* sp., the causative agent of pink-eye. One of the affected animals had slightly raised GGT, GLDH and AST, indicating mild liver damage. The two cria on the property were still nursing and remained unaffected.

All the llamas were grazing pasture and supplemented daily with pellets containing zinc for facial eczema prevention. This year had been a particularly bad season for **facial eczema** in the district, with *Pithomyces chartarum* counts up to 35,000 spores/g pasture. However, the paddocks grazed by the affected animals had spore counts of 100,000–785,000/g. *P. chartarum* spores produce sporidesmin, which has a direct cytotoxic effect on contact with tissues. To prevent aerosolised fungal spores entering the eyes while grazing the llamas were removed to covered yards and fed on hay. The corneal oedema resolved in a few weeks. Fungal cultures of the conjunctival swabs produced heavy growths of *P. chartarum*, confirming the presumptive diagnosis.

Deer

In late autumn to early winter there were cases of clinical **verminous pneumonia** caused by *Dictyocaulus* sp. A Waikato herd lost 12 weaners from a mob of 80 that had been drenched five weeks previously. At post-mortem examination the only abnormality was lungworms in the airways. Histology findings were typical of

verminous pneumonia, with numerous parasites in airways and flooding of alveoli by serofibrinous exudate and eosinophils.

Avian

In Northland a flock of hens with two-week-old chicks experienced an epidemic of periorbital scaly lesions. Histologically the lesions were characteristic of **fowl pox**. There was epidermal proliferation and ballooning degeneration with numerous eosinophilic intracytoplasmic inclusions.

A three-year-old female guinea fowl on public display in the lower North Island developed scaly leg lesions. Microscopic examination found marked compact orthokeratotic epidermal hyperkeratosis, with tunnels containing cross-sections of mites. This finding is characteristic of **scaly leg** caused by *Knemidocoptes mutans*.

Dog

A one-year-old castrated male huntaway from the east coast of the North Island presented with bilaterally enlarged thyroids, each measuring 100 x 70 x 40 mm. Histologically the features were characteristic of hyperplastic **goitre**, with large follicles lined by stratified epithelium thrown into papilliform folds. In the 1970s and 1980s there were published reports of farm dogs developing goitre when fed solely on mutton.⁽¹⁾

Reference

- (1) Nuttall, WO. Iodine deficiency in working dogs. New Zealand Veterinary Journal 34(5), 72, 1986.