

QUARTERLY REVIEW OF DIAGNOSTIC CASES – APRIL TO JUNE 2010

Gribbles Veterinary Pathology

CATTLE

Five **abortions** occurred over three days in a 550-cow Canterbury dairy herd. Two foetuses were submitted for laboratory investigation. One had myocardial, brain and muscle lesions typical of *Neospora* infection. The other had lesions in skeletal muscle, which were also consistent with *Neospora* infection. Sera from four aborting cows all had high titres of 1:2000. Titres greater than 1:600 are consistent with recent *Neospora* infection or recrudescence of infection, which are the most likely cause of these abortions.

A group of 365 cows from a 930-cow dairy herd in Canterbury was dried off and given dry-cow therapy. Within 72 hours after drying off three had developed severe acute **mastitis** and died. Two more became affected within 96 hours. Cultures of the milk from two of the cows grew *Pseudomonas aeruginosa*. All affected cows had low somatic-cell counts throughout the season, with most of them having cell counts below 50 000 cells per ml for most of the season. Weather and paddock conditions at the time were good, and the cows' udders were clean and dry. However, the dry-cow therapy tubes had been placed in warm water to aid insertion and the teats had been sprayed as the cows left the shed. It is suspected that the water in the buckets was the source of the *Pseudomonas*.

This case is of concern, as in a previous outbreak of *Pseudomonas* mastitis associated with dry-cow therapy many cases did not show up until the cows calved, and most of the affected cows died (Coates, 1998). Since then, two further episodes of *Pseudomonas* mastitis after the administration of dry-cow therapy have been diagnosed. In one of these cases the dry-cow therapy tubes had again been warmed in water that became exceedingly dirty.

Two six-month-old calves in a group of 300 on a Canterbury dairy farm were found dead, and another four were depressed and lethargic. Post-mortem examination revealed pale kidneys with petechiae, and histological examination revealed tubular necrosis. The calves had grazed a paddock three weeks earlier that had oak trees with large numbers of acorns on the ground. Acorn toxicity was diagnosed.

A North Canterbury dairy cow had mastitis 12 days after drying off. The animal was recumbent and there was no response to tylosin treatment. When the milk

was cultured there was a heavy predominant growth of *Escherichia coli*. Many intra-mammary infections with this organism are mild and self-limiting but some can be more severe and recurrent. Antibiotic sensitivity testing was not requested.

After a five-year-old South Canterbury dairy cow aborted the foetus was submitted for laboratory investigation. The pleural fluid from the foetus was negative to a bovine viral diarrhoea (BVD) antigen ELISA test. Histological examination of the foetal tissues showed mild lymphoid infiltrates in the liver, heart and lung. These were non-specific but suggested exposure to some infectious disease. The foetal stomach contents were cultured and a heavy pure growth of *Escherichia coli* was isolated. This organism is a sporadic cause of bovine abortion.

Parasite infections were problematic during this quarter, especially in young animals. Reports of diarrhoea and death were common, and often associated with marked thickening of the abomasum at post mortem. Histopathological examination of the abomasum usually revealed diffuse nodular hyperplasia and multiple immature **ostertagia** nematodes encysted in the lamina.

In a mob of 60 nine-month-old Jersey heifers from the Wairarapa, four had died and eight had diarrhoea. **Verminous abomasitis** and **enteritis** were confirmed in the dead animals. A faecal egg count of 2 800/g was recorded from the affected animals. *Yersinia* faecal culture and bovine viral diarrhoea (BVD) antigen tests were negative.

In another case of ill-thriven one-year-old cattle with diarrhoea, average faecal egg counts were 1 500/g. *Salmonella* Typhimurium and *Yersinia pseudotuberculosis* were also cultured from faeces, confirming multi-factorial causes for the diarrhoea.

Investigations of ill-thrift in weaners were often associated with selenium deficiency. In a typical case from the Manawatu, diarrhoea and occasional deaths were reported in a mob of 10-month-old Friesian heifers. Serum selenium concentrations ranged from 60–130 nmol/L (normal 140–1000), confirming marked **selenium deficiency**. Serum copper concentrations were within the normal range (8–18.8 umol/L). Two heifers had elevated pepsinogen concentrations of 3.2 and 3.3 IU/L (normal 0–2.6), indicating abomasal damage which was most likely due to **parasitism**.

In another case of **selenium deficiency** from the Rangitikei, 30 nine-month-old Friesian heifers and steers from a mob of 240 were ill-thriven. Many were in poor condition with diarrhoea. Four were euthanised and a post-mortem examination revealed significant **lungworm** burdens. In addition, faecal egg counts ranged from 50–5400 eggs/g. The serum selenium concentration ranged from 40–80 nmol/L, confirming that selenium deficiency was contributing to ill-thrift. Two other cases, from the Wairarapa, where ill-thrift and diarrhoea was investigated in nine-month-old heifers, found serum selenium concentrations averaging 30 nmol/l and 100 nmol/l. In both these cases the sick heifers were also tested for the presence of BVD virus, but this was not detected.

Cases of **yersiniosis** were recorded from heifers in Taranaki. In one group of 150 Friesian yearlings, half had diarrhoea. In another group of 60 nine-month-old dairy heifers, 15 were febrile and had evidence of watery diarrhoea. In each case *Yersinia pseudotuberculosis* was cultured from faeces.

Heightened awareness of **bovine viral diarrhoea** (BVD) and control schemes on some farms have led to investigations of poorly growing animals. In one case from the Wairarapa a two-year-old cow rapidly lost condition and developed haemorrhagic diarrhoea. A BVD antigen ELISA on serum was positive, confirming BVD virus infection presenting as **mucosal disease**. In a second case, a six-month-old beef calf developed diarrhoea. A BVD antigen ELISA on serum was positive, confirming viraemia most suggestive of **mucosal disease**. If there is any doubt, and transient infection is suspected, the ELISA should be repeated after 28 days. Persistently infected animals will return sequential positive results, while transiently infected animals return one positive, then one negative result.

Favourable weather conditions in autumn encouraged growth of *Pithomyces chatarum* (the fungus producing spores containing sporidesmin toxin and causing **facial eczema**). This toxin affects bile ducts when ingested. Measurement of gamma-glutamyl transferase (GGT) concentration predicts the degree of bile-duct damage. Forty-seven recently purchased Jersey cows from Taranaki were serum sampled to determine whether they had been exposed to sporidesmin. Only five had GGT concentrations in the normal range (9–39 IU/L). Of the

remainder, 14 had mild biliary damage (100–300 IU/L), six had moderate damage (300–600 IU/l) and 22 had severe damage (>800 IU/L).

A black eight-month-old Friesian calf from Taranaki developed conjunctivitis and crusting of the muzzle. The veterinarian suspected infectious bovine rhinotracheitis (IBR) but also wanted to rule out **facial eczema**. A serum sample tested by IBR ELISA was negative but the GGT concentration was 1 501 IU/L, confirming severe biliary damage. Dermatitis results from secondary hepatic photosensitisation.

Later in the autumn sporidesmin exposure was suspected as a cause of ill-thrift. Twenty Friesian cows from a herd of 300 in Taranaki had lost weight. Serum GGT concentrations from four of the affected animals ranged from 1496–2461 IU/L, confirming sporidesmin exposure and severe biliary damage.

Two seven-day-old Friesian bull calves from Hawke's Bay were weak and dehydrated, and the veterinarian suspected insufficient colostrum ingestion. This was confirmed when serum GGT concentration was measured at 59 and 70 IU/L. If sufficient colostrum has been ingested, GGT concentrations should be >130 IU/L in calves seven days old. Diarrhoea was caused by large numbers of **cryptosporidia**, and **rotavirus** antigen was detected in the faeces of these calves.

Three five-week-old Friesian calves in the Rangitikei developed dysentery. Faecal examination revealed extremely high numbers of coccidia oocysts, confirming **coccidia** infection.

Two 10-day-old Friesian calves from Rangitikei were ill and one had died from a mob of 30. The calves collapsed suddenly after being in good health the previous day. They had foul-smelling, watery diarrhoea. *Salmonella* **Typhimurium** was cultured from faecal samples of both.

Two more cases of *Salmonella* **Typhimurium** were diagnosed in adult cattle. One was an adult dairy cow from the Wairarapa and the other from Otaki. Both presented with acute diarrhoea.

Two adult Devon beef cows from the Wairarapa with calves at foot died suddenly while grazing rank, mature pasture. Another cow was recumbent but very agitated and had an elevated heart rate. A post-mortem examination of one dead cow did not reveal

any abnormalities. The serum magnesium concentration of the recumbent cow was 0.19 mmol/L (normal range 0.6–1.23), confirming a diagnosis of **hypomagnesaemic tetany**.

Autumn is the most common season for bovine abortions and various aetiologies can be responsible. *Neospora* is most common in the middle trimester, and diagnosis is by immunofluorescent antibody titres (IFAT) on the dam sera. In one case from Taranaki where the foetus was too autolysed for analysis the IFAT was >1:2000, indicating recent infection or recrudescence of infection. In the last trimester, culture of aseptically collected foetal stomach contents, plus histopathology of foetal tissues and placenta, are the most effective diagnostic tools. In two foetuses from Taranaki with evidence of bacteraemia and placental necrosis, gram-positive bacterial rods were present. Microbiology confirmed *Listeria monocytogenes* from the stomach contents of one calf. The other was not sampled.

After four abortions on a Rangitikei dairy farm, a foetus was collected for investigation. Along with placentitis and meningitis in the calf, *Aspergillus* was cultured from stomach contents.

Two calves aborted on a Manawatu dairy farm, one with plaques on the skin. Histopathology showed these plaques were a mixture of fungal hyphae and keratin. *Aspergillus* was cultured from the stomach contents.

Mortierella spp. were cultured from the stomach contents of a Hawke's Bay aborted foetus. Histopathologic examination of the brain revealed **fungal encephalitis** and **thrombotic meningitis**.

Staphylococci were cultured from the stomach content of an aborted Friesian foetus from the Wairarapa. Fibrin filled many alveoli of the lung, suggesting this was a pathogenic infection and cause of foetal death.

One Hereford cross beef cow from a herd in the Wairarapa had aborted about 10 days before she was examined because of weight loss. Another cow had died recently while aborting a decomposed foetus. A microscopic agglutination titre for *Leptospira hardjo* revealed a titre of 1:1600 in the surviving cow, confirming recent **leptospirosis**. The cows had not been vaccinated.

A six-year-old dairy cow from the Rangitikei was found recumbent, blind and stargazing, with muscle tremors

and nystagmus. She was euthanised and the brain was removed and examined as part of the TSE Surveillance Scheme. There was no evidence of TSE but there was extensive necrosis and inflammation associated with numerous branching fungal hyphae. **Fungal encephalitis** was diagnosed.

Eighteen mixed-age dairy cows died overnight on a Taranaki farm after grazing a new grass paddock. Aqueous humour collected from four of them was positive for nitrate, confirming **nitrate toxicity** as the cause of death.

Four mature Friesian cows from Hawke's Bay were being milked once daily in the evening, then left for the rest of the time in an overgrown tanker-track area strewn with rubbish. Veterinary attention was sought after two of the cows were found convulsing. Intravenous magnesium and calcium had no effect, but one cow responded to sedation. The other died. On post-mortem examination a powdery, white sediment was found in the rumen. Similar sediment was found in a drum where the farmer had been mixing a nitrogenous fertiliser called "Less N". The material had become mixed with rainwater and the cows had drunk it. Pre-treatment serum samples from the recovered cow revealed a bicarbonate concentration of 15 mmol/L (normal range 26–34), indicating the cow had metabolic **acidosis**. Magnesium and calcium concentration were normal. These findings are consistent with **urea toxicity**.

Two mobs, one of mixed-age Friesian cows and another of year-old Angus/Hereford cross beef heifers, were being fed a mixture of onions and maize silage. They were not growing as expected and some appeared anaemic on examination. Six of the Friesians and four of the cross heifers were sampled for serum and blood. Nine had a decrease in the packed cell volume (PCV), haemoglobin concentration and red blood cell count (RBC). PCV ranged from 0.10–0.22 L/L (normal range 0.24–0.46), haemoglobin 32–76 g/L (normal range 80–140) and RBC $1.48\text{--}3.31 \times 10^{12}/\text{L}$ (normal range $5\text{--}7.7 \times 10^{12}$), confirming **anaemia**. Reticulocyte counts and nucleated red cells were increased in all the anaemic animals, indicating that regeneration was occurring. Heinz bodies were present in all samples. These findings are consistent with **onion toxicity**. Onions contain an oxidant, n-propyl disulphide, which affects erythrocytes and leads to intravascular haemolysis with Heinz body formation.

Over a week, three abortions affected a group of 40 rising two-year old heifers at a Taranaki farm. Histology revealed little in one autolysed third-term foetus, except for increased numbers of clusters of leukocytes in blood vessels. A second foetus had multiple intravascular colonies of morphologically uniform bacteria in a variety of organs. There was little reaction to the bacteria except in the placenta, where some small foci of necrosis and inflammation were present along with bacteria which were morphologically the same. Culture of stomach contents was positive for *Listeria monocytogenes* in two foetuses.

Three two-year-old beef heifers from Marlborough had a short history of lethargy and anorexia, and one was also ataxic. One died the next day. Necropsy showed reddened lymph nodes and consolidation of the lungs. The animal was BVD antigen ELISA negative. Histologically there were areas of periacinar necrosis and multiple small foci of mucosal necrosis in the abomasum and small intestine containing numerous small gram-positive coccobacilli. Fibrinous thrombi filled some submucosal vessels. The animals had been fed old haylage and the submitter was concerned about listerial enteritis, as has been seen in sheep. The gram-positive bacteria in the areas of necrosis were consistent with this, and culture of intestine and lymph node was negative for *Salmonella* but yielded heavy growths of *Listeria monocytogenes*. The periacinar **hepatic necrosis** was not consistent, however, and remains unexplained.

Salmonella Typhimurium was isolated from the faeces of a calf that died on a Waikato farm. Histology revealed typical bacterial enteritis.

A property in Marlborough had eight abortions and premature calves. The calf examined had lived for 24–36 hours and had ulceration of the oral and nasal mucosa as well as the distal limbs. There was also mild **arthrogryposis**. Histology of the tongue and skin of the distal leg revealed erosions or ulcers of the epidermis. The superficial layers of epidermis adjacent to these areas were spongiotic. Many of the basal epidermal cells contained large eosinophilic intracytoplasmic inclusions. The underlying stroma appeared hypercellular and, in some areas, slightly myxomatous. The changes were characteristic of **familial acantholysis** (Jolly et al 1973).

Dairy cattle on pasture on a Southland farm were being fed out whole-crop silage from a large stack. One morning

six cows were found dead in the paddock, one died in yards during milking, and another in the same yard was found ataxic with a profuse diarrhoea. This cow died during metabolic treatment by the farmer. Closer examination of the area on the silage stack face from where the most recent silage samples had been taken from revealed a discoloured, slightly damp area two to three metres in diameter. Water had leaked through a hole in the cover and a large amount of mould was present. This part of the stack was removed and there were no more cases. The acute deaths of these cows may have been caused by a **fungal mycotoxin** in the spoiled silage.

A mob of 140 dairy cows on a Southland farm was placed on a new grass paddock with a substantial growth of fathen (*Chenopodium album*). The next morning the farmer found one dead and seven recumbent with clinical signs suggestive of **milk fever (hypocalcaemia)**. All recumbent cows responded to treatment with calcium. The serum calcium of one affected cow was 1.27 mmol/L (normally >2.0 mmol/L). Fathen contains high concentrations of oxalates, which bind calcium and produce clinical signs of hypocalcaemia.

Over a seven-day period in mid-July, five of a mob of 100 heifers on a Southland dairy farm became severely ill and one died. They all aborted and most had to be assisted to deliver the dead calves. *Salmonella* Brandenburg was isolated from one dead calf.

SHEEP

Lesions of **neuroaxonal dystrophy** were present in the lumbar spinal cord and brain of a lamb and a two-tooth ewe from a small flock on a 10-acre block in North Canterbury. The owner has had wobbly, incoordinated lambs each year for about five years and the lambs have remained that way into adulthood. The condition has been evident about weaning time and the affected animals look similar to cases of ryegrass staggers but do not get worse when chased around. Eighty lambs were born this year and six to 10 had the condition, which is assumed to be genetic.

Salmonella Hindmarsh was cultured from multiple cases of deaths in ewes. Most cases were from the Wairarapa, with some from the Manawatu. Mob sizes ranged from 300–1200 and the ewes were two to six years old. Typically four to 10 ewes were reported to have died over three to seven days before veterinary attention was requested. In some cases there were no obvious lesions at post mortem,

while in other cases reddening of the gastrointestinal tract, dysentery and enlarged mesenteric lymph nodes were reported. One case described pericardial and pleural effusions. *Salmonella* Hindmarsh was cultured from intestinal contents in each case, and also from mesenteric lymph nodes in one case.

Deaths and ill-thrift in ewe hoggets were investigated in the Wairarapa and Hawke's Bay. In one case 20 nine-month-old hoggets were dead and 30 were ill thriven from a mob of 850. Surviving animals were reported with green-stained diarrhoea. At post-mortem examination the only gross finding was intestinal reddening. Histopathological examination of the abomasum and small intestine found numerous **nematodes** in the lumen and lamina propria. Villous atrophy and inflammatory cell infiltrates reflected the host's response to the infestation in this case of **gastrointestinal parasitism**. In another mob of 600 eight-month-old hoggets, 30 had died. Again nematodes were visible in the intestine on histopathology, both within the lumen and buried in the tissue. Faecal egg counts in this case were 2550 eggs per gram.

An eight-month-old ewe hogget from Hawke's Bay was noted circling before dying. Lesions of meningoencephalitis in the brain stem, associated with low numbers of gram-positive bacterial rods, confirmed **listeriosis**. Traditionally this disease is expected in ewes being fed silage in winter.

Three year-old ram hoggets in a mob of 280 were found dead in a paddock, and 12 were observed to have diarrhoea. On post-mortem examination of two of the dead rams there was marked fibrinous peritonitis and pleuritis. When the lung was sectioned a purulent exudate exuded from the cut surface. A heavy growth of *Arcanobacterium pyogenes* was cultured from the liver and lung of both rams, confirming *Arcanobacter* infection and **septicaemia**.

Ten of about 300 Texel cross ram hoggets in a mob on a Southland farm had died of unknown causes during the previous month (May). The farmer then noticed that a further four hoggets had difficulty walking, in each case because of a large painful testis. The affected rams were euthanised and the affected testes examined. They all showed chronic changes, with extensive fibrosis containing pockets of green, purulent exudate. The unaffected testes were atrophic. Bacteria resembling

Actinobacillus seminis were cultured from an affected testis. The cause of death of the 10 dead hoggets was not established.

From mid-April to mid-May there were many outbreaks of **intestinal parasitism** in Southland hogget flocks. The weather was possibly slightly warmer and wetter than in previous years, perhaps enabling a rapid hatch of high numbers of infective larvae. Most of these outbreaks occurred in hoggets that had been drenched only two or three weeks before. The signs of acute diarrhoea, weight loss and death of affected animals were so severe that experienced veterinarians investigating these outbreaks initially thought the cause was acute salmonellosis. In one outbreak, faecal egg counts from affected animals were relatively low, yet a gastrointestinal worm count revealed 72 000 **nematodes**, mostly immature non-egg-laying stages. In this outbreak 35 hoggets died over 48 hours.

There were several outbreaks of diarrhoea and deaths in mature ewes on Southland sheep farms during early May. On most of these farms 20–30 ewes died and *Listeria monocytogenes* was isolated from the faeces of affected ewes. The source was spoiled baleage that had been contaminated by water. In some cases this baleage had been made the previous season.

Twenty-six ewes were found down after having been yarded for 24 hours and then put back on the same paddock. Twenty of them responded rapidly to treatment with calcium. The remainder took another 24 hours. **Calcium deficiency** was indicated.

During January a Southland farmer gave a mob of 1300 ewes 10 g oral copper capsules – a dosage normally recommended for animals in the 100–200 kg weight range. He thought his pasture was too high in molybdenum. He started finding ewes dead in early March and by mid-May 60 had died. One animal was necropsied and found to be very jaundiced, a characteristic of chronic copper poisoning in sheep. The liver copper was 10 160 $\mu\text{mol/kg}$ (toxic level >2800) and the kidney copper was 1030 $\mu\text{mol/kg}$ (toxic level >150). These concentrations are consistent with **copper toxicity**.

A group of 1700 ewes on a farm in Southland was put on a paddock that had been initially sown with swedes. The swede crop had failed, meaning any that did grow were quite small, so the paddock was mainly re-grown grass. The ewes were put on to a break and also given silage

from a stack that was being fed to cattle without problems. The next day the ewes appeared very hungry, so they were given a much bigger break. On the third day the farmer found about 100 of them were very lame on all four feet. On close examination the affected feet appeared hot, but there was no swelling and there were no external lesions. All ewes were moved off the paddock and fed grass and hay, and all but one recovered over the next couple of days. The affected paddock and silage were examined and no ergotised ryegrass seeds or toxic plants were found. This was most likely an outbreak of acute **laminitis** – something that is rarely reported in sheep and is usually associated with the feeding of concentrates. In this outbreak the poorly-grown swedes may have provided a diet similar to that of a concentrate ration.

DEER

Cases of *Yersinia pseudotuberculosis* infection in red deer were confirmed from Hawke's Bay and the Rangitikei. In all cases the mobs were six-month-olds grouped in herds of 200. From two to 20 animals were affected, with two to six dying. Culture from either faeces or small intestinal contents identified *Yersinia pseudotuberculosis* in each case. *Yersinia* infections are associated with the stress of inclement weather and insufficient feed in young deer.

In a line of 100 rising three-year-old hinds in the Rangitikei, 15 were ill thriven. Serum samples collected from five of the poorest animals had serum copper concentrations of <3–6 $\mu\text{mol/L}$ (normal range 8–18.5), confirming hypocupraemia. Other enteric diseases leading to poor copper absorption need to be ruled out to confirm primary **copper deficiency**.

There were many outbreaks of **yersiniosis** caused by *Yersinia pseudotuberculosis* in weaner deer in many parts of Otago and Southland from late April to mid May. Mob sizes varied from 300 to 1000 and the numbers of weaners dying in the affected mobs varied from 10 to 100. Diagnosis was made by culture of intestinal contents and histopathology of the lower intestinal tract. Predisposing causes included recent transportation or weaning, combined with poor weather conditions. Most affected mobs had not been vaccinated against this bacterium.

PIGS

A sample of neck muscle obtained from a feral boar in the Wairarapa was submitted. The muscle had multiple heavily mineralised granulomas which were 1 mm in

diameter in cross-section of the muscle, and oval and up to 2 mm long in the longitudinal section. A thin layer of epithelioid cells, lymphoid cells and occasional foreign-body giant cells surrounded the mineralised necrotic tissue. There was an outer fibrous capsule. No parasites or parasite remnants were detected in these granulomas. One normal viable sarcocyst was seen in a muscle fibre. A diagnosis of **multifocal granulomatous myositis** was made. It is generally assumed that these granulomas are a reaction to degenerating sarcocysts. They are more common in older animals. Three species of *Sarcocystis* are reported in swine: *S. miescheriana* (with a pig/wild Canidae cycle), *S. porcifelis* (with a pig/cat cycle), and *S. suis* (with a pig/human cycle).

CANINE AND FELINE

A nine-year-old spayed Alaskan malamute with several months' history of pancreatitis and abdominal pain was found to have an intestinal **lymphoma** which had resulted in jejunal perforation and septic **peritonitis**. Cytological examination of the peritoneal fluid showed intracellular and free bacteria. The population was mixed but consisted mainly of rods. The dog was treated with combination therapy including enrofloxacin, metronidazole and cephalosporins. The abdominal fluid cytology was monitored daily. About three days after surgery the bacterial population had changed and now consisted almost entirely of cocci. Culture resulted in the isolation of *Enterococcus faecalis*, which was resistant to amoxicillin/clavulonic acid, tetracycline, cephalothin, trimethoprim/sulphonamide and penicillin. The dog's condition deteriorated and the owners elected euthanasia.

A three-year-old male miniature poodle in Wellington was taken to a veterinarian for investigation of multiple severe skeletal-joint and ligament problems whereby joints were extremely lax. Lipaemic corneal opacities were also observed, and the dog had an enlarged liver, tender abdomen and an enlarged heart. Haematology revealed a mild anaemia with HB 114 g/L (reference range 120–140) and PCV 0.34 L/L (reference range 0.37–0.55). There was a mild neutrophilia of $13.9 \times 10^9/\text{L}$ (reference range $3.6\text{--}11.8 \times 10^9$) and monocytosis of $2.9 \times 10^9/\text{L}$ (reference range $0.2\text{--}1.5 \times 10^9$). Lymphocyte numbers were normal. There was a mild hypoalbuminaemia of 30 g/L (reference range 33–44) and increased serum CK concentrations of 1654 U/L (reference <386). The blood smear contained large numbers of intracytoplasmic azurophilic granules in all neutrophils. Neutrophils were also seen with

nuclei resembling those seen in myelocytes, and band cells were also seen. Although the lymphocyte number ($2.5 \times 10^9/L$) was within the reference range of $1-4.8 \times 10^9$, the lymphocytes also contained smaller numbers of azurophilic intracytoplasmic granules. Toluidine-blue stains were negative. The intracytoplasmic inclusions resembled those described in lysosomal storage diseases including mucopolysaccharidosis. A diagnosis of probable **lysosomal storage disease** was made. The skeletal defects described by the clinician resembled those described in mucopolysaccharidosis type VII, which has not been seen previously in miniature poodles though it has been reported in New Zealand huntaways.

A five-year-old spayed domestic shorthaired female cat from Wainuiomata developed a firm ulcerating mass in the groin. The affected tissue and surrounding fat were surgically removed and the cat recovered. On histopathology there was extensive liquefactive necrosis surrounded by epithelioid macrophages, neutrophils and foreign-body giant cells. Occasional acid-fast organisms were visible in the necrotic debris. About a week later the cat was returned for examination, as it was coughing, and the owner reported coughing had been present for three months. As **mycobacterial infection** was the main differential diagnosis, the owner elected to euthanise the cat. On post-mortem examination there was marked enlargement of the mediastinal and bronchial lymph nodes containing purulent material. Abscesses were also visible in the lung, and a mineralised abscess expanded one mesenteric lymph node. Further acid-fast organisms were identified in the necrotic material within the lymph nodes. As **tuberculosis** was one differential for these lesions, the local Medical Officer of Health was notified and instituted in-contact testing of the owner and veterinary staff. The owner of the cat had only recently obtained it from the local RSPCA so did not know its origin. PCR testing confirmed the presence of *Mycobacterium bovis* DNA.

NON-POULTRY AVIAN

In April 2009 a Waikato bird fancier bought a new aviary stocked with two budgerigars, two cockatiels and two quail. The birds were well until 1 January 2010, after which one budgerigar became ill and died on 10 January after losing weight and having diarrhoea. The second died on 3 March and the third during June, both after developing diarrhoea. Tissues from the third bird were sent to the laboratory. Histopathological examination

of the proventriculus showed that the superficial mucosa was partially sloughed and infiltrated with broad sheaves of large elongate megabacteria consistent with *Macrorhabdus ornithogaster*. The propria was infiltrated with moderate numbers of lymphoid cells. **Megabacteriosis** was diagnosed (Christensen et al, 1997).

Blood samples were received from a gannet (*Sula bassana serratator*) found in Hawke's Bay. Atypical red-cell inclusions were seen on the smears and MAFBNZ was contacted. The smears were referred to Massey University for a second opinion. The inclusions were clear, irregular and slightly refractile, and occasionally at the margin contained amorphous basophilic material, which was thought to be artefact or persistent cytoplasmic organelles. A blood sample was sent for PCR for avian malaria, which was negative.

A six-year-old male red-crowned parakeet (*Cyanoramphus auriceps*) from a Southland aviary was euthanised and necropsied after extensive feather and weight loss. Six out of 10 of the same species from the same aviary had died over the previous 12 months with similar signs, but these birds had not been examined. There were no gross lesions in the dead bird. Feathers were negative for psittacine beak and feather circovirus by PCR. Histopathological examination of the affected skin and a range of other tissues showed severe skin changes of a severe **hyperkeratosis**. Almost every feather follicle was dilated and contained keratin, mite eggs and one or two sarcoptiform mites. A formalin-preserved piece of affected skin was partially digested in KOH, leaving large numbers of sarcoptiform mites which were teased out using a dissecting microscope and identified as *Knemidocoptes gallinae*, the **depluming mite**. These are not species specific and have been found on a variety of birds including fowls, pigeons, pheasants and geese.

HORSES

Three horses were examined with areas of **alopecia** over the saddle area. **Trichophyton equinum** was recovered from a sample taken from one horse.

A swab from a two-year-old warmblood horse was received with no history. *Staphylococcus aureus* was isolated and the organism was found to be resistant to oxacillin, so was sent for further testing. It was confirmed as a **methicillin-resistant S. aureus (MRSA)**. When tested against the antibiotic methi/flucloxacillin, the MIC was 256 ug/ml. (*S. aureus* is considered susceptible to

methi/ flucloxacillin if MIC \leq 2.0 ug/ml and resistant when \geq 4.0 ug/ml). It was then sent to ESR Kenepuru for typing and found to be **MRSA Spa type t064**. Pulsed-field gel electrophoresis (PFGE) was also performed. The isolate was found to be 84 percent similar to, but not identical with, three equine MRSA isolates from the North Island.

A six-month-old thoroughbred weanling in the Wairarapa was not gaining weight despite eating well. It showed a moderate **anaemia** with HB 77 g/L (reference range 100–180) and PCV 0.23 L/L (reference range 0.32–0.55), possibly as a result of blood loss though the cause was not obvious. There was a neutrophilia of $11.7 \times 10^9/L$ (reference range $2.7\text{--}7.4 \times 10^9$), monocytosis of $3.5 \times 10^9/L$ (reference range $0\text{--}0.3 \times 10^9$), lymphocytosis of $5.4 \times 10^9/L$ (reference range $1.8\text{--}4.4 \times 10^9$), increased fibrinogen of 10 g/L (reference range 2–4) and hyperglobulinaemia of 47 g/L (reference range 20–39), indicating marked inflammation. There was also hypoalbuminaemia of 21 g/L (reference range 27–39). Potential causes were GI and urinary losses, decreased hepatic production and severe exudation, for example peritonitis. The anaemia gradually improved and the cause was not found.

Two equine **abortions** were investigated during this quarter. Both mares were multiparous thoroughbreds, one from Taranaki and the other from the Wairarapa.

Both aborted at eight months and a necrotising and suppurative **placentitis** was seen on histopathology. *Streptococcus dysgalactiae* ssp. *equisimilis* was cultured from the Taranaki mare's placenta, and *S. equi* ssp. *zooepidemicus* from the Wairarapa mare's foetal tissues.

Over several months several young horses in a mob of 20 on a runoff in Otago developed weight loss in spite of adequate feed and frequent worming. Diarrhoea was not seen. The owner euthanised one severely affected horse. When another developed similar signs a couple of weeks later it was examined by a veterinarian and showed severe weight loss and marked dependant oedema. A blood sample showed a severe **panhypoproteinaemia** with an albumin of 10 g/L (normal range 28–38). This suggested a massive loss of protein through a damaged gastrointestinal tract. As a guarded prognosis was given, the horse was euthanised and necropsied. The major lesions noted were very dark colouration of the liver and a marked thickening and fissuring of the mucosa in an extensive area of the large intestine.

Abdominal lymph nodes also appeared prominent. Histopathological examination of the liver showed a marked **haemosiderosis**, probably due to a high intake of dietary **iron**. Sections of the affected large intestine showed a mucosa packed with **cyathostome** larvae. The submucosa showed a large number of microabscesses, often containing larval fragments. The remaining affected horses were successfully treated with an anthelmintic approved for cyathostomes, combined with steroids and antibiotics.

LLAMOIDS

A three-year-old female alpaca from the Wairarapa presented in lateral recumbency with abdominal pain. Biochemical testing on serum samples revealed marked increases in GGT of 1676 IU/L (normal range 2–190) and GLDH of 468 (normal range 2–19), confirming severe **liver damage**. This was most likely due to consumption of **sporidesmin** toxin, but other causes such as liver abscesses or toxins were not ruled out.

POULTRY

A frozen poultry carcass with extensive skin lesions over the ventral surface and on the legs was sent for examination. There were slightly brownish thickenings up to 5 mm in diameter around the feather follicles. In some regions the lesions coalesced. Histology revealed the epidermis was largely missing. The remaining epidermis and superficial dermis was degenerate, likely from freezing/thawing and scalding during feather removal. There were infiltrates of degenerate mononuclear cells in the dermis, often around blood vessels and feather follicles, sometimes forming solid sheets and infiltrating the underlying adipose tissue. A diagnosis of **dermal lymphoid infiltration** consistent with **Marek's disease** was made.

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CATTLE

Drought in the northern North Island shortened the **facial eczema** season because the climatic conditions were unfavourable for sporulation of *Pithomyces chartarum*. However, when the autumn rain came it remained unseasonably warm and for a short time in May there was a marked spike of sporidesmin challenge.

A mob of underfed calves was moved to a coastal Waikato property and over the following two weeks two died. The calves were treated with an endectocide containing abamectin. The next morning two were dead and eight were recumbent. The abomasum of the dead calves displayed the textbook “Morocco leather change” caused by severe **ostertagiosis**. Microscopically the livers had severe bridging portal fibrosis and biliary hyperplasia that replaced about 50 percent of the liver parenchyma. These lesions are the typical sequelae of severe **sporidesmin toxicosis**. Abamectin is not recommended for calves under 100 kg, owing to potential toxicity. In this case not only were the calves heavily parasitised but also their functional hepatic mass was severely reduced. The liver lesions are likely to have resulted in a lower-than-normal rate of **abamectin clearance**, and the clinical signs were consistent with toxic levels in the plasma.

Preparations containing zinc are administered orally to prevent sporidesmin toxicosis. Controlled-release intraruminal boluses have recently become available but if the coating on the bolus is damaged the rate of zinc release can increase and cause toxic levels to develop. In the Bay of Plenty an adult cow died and the post-mortem findings were anaemia and jaundice. Histologic examination found severe interstitial fibrosis of the pancreas with atrophy of the exocrine acini, haemoglobinuric nephrosis and hepatic centrilobular coagulative necrosis. Pancreatic fibrosis and intravascular haemolysis have been associated with zinc toxicosis. In this case the liver zinc concentration was 470 $\mu\text{mol/L}$ (reference range 11–20; therapeutic/prophylactic levels up to 35), confirming **zinc toxicosis**.

In the Waikato cows with rumen fistulae were simultaneously administered a zinc bolus and a magnesium bolus. One died a week later. Post-mortem examination of the rumen contents revealed that the zinc bolus had broken into fragments. The serum zinc

concentration was 870 $\mu\text{mol/L}$ (reference range 11–20; therapeutic/prophylactic levels up to 35), confirming **zinc toxicosis**. Lesions included abdominal fat necrosis, pancreatic fibrosis, haemoglobinuric nephrosis, and hepatic centrilobular degeneration and necrosis. The remaining cattle had the rumen contents and zinc bolus fragments removed through the rumen fistula.

Owing to the predominantly seasonal calving pattern in New Zealand, the majority of abortion investigations occur in autumn. **Neospora abortion** tends to be most prevalent early in the season. In a typical case, three of a herd of 400 cows slipped their calves in two days. Two of these cows tested positive for *Neospora* by antibody ELISA. A 1.3-kg foetus submitted for examination displayed the multifocal gliosis and necrosis in the cerebrum and midbrain typical of *Neospora* infection.

In late autumn **mycotic abortion** becomes more prevalent. A mob of 600 cows in the King Country was fed silage that had some visible mould. Five of the cows aborted in one week. Unfixed placenta was submitted. There was macroscopic cotyledonary cupping and necrosis and marked thickening of the intercotyledonary areas. The histologic lesions were typical of fulminant mycotic placentitis. There was lytic necrosis of trophoblastic epithelium and the chorioallantois, with scattered fungal hyphae that sometimes extended along blood vessels.

Following the dry late summer across the North Island many replacement calves entered the autumn in light body condition. Following the autumn rains there were many severe outbreaks of **ostertagiosis**. On a typical Manawatu property calves presented with ill-thrift and scouring. Faecal egg counts ranged from 1950–2350 strongyle eggs/g.

An adult cow in the Nelson area was seen in respiratory distress and died the next day. There was gross consolidation of the lung parenchyma. Histologically there was thrombosis of pulmonary vessels, coalescing coagulative necrosis of the parenchyma, patchy haemorrhage and suppurative inflammation populated by numerous fungal hyphae. Classically **mycotic pneumonia** caused by *Mortierella wolfii* follows fungal abortion. In this case abortion was not reported.

In the southern North Island there were a few cases of **salmonellosis**. In one week two dairy cows in a Manawatu

herd became ill and had reduced milk production. Clinical examination findings included a temperature of 38.1°C, heart rate 80 beats/minute, respiration rate 32 breaths/minute, body condition score 4/9, poor gut fill and profuse dark brown watery diarrhoea. *Salmonella typhimurium* was cultured from the faeces of both cows.

DEER

Mixed-age wapiti-cross hinds were in poorer condition than expected given the amount of feed on offer to the mob. One animal in very poor condition was euthanised and at post-mortem examination showed evidence of abomasal parasitism. Histologically there was marked nodular hyperplasia of the abomasal mucosa, associated with intramucosal cross-sections of **nematode parasites**. The findings are consistent with **ostertagiosis**. Faecal egg counts did not indicate heavy parasitism, though in deer these are unreliable as indicators of worm burden. Analysis of liver biopsy specimens from a sample of the mob demonstrated adequate hepatic copper reserves.

PIGS

From time to time samples are submitted for investigation of **abortion** and stillbirth. Two foetuses from a litter that aborted three weeks before the due date of farrowing were submitted from a property in the Wellington region. The sows had been vaccinated against leptospirosis, but the vaccination status with respect to porcine parvovirus was unknown. Heart blood from the two fetuses was positive for **porcine parvovirus** antibodies, and a *Toxoplasma* antibody screening test was negative.

In a semi-commercial Waikato operation a litter of piglets developed diarrhoea 24–36 hours after birth. Three died within the first two days. Faecal samples were submitted from two piglets and *Escherichia coli* K88 was isolated.

SHEEP

An eight-year-old Romney ewe was found cast in the Waikato. It fell to the side when made to stand up, and died within 24 hours. Brain and spinal cord samples were submitted for TSE screening. At the three standard brainstem sites there was oedema, and neurons had intracytoplasmic ageing pigment. The cerebrum displayed subacute laminar cortical necrosis and a diagnosis of **polioencephalomalacia** was made.

In Hawke's Bay 12 out of 990 mixed-age ewes were found dead or moribund, with haemorrhagic diarrhoea. Post-mortem examination revealed ecchymotic haemorrhage

of the caecum, and watery gut contents. The most significant histological findings were erosive typhlitis and embolic microabscesses in the liver, consistent with bacterial showering from the gut. *Salmonella Hindmarsh* was cultured from the gut contents.

In the South Island it is not unusual for gastrointestinal parasitism by *Nematodirus* spp. to cause epidemic outbreaks of disease. In a typical case on a Southland farm 40 out of a mob of 360 replacement lambs were affected by acute onset of diarrhoea, and 22 died. All mobs on the property had been drenched with levamisole six weeks previously, but only one mob was affected. A post-mortem examination was conducted on one dead lamb, and gross thickening of the jejunal wall was noted. A faecal egg count found 11 750 strongyle eggs/g and 550 *Nematodirus* eggs/g. Individual faecal egg counts from nine others in the mob found 950–34 100 strongyle eggs/g (mean 6797) and 0–2300 *Nematodirus* eggs/g (mean 385). The heavy parasite burdens account for the clinical signs.

In Otago 12 ewes out of 1300 died acutely. Post-mortem findings included green, watery diarrhoea, white vulval discharge and marked inflammation of the abomasum and duodenum. Histologically there was marked multifocal abomasitis and enteritis with infiltrates of neutrophils extending into the tunica muscularis. The lesions are suggestive of **enteric listeriosis**. *Listeria monocytogenes* and *L. ivanovii* were cultured from intestinal contents.

GOAT

A Nubian goat in South Canterbury was examined because it had a subcutaneous swelling in the neck that could have been an enlarged lymph node. The owner suspected **caseous lymphadenitis**. A needle aspirate specimen was submitted and *Corynebacterium pseudotuberculosis* was cultured.

COCKATIEL

A faecal sample was submitted from a one-month-old cockatiel in Wellington after it was presented to the attending veterinarian in poor body condition with diarrhoea. A faecal egg count demonstrated 36 600 ascarid eggs/g and a diagnosis of severe **ascariasis** was made.

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