

ANIMALS

Quarterly report of diagnostic cases: October to December 2018

SVS Laboratories

Bovine

Two mature Friesian cows from different farms in Matamata-Piako presented for acute onset of blindness caused by hyphaema. Multiple haemorrhages were also seen in the mucous membranes and skin of one animal. Both animals had **thrombocytopenia** and platelet counts were estimated to be $20\text{--}40 \times 10^9/\text{L}$ in one animal and $< 10 \times 10^9/\text{L}$ in the other (reference range $220\text{--}640 \times 10^9$). No treatment was given and the cows spontaneously recovered over the next week. Immune-mediated platelet destruction was considered the most likely cause, possibly following exposure to an agent which had adsorbed to platelet surfaces.

A 2-year old heifer from Hauraki presented with a fractured forelimb caused by **copper deficiency**. The post-mortem liver copper level was $< 50 \text{ umol/kg}$ (reference range $95\text{--}2,000$). While not common, copper deficiency can be associated with fractures and other musculoskeletal abnormalities such as dropped hocks and flying scapulae.

A 4-month-old Jersey calf from Kaipara presented with bilateral dry sloughing of the ear tips. Biopsies were submitted and showed necro-ulcerative dermatitis with underlying vascular changes characterised by fibrinoid vascular degeneration, thrombosis, oedema and haemorrhage. Differential diagnoses included photosensitisation and ergotism. The submitting veterinarian reported that he had walked the paddock and found weed seed heads infected with ergot, and a clinical diagnosis of **ergotism** was made.

Six animals from a mob of seventy 15-month-old crossbreed heifers from Otorohanga presented clinically with neurological signs and were suspected to have thiamine deficiency or lead toxicity. Two of the animals subsequently died. Blood lead concentrations in three survivors exceeded 0.5 mg/L (toxic level > 0.35), confirming a diagnosis of **lead toxicity**.

A 3-year-old cow from Matamata-Piako presented with a firm 20-cm spherical mass on the lateral thorax. The overlying epidermis was recently ulcerated by trauma. Wedge biopsies submitted for histopathology showed sheets of polygonal cells with variable amounts of brown intracytoplasmic pigment, and a diagnosis of **melanocytoma** was made. Cattle infrequently develop melanocytomas and some of these are congenital neoplasms that are reported in young animals. In general these are benign tumours.

Four calves from the western Bay of Plenty initially presented with increased respiratory rates and harsh lung sounds. The calves died and on-farm post-mortem examinations showed consolidated areas of the lungs with nematodes. Tissue samples were submitted for histology and culture. Histologically, more than 90 percent of the pulmonary architecture was distorted by suppurative and eosinophilic inflammation consistent with **bronchointerstitial pneumonia**. *Trueperella pyogenes* was cultured from scattered abscesses. Bronchial lumina contained cross- and tangential sections of adult nematodes, and smaller bronchiolar lumina and adjacent alveoli contained tangential sections of nematode larvae, consistent with **lungworm** infection. Pneumonia is a common cause of morbidity in young calves and is often a multifactorial disease with viral and bacterial components. In this case, lungworm infection, which can be seen in young calves that have been put on grass early, was a likely co-morbidity factor that contributed to the severity of the pneumonia.

A 2-year old steer from Matamata-Piako presented for sudden onset of diffuse dermal lumps that were worse in the neck and groin areas (**Figure 1**). The lesions were not pruritic or suppurative. Cytology of impression smears were diagnostic for **cutaneous lymphoma** characterised by intermediate to large lymphocytes with 2–6 variably sized round to irregular nucleoli, and occasional atypical mitoses. Given the

age of the animal, sporadic cutaneous lymphoma (non-BLV-associated) was most likely. These are considered indolent cutaneous lesions in 2–3-year-old cattle.

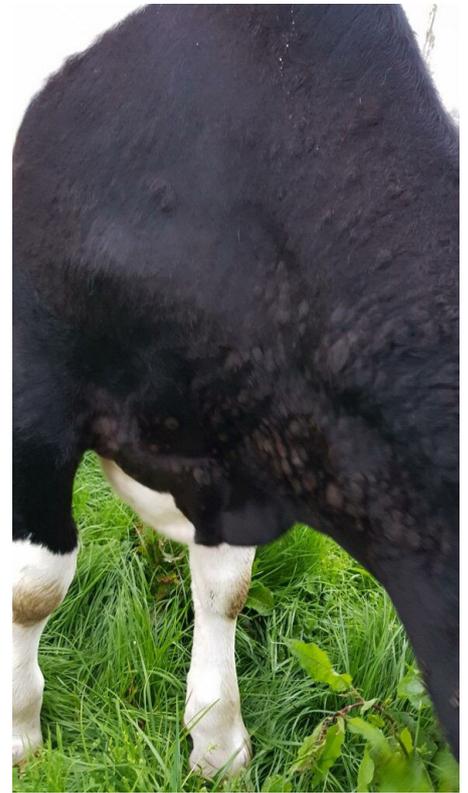


Figure 1. Two-year old steer with skin lumps (photo: Kylie Van Ras, MVP Vets)

Caprine

Five of six goats from Matamata-Piako were positive on ELISA serology for *Mycobacterium avium ssp. avium* and a diagnosis of **Johne's disease** was made. The primary clinical presentation of this disease in goats is weight loss, and clinical disease is often triggered by a preceding episode of stress such as parturition or new animals introduced into the herd. Unlike cattle, goats rarely have persistent watery diarrhoea.

A cohort of adult female Saanen goats from Whangarei presented with depression and neurological signs. The brains from two goats were submitted for histopathology. Abscessation, perivascular and meningeal mononuclear inflammation, and rarefaction were seen. In addition, intracytoplasmic gram-positive bacilli were present within

areas of inflammation in the brainstem, consistent with *Listeria spp.* infection. Most antibiotics used to treat *Listeria spp.* are readily pumped from the brain by transporters within the blood-brain barrier, so that antibiotics may not reach clinically effective concentrations in the brain, and result in failure to respond to treatment. Also, animals that are recumbent when treatment is initiated respond poorly and have a poor prognosis.

Exotic ruminant

A **cervical leiomyoma**, an **ovarian luteoma** and **cystic remnants of the mesonephric duct** were diagnosed on histopathology following post-mortem examination of an 18-year-old female sitatunga or marshbuck (*Tragelaphus spekiti*) from Waikato. The uterus, ovaries, oviduct, urinary bladder and cystic lesion were submitted en bloc for histology. Leiomyomas are benign lesions of smooth-muscle cells and are common in the reproductive tract of many species. Luteomas are ovarian tumours derived from sex-cord stromal (or interstitial) cells. The most distinctive histomorphological feature of this luteoma was the abundant eosinophilic cytoplasm that contained numerous lipid-type steroid vacuoles. Many interstitial cell tumours are reported to be hormonally active. Mesonephric ducts are embryonic structures that are associated with sexual development and can give rise to cysts in all species, including sitatungas. Cystic remnants of these ducts are often an incidental finding at the time of necropsy.

Cervid

Three 1-year-old deer from Tasman presented with weight loss and ill-thrift. Serum was submitted to test for *Mycobacterium avium* ssp. *paratuberculosis* antibodies by the Paralisa test. All three animals had high levels of MAP antibodies, consistent with **Johne's disease**. Disease outbreaks typically affect young deer aged 8–15 months, resulting in reduced growth rates, muscle wasting, ill-thrift and diarrhoea.

About 10 percent of 92 one-year-old deer from Taupo were found to have increased rib fractures following transportation to the abattoir. Ribs were collected and submitted for histologic examination. In each affected deer, at

least one costochondral junction was mildly enlarged and the physis, on cut section, was grossly irregular. The most striking histopathologic changes were a lack of mineralisation of the cortex, with increased osteoclastic resorption and an infraction line in at least one animal. A diagnosis of **osteomalacia** was made. These changes are most consistent with calcium deficiency, but in New Zealand this is not common among most grazing ruminants. In this case, the farm was reported to be supplementing phosphorus and the changes may reflect a calcium-to-phosphorus imbalance, with marginal to low normal dietary calcium in the face of excess dietary phosphorus. In other cases, vitamin D deficiency should also be considered. Liver copper analysis was performed to rule out bone disease caused by copper deficiency. Hepatic copper levels in 10 deer ranged from 50 to 190 $\mu\text{mol/kg}$ with a median of 115 (reference range 100–2,000, with 60–100 being marginal and < 60 being deficient). While copper concentrations were marginal in three deer and deficient in only one, the histological lesions were not consistent with copper deficiency. However, marginal copper concentrations in some animals could have compounded bone fragility as a result of decreased collagen cross-linking.

Equine

A 1-month old foal from Matamata-Piako had had diarrhoea since birth and developed bilateral tibiotarsal effusions and fever without significant lameness. On chemical analysis, serum amyloid A was 1,652 mg/L (reference range 0–8). A mild band neutrophilia was present and synovial fluid analysis revealed nucleated cell counts (NCC) of $56.3 \times 10^9/\text{L}$ and $90.6 \times 10^9/\text{L}$ (reference range $< 1.0 \times 10^9$), with neutrophil percentages of 97 and 99 (reference < 10) and total solids (TS) of 49 and 52 g/L (reference range < 15) respectively. Bacteria were not seen on cytology and no organisms were cultured. An initial diagnosis of **suppurative arthritis** was made. Sixty hours after arthroscopic lavage and following regular intra-articular antibiotics, NCC and TS from one joint were essentially unchanged, whereas in the second joint the NCC had decreased to $15.8 \times 10^9/\text{L}$ and neutrophils to 91 percent. TS by refractometer remained the same. After a second arthroscopic lavage and over the ensuing 6 days, NCC in both joints

ranged from 12.9 to $22.9 \times 10^9/\text{L}$ with 76 to 97 percent neutrophils and TS of 41 to 44 g/L. Chemical arthritis was suspected as a cause of chronically elevated NCC, neutrophils and TS. Three days after the final intra-articular antibiotic treatment NCC had fallen to 1.9 and $2.4 \times 10^9/\text{L}$, neutrophil count to 20 and 29 percent, and TS to 35 and 37 g/L. These results confirmed **chemical arthritis** and illustrate the effects of arthroscopy and intra-articular antibiotics on NCC and TS.

An adult gelding from Matamata-Piako had a sinus tumour, with mineral opacity on radiographs. The lesion was surgically excised and diagnosed as a **sinonasal osteosarcoma**. In general, sinonasal sarcomas vary in size but are often large and multilobulated, and may infiltrate into adjacent bony structures, resulting in facial deformities, loss of teeth, exophthalmus and nervous signs. Large neoplasms may also project into the meatus, narrow the lumen and interfere with airflow, resulting in stertorous breathing.

A 12-year-old gelding from Matamata-Piako presented with a mass on its neck. Histomorphology showed the tumour was composed of vascular spaces up to 700×600 microns and lined by mature endothelial cells. A diagnosis of **haemangioma** was made. A previous penetrating lesion or infection at this site may have caused a proliferative vascular hyperplasia or a vascular malformation. Regardless of the inciting cause, this type of lesion is slow-growing and complete surgical excision is usually curative.

A 15-year-old mare from Matamata-Piako presented with severe purulent endometritis. On cytology, numerous fungal hyphae, pseudohyphae and yeasts were present, but no bacteria and only rare neutrophils were noted (**Figure 2**). On culture, moderate growth of *E. coli* and a heavy growth of *Candida albicans* were found. Inter-uterine treatment commenced and 10 days later repeat cytology and culture revealed only a scant growth of staphylococci. **Mycotic endometritis** is uncommon and accounts for 1–5 percent of confirmed cases of equine uterine infections. Infection occurs after a significant disturbance in normal vaginal or uterine defences, or is a result of generalised immunosuppression. The transition from yeast to hyphae is considered a key factor

in the virulence of *C. albicans*, although is not necessary for infection.

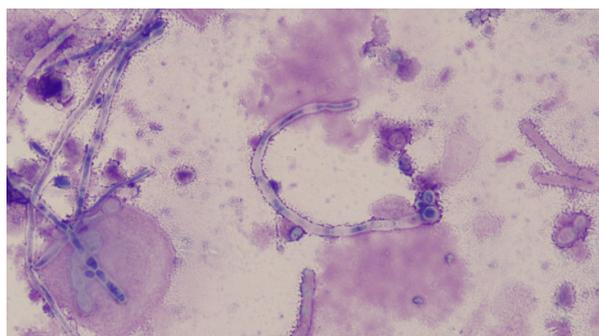


Figure 2: *Candida albicans* hyphae, pseudohyphae and yeast from an equine uterine swab

Uterine swabs were submitted from a 2-year-old Warmblood filly from Waipa for uterine cytology and culture. Moderate numbers of yeast cells were seen on cytology and confirmed as *Trichosporon sp.* on culture. A diagnosis of **fungal endometritis** was made. While *Candida* spp. (see previous item) and *Aspergillus* spp. are the most common fungal organisms isolated from equine endometritis, other isolates may include *Trichosporon* spp., *Cryptococcus neoformans* and *Fusarium* spp. Prolonged antibiotic therapy may be a predisposing factor in some cases of fungal endometritis. Transmission of organisms from stallions has not been documented.

A 2-year-old gelding in Waikato presented with round alopecic skin lesions. *Trichophyton sp.* was cultured and a diagnosis of **equine dermatophytosis** (ringworm) was made. Dermatophytes can be transmitted via contact with infected hair or from fungi in an environment contaminated by infected horses. Equipment such as brushes, combs, blankets and tack acts as a fomite and readily transmits fungi from one animal to another. Rodents and companion animals also can spread dermatophytosis to horses.

Poultry

Failure of endochondral ossification (**rickets**) was diagnosed in 3-week-old chickens from Waikato. The chickens presented with ongoing lameness and some were found dead. Grossly, birds had expansion of the proximal tibial physis. Histopathology confirmed failure of endochondral ossification characterised by zones of hypertrophy up to 5 mm wide, and limited osteoid deposition. The zone of proliferation had no significant

lesions. In this case, histologic lesions support a **phosphorus deficiency**.

About twenty 3-week-old female broilers in a flock of 30,000 birds in Auckland presented with unilateral, apteric lesions with serocellular crusts on one wing. Lesions were submitted for histology. The diagnosis was **ulcerative and granulomatous dermatitis (Blue wing disease)**, with cellulitis, myositis and synovitis. In some areas the lesions were

characterised by coagulative necrosis, and associated blood vessels contained fibrin thrombi. Given the distribution and histomorphology of the lesions, **trauma** was suspected.

Two-month-old female breeder chickens in Auckland presented with enlarged tibiotarsal joints. On post-mortem examination, the joints had increased serous to gelatinous fluid. Histologically, the synovium was enlarged as a result of synoviocyte proliferation and monocytic inflammation. A diagnosis of **lymphoplasmacytic and histiocytic synovitis** was made. Changes in the synovium were suggestive of avian orthoreovirus (reovirus) or *Mycoplasma synoviae* infection. Reovirus infection is the most common viral cause of arthritis in chickens.

Avian

A **hepatic sarcoma** was diagnosed in an aged adult lovebird (*Agapornis* sp.) from Waikato. The submitting veterinarian noted hepatomegaly during post-mortem examination. On cut sections, the liver lobes were mottled tan/yellow and red. An unencapsulated spindle-cell tumour effaced and compressed the normal hepatic architecture. Sarcomas are the most commonly reported neoplasms in lovebirds and the lack of a primary lesion elsewhere in this bird was unexpected. In addition, white-to-yellow plaques were seen in the air sacs and on the surface of the right lung. Histology showed a **granulomatous pneumonia and airsacculitis**. *Penicillium* spp. were cultured, consistent with **mycotic granulomatous pneumonia and airsacculitis**. While not as common as *Aspergillus* spp. in birds, *Penicillium* is also pathogenic. Both lesions would have contributed to morbidity in this bird and

either or both may have been associated with mortality.

Enucleation was performed in an adult kaka in Rotorua owing to loss of vision and chronic ulceration and oedema in the affected eye. Histology was performed and a diagnosis of **endophthalmitis** with ulcerative conjunctivitis, phacolytic uveitis, hyphema, a linearly bisected ossicle and retinal degeneration was made. The sharp and linear laceration through the bisected ossicle was suggestive of **trauma**, with a puncture wound suspected. Trauma would have resulted in the observed hyphema, inflammation and separation of the retina. A common sequela to retinal detachment is cataractous changes in the lens. In this case, the lens was almost fully emulsified.

Canine

A 3-year-old mixed-breed dog from the Bay of Plenty presented with depression and weakness after having gone missing for a week. Bloodwork at presentation showed mildly elevated muscle enzymes, borderline albumin despite evidence of dehydration, and mildly elevated serum potassium. Repeat bloodwork 3 days later revealed a five-fold increase in creatine kinase even though the dog had remained in the veterinary clinic on IV fluids over that time. It transpired that the dog had been fed feral pig meat and a tentative diagnosis of **pig-dog (“go-slow”) myopathy** was made.

A 13-year-old spayed female dog in the western Bay of Plenty had a mammary mass and thoracic radiographs were reported as suspicious. Surgical biopsies were submitted for histology and a diagnosis of **inflammatory mammary carcinoma** was made. These carcinomas characteristically invade the superficial dermal lymphatic vessels, as was seen in this case. They are known to produce large amounts of Cox-2, which promotes metastasis via lymphatic and vascular invasion. Inflammatory mammary carcinomas, while rare, are considered the most aggressive malignant mammary carcinoma of dogs and humans. In general, at the time of diagnosis most neoplasms have already metastasised to distant sites including regional lymph nodes, lung (as suspected in this case based on “suspicious” radiographic changes reported by the clinician), liver, spleen and heart. Prognosis is poor to grave.

Three separate adult dogs and a litter of puppies in Tauranga all presented with diarrhoea. In all cases, *Giardia* sp. antigen was detected via faecal ELISA and a diagnosis of **giardiasis** was made. One adult dog was also positive for *Campylobacter jejuni* on bacterial culture, and another had **ascarid** eggs on faecal flotation. *Giardia*, *C. jejuni* and ascariasis are zoonotic, and in-contact persons, especially immunocompromised individuals (including very young and aged persons) were advised to take appropriate precautions.

Feline

Two adult cats in Tauranga and one adult cat in Hamilton presented with diarrhoea. All three tested positive for *Giardia* sp. antigen by ELISA and one was also positive for *Campylobacter jejuni* following bacterial culture of faeces. As in the canine cases listed above, in-contact persons were advised of the zoonotic potential of these organisms.

Lagomorph

Acariasis (consistent with *Cheyletiella* sp.) was diagnosed in an adult male Giant Flemish rabbit in Marlborough after it presented with hair loss. The rabbit was being treated weekly with a topical imidacloprid and moxidectin product (a treatment for *Psoroptes cuniculi* ear mites). A hair pluck was submitted for cytology and showed numerous biting mites that varied in size and developmental stage, with prominent, curved mouthparts and paired legs. *Cheyletiella* spp. are non-burrowing mites that feed on keratinised cells, and infection is colloquially known as walking dander. This is a zoonotic organism and human cases are associated with an infested animal in the household.

Gribbles Veterinary Pathology

Bovine

Three out of 200 bulls died on a Northland farm after showing signs of acute epistaxis, dyspnoea, coughing and anorexia. Necropsy of a 15-month-old Angus cross bull revealed multifocal to coalescing raised yellow nodules throughout the liver, with adhesions. There were also pleuritic adhesions and pulmonary consolidation, raising concern about possible tuberculosis. Histopathological examination of the lung and liver revealed severe subacute

necrosuppurative pneumonia and hepatitis (abscesses) with intralosomal filamentous bacteria that were Gram negative. They were also acid-fast negative with Ziehl-Neelsen stain, which ruled out *Mycobacterium* spp. No bacteria were isolated on aerobic culture of a liver abscess. However, previous antibiotic treatment may have affected the viability of any bacteria present, preventing isolation. The possibility that the bacteria seen on histopathology were anaerobic could not be ruled out, as anaerobic culture was not performed. The clinical and pathological findings were considered to be consistent with **caudal vena cava syndrome**. This is often associated with initial ruminal acidosis causing bacterial rumenitis with subsequent septic emboli in the caudal vena cava, eventually resulting in liver and lung abscesses. Pulmonary thromboembolism may cause acute haemorrhage and death.

A cow of unspecified age from Northland showed signs considered by the owner to be consistent with polioencephalomalacia. The farm had had four similar cases in the previous week and the brain of the cow was submitted for histopathological examination. There was a moderate subacute encephalitis, predominantly within the brainstem and midbrain and extending along cranial nerves. This was considered to be consistent with a bacterial encephalitis caused by *Listeria monocytogenes*. This occurs in adult ruminants, usually in the winter and spring. The bacteria are in the environment (especially in silage and soil) and in the faeces of ruminants. It is thought that an initial infection in the nasal or oral cavity spreads by local invasion to the cranial nerves and then to the brain. **Listeriosis** can be sporadic, or occur in outbreaks associated with feeding of silage.

Two 6-week-old Friesian calves from a group of 38 in Northland died suddenly, one of them after having a seizure. Histopathological examination of a range of tissues from both calves revealed no definitive cause of death, although symmetrical foci of vacuolation were noted in thalamic nuclei near the third ventricle in the brain of one calf. Another calf died subsequently, and histopathological examination of a range of tissues again showed no definitively significant lesions. A diagnosis of

lead toxicity was considered, since peracute lead toxicity may not cause any histological lesions. A section of kidney was stained with Ziehl-Neelsen stain and this revealed acid-fast intranuclear inclusions. A sample of fixed liver from that calf was found to contain 16.3 mg/kg of lead (> 5 mg/kg generally considered toxic), confirming the diagnosis of **lead toxicity**. Further investigation revealed the presence of lead-based paint on wooden rails in the calf-rearing shed.

A 10-week-old Friesian cross calf from Hauraki had a hard rostral mandibular mass that appeared to contain fragments of teeth. Histopathology of samples from the mass revealed disorganised and inflamed fibrous, bony and dental tissues, including structures resembling immature teeth. A diagnosis of **compound odontoma** was made. This is thought to be a developmental abnormality or hamartoma, rather than a true neoplasm.

Twenty of 650 calves from North Otago presented with neurological clinical signs and 12 died. Histological examination of the tissues from two of the dead calves revealed changes consistent with **polioencephalomalacia**. This is quite frequently seen in calves, the most common cause being thiamine deficiency, which is thought to be induced by dietary changes including the ingestion of thiaminase-containing plants that cause a functional deficiency of thiamine. Sulphur toxicity may also be implicated, as well as lead and salt toxicity. History, response to treatment (intravenous administration of vitamin B1) and access to known toxins help differentiate between the different causes.

Six animals in a group of 160 three-month-old dairy calves on a mid-Canterbury farm showed neurological signs including blindness and one had died. One of the remaining affected calves was sacrificed and the brain submitted for histological examination. There was patchy bright fluorescence of parts of the cerebral cortex when the brain was examined under ultraviolet light. Histopathological examination revealed lesions typical of **polioencephalomalacia**. This disease is common in calves from November to February each year.

Two of 50 dairy calves on a mid-Canterbury farm were found dead and a third animal that was recumbent and

in respiratory distress died soon after. At necropsy the calves were found to have fibrinous peritonitis and pleuritis. *Pasteurella multocida* was recovered in pure culture from the liver of one calf. This episode was typical of **septicaemic pasteurellosis**, which in weaned calves in New Zealand is associated with a specific type B *P. multocida*.

A calf-rearing unit in the Nelson area with 400 calves experienced an acute outbreak of **pneumonia** with 12 sick calves, three of which died. Tissues were received from one dead calf and histological examination revealed a fibrinous pneumonia consistent with either *Histophilus somni* or *Mannheimia haemolytica* infection. A heavy growth of *Mannheimia haemolytica* was cultured from the lung. This bacterium is a common isolate from sheep pneumonias but is not so common in pneumonia of cattle in New Zealand.

Several cases of severe anaemia caused by **theileriosis** were diagnosed in individual adult dairy cows from a number of properties in Waikato during this quarter. Clinical theileriosis in New Zealand is most commonly associated with the **Ikeda strain** of *Theileria orientalis*.

Calf diarrhoea was a common reason for testing in Waikato in this period. In the early spring rotavirus and cryptosporidium were the most common findings. Coccidial infection was more common in animals more than 1 month old. Several outbreaks of gastrointestinal disease in older calves during late spring and early summer (November and December) were reported, and dual infection with **coccidia** and *Yersinia pseudotuberculosis* was diagnosed after testing.

A 20 x 15 x 10 cm mass excised from the flank of a 4-month-old male Jersey calf from Taranaki was dark in colour and histological examination confirmed a **melanoma**. Melanocytic tumours make up only about 5 percent of all bovine tumours and most of them occur in the skin and subcutaneous tissue. They tend to occur in young cattle and it is thought that they may have a congenital aetiology. The literature suggests they are expected to exhibit benign behaviour, and complete surgical excision is associated with a favourable outcome.

A Jersey cow presented with a sudden onset of a very large fluctuant fluid-

filled lesion on the right side of the neck. There was about 4 litres of serous fluid and necrotic tissue within the mass. Cytological examination of the fluid revealed moderate numbers of neutrophils with very large numbers of bacteria present, mainly rods, confirming a suppurative septic inflammatory lesion (**abscess**). Culture of the fluid yielded a heavy growth of *Trueperella pyogenes*.

About 10 of 160 weaner calves from the King Country were found dead. These dead calves as well as several other live ones had variably severe **diarrhoea**. Histological examination of tissues from one of the calves revealed a multifocal suppurative enteritis with intralesional colonies of bacteria. There was also severe villus blunting and atrophy. These lesions were considered typical of **yersiniosis**. Culture of the intestinal contents of this calf and also the faeces of three of the other affected calves yielded *Yersinia pseudotuberculosis*. There were also moderate numbers of coccidial organisms present in all three faecal samples, suggesting that the aetiology may have been multifactorial in this case.

A 6-year-old Friesian cross cow from a farm in Taranaki had reduced milk yield and was inappetent. On rectal examination faeces were normal in consistency but more scant than expected. The cow's temperature was 38.2°C and no abnormal gastrointestinal "pings" were heard. She had tachycardia and a systolic heart murmur. No jugular distension was noted and the jugular pulse was considered normal but the mucus membranes appeared pale. Serum biochemistry revealed a severe hypomagnesemia of 0.09 mmol/L (reference range 0.59–1.08) accompanied by a moderate non-regenerative anaemia with a haematocrit of 0.19 (reference range 0.24–0.46), low haemoglobin (68 g/L; reference range 80–140), low RBC count ($3 \times 10^{12}/L$; reference range $5\text{--}7.7 \times 10^{12}$) and increased numbers of nucleated RBCs (106 per 100 white cells, including occasional rubricytes). A diagnosis of **anaemia caused by hypomagnesemia** (also known as **Taranaki anaemia**) was made.

About 10 of 60 mixed-age South Devon cows from Wairarapa experienced late-term abortions over a 3–4-week period. Histology on three fetuses and associated placentas did not yield significant histological findings. Microbiological

culture of the fetal stomach contents was negative. A complete blood count performed on two of the affected cows about 2–3 weeks after they had aborted suggested they were in late recovery from a previous anaemic episode. Organisms consistent with *Theileria* spp. were identified on the blood smear and PCR confirmed the presence of *Theileria orientalis* **Ikeda strain**. It was suspected that **theileriosis** may have been the cause of the late-term abortions in these cows, as other common causes were ruled out.

About a hundred rising-2-year-old beef cattle on a North Otago farm broke through a fence onto a kale crop. Over the ensuing days, nine animals died and a further 15 developed neurological signs and recumbency. There were no significant gross findings on necropsy of two of the animals. A full set of formalin-fixed tissue samples was collected. The brains of both animals had areas of rarefaction and neuronal necrosis within the cortical grey matter. Vascular endothelial cells were swollen and vesicular and meningeal and perivascular spaces were infiltrated by gitter cells. These findings were considered typical of **polioencephalomalacia**. Possible mechanisms included disruption of rumen microflora with consequent thiamine deficiency, or excess dietary sulphate.

An outbreak of **sporadic bovine encephalomyelitis** occurred on a North Otago dairy farm. Affected calves were 4–6 weeks old and had been on grass for 2–3 weeks. About 10 calves became weak and pallid, and were straining to defaecate. At least five died. As the outbreak progressed, some calves developed hindlimb ataxia and opisthotonus. Faecal samples from five calves were negative for coccidial oocysts. Serum biochemistry testing on two calves was unremarkable. Necropsy revealed fibrinous exudate within the pericardial and peritoneal cavities. Histopathological examination revealed severe subacute lymphohistiocytic and suppurative meningoencephalitis, polyserositis and vasculitis. The diagnosis was confirmed by the detection of *Chlamydia pecorum* by PCR on EDTA blood and pericardial fluid.

Five 2-year-old Friesian heifers on a South Taranaki dairy farm had reduced milk production and became sick and lethargic over a period of several days.

The affected heifers had diarrhoea and inappetence. One heifer died and was necropsied. The caecum and large intestine contained bloody fluid material. Histological evaluation of the distal small intestine and large intestine revealed necrotising and eosinophilic enterocolitis with loss of crypt epithelium and nests of coccidial oocysts. Culture of the liver and faeces was negative for *Salmonella* spp. These findings were compatible with a diagnosis of **coccidiosis**.

Three 2-year-old heifers from a herd of 520 Friesian cows in Manawatu developed proliferative wart-like lesions located mostly on the head and neck. In one case the udder was also affected. The lesions involved both skin and subcutaneous tissue and had a granular texture. A sample was collected from one of the larger masses (15 x 7 x 10 cm), fixed in 10 percent formalin and submitted for histopathological examination. There was pyogranulomatous cellulitis and granulation tissue punctuated by bacterial colonies embedded in characteristic, brightly eosinophilic radiating material (club colonies). These findings confirmed a diagnosis of **actinobacillosis**, which was suspected to have been caused by trauma associated with cattle feeders.

Two unusual malignant tumours were diagnosed in cattle on Taranaki farms during this period. In one case, biopsies were submitted from a large mass in the left flank of an adult Friesian cow. Histological examination revealed highly pleomorphic mesenchymal cells arranged in irregular vascular structures, compatible with a **haemangiosarcoma**. The other tumour presented as marked swelling of the base of the horn in a 13-year-old beef steer. Examination of an incisional biopsy revealed pleomorphic spindle cells arranged among deposits of osteoid and chondroid matrix. The tumour was diagnosed as an **osteosarcoma**. These are rarely reported in cattle and tend to involve the bones of the head.

About 10 percent of a herd of 300 Friesian cross dairy cows on a South Taranaki farm developed proliferative lesions between the toes. Hind and forefeet were affected. Some of the lesions were raw and ulcerated; others crusty and papillated. Five samples were

biopsied for histological evaluation and silver staining. All had similar lesions that varied in severity and chronicity, and were characterised by marked epidermal hyperplasia and hyperkeratosis, erosion and ballooning degeneration. Three biopsies had dense swathes of silver-positive **spirochaetes** infiltrating the stratum spinosum and papillary dermis. The histological findings confirmed the clinical suspicion of **bovine digital dermatitis**. Further discussion with the farmer suggested the possibility that the infection had spread through use of a footbath with an inadequate concentration of formalin.

There were several outbreaks of **pinkeye (keratoconjunctivitis)** in cattle in mid and North Canterbury in this quarter. In some cases the herds had been vaccinated against this condition within the last few weeks using an inactivated *Moraxella bovis* oil-emulsion adjuvant vaccine, but new cases were still developing. Most of the outbreaks involved adults but on one property about 10 percent of calves were affected. In one outbreak nearly half of the 900 milking cows on the property were affected over a period of several weeks. When swabs from the eyes of the affected animals in these outbreaks were cultured, the majority were found to be infected with *Moraxella bovoculi*. *Moraxella bovis* was not isolated. In the case involving calves, IBR virus (bovine herpesvirus-1) was also detected by PCR testing. *M. bovoculi* can be isolated from normal cattle and also from cattle with keratoconjunctivitis, but its exact role in the pathogenesis of disease is uncertain. However, the fact that it was consistently found in these outbreaks is of interest, though unaffected cattle in the peer group were not tested for comparison.

Routine monitoring of copper and selenium concentrations in liver biopsies occasionally revealed some unexpected results this quarter. In one case six animals from a group of mixed-age crossbred cattle in mid Canterbury were tested and had an average liver selenium concentration of 59,397 nmol/kg, with a range from 16,769 to 126,032 (adequate range 850–15,000). Concentrations greater than 32,000 are generally considered to be indicative of **selenium toxicity**. No history was available so the reasons for the excessive concentrations were not determined, but excessive supplementation was most likely.

In late November, a sudden drop in milk production accompanied by loss of condition and watery diarrhoea in mixed-age milking cows on a property in the Waimate district prompted laboratory testing. Faecal samples were received from five animals. **Salmonella Bovismorbificans** was isolated from all five, with heavy bacterial growth in four cases, confirming the attending veterinarian's suspicion of **salmonellosis**.

Eighty of 350 milking dairy cows on an Otago farm developed a severe vaginitis. A pooled sample of vaginal material from a number of affected cows was tested, along with a swab from a single affected cow. Both samples were positive for *Ureaplasma diversum* by PCR but no comparative testing of unaffected animals was undertaken and the significance of this finding is not clear.

After a group of 700 2–3-month-old Friesian heifer calves were vaccinated with a clostridial vaccine, about 400 developed **injection site lesions** that looked like abscesses. Culture of material from these lesions did not yield any bacteria, and cytological examination revealed a pyogranulomatous inflammatory reaction containing degenerate neutrophils and macrophages but no bacteria could be identified. The vaccine had been injected intramuscularly rather than by the recommended subcutaneous route. Such reactions are often more severe in animals of this age than in older animals, and they usually resolve without treatment over a period of months.

Three 6-week-old unweaned beef calves from a large group on a sheep-and-beef farm in Central Otago were found dead. Necropsy of one of the dead calves revealed it to be in very good body condition. There were pale streaks over the epicardium and several litres of straw-coloured fluid in the pleural cavity. Histopathological examination of the heart revealed changes consistent with **congenital white muscle disease**. The concentration of selenium in the liver of this calf was so low that it was undetectable by our method. There had been management changes on this farm during late winter and it was suspected that the pregnant cows had not received selenium supplementation in late pregnancy that was usual on this property.

Ovine

A lamb from Kumeu had a history of progressively severe lameness over a period of 2 weeks. Radiographs revealed a mottled appearance of the bone and the lamb was euthanased. Within the proximal tibia and the mid cannon bone (metatarsus) there was a mild to moderate subacute **osteomyelitis** with bone remodelling. This was considered likely due to a bacterial infection secondary to bacteraemia originating from an omphalitis.

Two 8-month-old Wiltshire hoggets from the Auckland region died. One showed antemortem signs of acute lethargy, collapse, icterus, pyrexia, tachycardia and tachypnoea. The sheep had been fed a mixture of sheep pellets and tree branches, including trimmings from *Pittosporum* spp. and puriri (*Vitex lucens*). At necropsy, the urinary bladder wall appeared inflamed, the liver was yellow and the kidneys were grey to black. The urine was dark red to black. Antemortem blood samples showed a mild anaemia, with a haematocrit of 0.2 (reference range 0.22–0.4). There was gross and microscopic evidence of haemolysis, including lysed red blood cells seen in the blood smear and an inflammatory leukogram with a neutrophil count of $23.3 \times 10^9/L$ (reference range $0.4\text{--}5 \times 10^9$), monocytes $1.3 \times 10^9/L$ (reference range $0\text{--}0.6 \times 10^9$), eosinophils $2 \times 10^9/L$ (reference range $0\text{--}1 \times 10^9$) and basophils $0.3 \times 10^9/L$ (reference range $< 0.1 \times 10^9$). Serum biochemistry showed mild azotaemia with increased urea (13.3 mmol/L; reference range 3.9–11.3), creatinine (150 $\mu\text{mol/L}$; reference range 80–145) and bilirubin (185 $\mu\text{mol/L}$; reference range 0–8). These changes were considered suspicious of haemolytic anaemia with associated haemoglobinuric nephrosis. A sample of fresh liver contained 5,340 $\mu\text{mol/kg}$ of copper (adequate range 95–3,000). Histopathology of samples of liver, kidney and bladder showed a chronic hepatopathy with bridging fibrosis, “copper cells” (pigment-laden macrophages) and hepatocyte karyomegaly as well as haemoglobinuric nephrosis in the kidney and multifocal thrombosis in the bladder wall. A diagnosis of **chronic copper toxicity** was made. It was speculated that this might have been caused by a combination of dietary copper intake, lack of other

elements that could reduce copper uptake, and possibly an additional dietary hepatotoxin. Puriri and pittosporum trees are not generally considered toxic but it has been reported that *P. tenuifolium* fed to rats resulted in a weight gain when dried leaves formed 30 percent of the ration, but a loss of weight when this was increased to 60 percent (Connor 1977).

A 3-day-old East Friesian lamb from Otorohanga suddenly died. Histopathological examination revealed lesions in the lungs and liver that were considered typical of **septicaemia**. Omphalophlebitis was considered to be the likely route of infection, but fresh tissues were not cultured so the specific aetiological agent could not be identified.

An outbreak of **leptospirosis** was diagnosed on a Central Hawke's Bay sheep farm. Initially, eight 1-month-old lambs were found dead about 10 days after docking. Reported necropsy findings included yellow (jaundiced) carcasses and dark-coloured kidneys. This correlated with the histological changes, which included hepatocellular necrosis, interstitial nephritis and renal tubular haemaglobin pigment. A MAT test of heart blood taken from a recently dead lamb showed titres of $> 1:1,600$ to *Leptospira Pomona* and *Leptospira Hardjo*.

In early October eight of 40 lambs aged 2–4-weeks on a Waitaki farm died suddenly after vaccination, anthelmintic treatment and selenium supplementation. The investigating veterinarian suspected **acute selenium toxicity**. This diagnosis was confirmed when the liver selenium concentration in one of the lambs was found to be 139,883 nmol/kg (toxic level $> 32,000$ nmol/kg).

Camelid

Skin biopsies were examined from an adult alpaca in the Auckland area that had had pruritic skin disease for a few months. There was a mild chronic-active hyperkeratotic perivascular dermatitis with rare superficial mites, consistent with *Chorioptes bovis*.

An 11-year-old alpaca from Northland had a hard mass on the left rump that was slowly increasing in size. Histopathological examination revealed a subcutaneous mass composed of thick and anastomosing bone trabeculae, consistent with an **osteoma**. These are uncommon tumours, mainly found on

craniofacial bones. They exhibit slow, progressive growth over months and may persist indefinitely without becoming malignant.

A 2-year-old female alpaca in Waikato had severe chronic skin disease consistent with **hyperkeratosis**. Biopsies of the affected areas confirmed a primary hyperkeratosis with subcorneal intraepidermal and follicular pustules and pyogranulomatous furunculosis considered likely to be from a secondary bacterial infection. Causes of hyperkeratosis without epidermal hyperplasia include zinc-responsive dermatitis, idiopathic hyperkeratosis, ichthyosis and mange. As this animal had had the lesions from an early age and there had been no change during the period of zinc supplementation for facial eczema, a diagnosis of **ichthyosis** was considered most likely.

Cervine

Twelve red deer stags from the Paeroa area had velvet removed and two were found dead the next morning. On histological examination the most significant findings were in the lung and liver. There was marked pulmonary oedema and haemorrhage with eosinophilic infiltrates. Such findings have been described in stags that experience **xylazine-related deaths**. There did not appear to be pre-existing disease in the lung, liver and other examined tissues.

A low copper concentration (51 $\mu\text{mol/kg}$) was found in the liver of a stag from the Paeroa district, which died from xylazine-related complications after velvet removal. Of a further four cohort animals, three also had low serum copper levels, with two of these below the minimum detection level of the test and one marginal. **Copper deficiency** is diagnosed when liver copper concentration is $< 60 \mu\text{mol/kg}$ or serum copper is $< 5 \mu\text{mol/L}$. Deer with copper below these levels are at risk of clinical disease or impaired growth rates.

Equine

A **bacterial urinary tract infection** caused by *Enterococcus* spp. was diagnosed in a 16-year-old mare from the Bay of Plenty. Sediment in urine sample showed a marked pyuria and bacteriuria, and culture yielded a heavy growth of *Enterococcus* spp. Urinary tract infections are unusual in

horses. In this case there was a chronic neurological and muscular dysfunction of the bladder as a complication of a surgical procedure performed a few years before. *Enterococcus* spp. are commonly found in the lower urinary tract, and compromising factors involving the urinary tract can lead to opportunistic infections.

Avian

A captive male saddleback (*Philesturnus rufusater*) of unspecified age from the Auckland area had intermittent upper respiratory signs for one month. Necropsy revealed a granulomatous lesion in the region of the syrinx. Histopathological examination showed a severe subacute ulcerative necrotising heterophilic tracheitis with intralesional fungal hyphae consistent with *Aspergillus* spp. confirming a **fungal granuloma** and in the mesentery adjacent to the intestines there was a chronic active granuloma with intralesional mixed bacteria. As the bacterial granuloma was older than the fungal infection, the fungal infection was considered to be the cause of death but may have been secondary to immunosuppression from the underlying bacterial infection. The mixed bacteria in the granuloma within the mesentery adjacent to the intestines were considered likely to be enteric bacteria from a previous perforation of the intestinal tract, or possibly from a yolk sac infection.

A zebra finch (*Taeniopygia guttata*) from an Auckland zoological collection was found unable to fly, and then died. Histopathological examination of a range of tissues showed multifocal granulomatous inflammation in the intestines, lungs, liver, skin, bone marrow, skeletal muscle, trachea and spleen. Ziehl-Neelsen staining revealed acid-fast bacilli within macrophages, consistent with **mycobacteriosis**, probably caused by *Mycobacterium avium*.

A 3-year-old ring-necked lorikeet (*Barnardius zonarius*) from Canterbury was found dead. Histology revealed a suspected **viral hepatopathy** characterised by the presence of large amphophilic intranuclear inclusion bodies within degenerating hepatocytes. PCR on the liver was negative for Pacheco's disease and polyomavirus, but **adenovirus** was not tested for and remains a possible differential in this

case. All these viruses can produce similar hepatic lesions with the presence of intranuclear inclusion bodies.

Canine

A 1-year-old male French bulldog from Putaruru developed an **acute diarrhoea** and a faecal sample was received for testing. An ELISA test was positive for **giardia**, **ascarid** eggs were seen on a faecal egg count and *Campylobacter upsaliensis* was isolated on bacterial culture. It was considered likely that all these contributed to the diarrhoea, with the ascarid parasitism possibly the most significant of these findings.

A 7-year-old spayed Border Collie farm dog from Taranaki developed clinical signs of jaundice and depression. An MAT antibody titre of 1:1,600 for **Leptospira Hardjo** was considered to support a diagnosis of **leptospirosis** along with these clinical signs.

A 3-year-old female Greyhound from Whanganui had persistent diarrhoea, occasional vomiting and lost weight over a period of 3 weeks. ELISA testing of a faecal sample was negative for giardia and cryptosporidium, and a faecal egg count was negative. However, bacterial culture revealed a significant infection with **Salmonella Bovismorbificans**.

A male Schnauzer of unknown age from Whanganui dug up and ate a possum that had been killed with a first-generation anticoagulant poison. The activated partial thromboplastin time was increased at 22 seconds (reference range 10–15) and the prothrombin time was increased at 56 seconds (reference range 7–11). This suggested **secondary poisoning by anticoagulants**.

Feline

A 12-year-old female Bengal tiger (*Panthera tigris tigris*) from a Taranaki zoo developed a mass about 8 cm in diameter within the subcutaneous tissue of the neck. Initial fine-needle aspirates revealed a population of large round cells with abundant green-black cytoplasmic pigment on cytological examination. The mass was excised and submitted for histopathological examination. Histology confirmed a densely cellular neoplasm composed of nests, packets and streams of neuroendocrine cells containing variable quantities of cytoplasmic melanin. There were features of malignancy and large central areas of necrosis, confirming a diagnosis of

malignant melanoma.

A 5-year-old neutered male Domestic Shorthaired cat from Wellington had a 24-hour history of mucoid, foul-smelling diarrhoea but remained bright, responsive and normothermic. A faecal sample was positive for both **giardia** and **cryptosporidium** on ELISA testing and *Toxocara cati* eggs (100 per gram) were found in the faeces. It was considered likely that this cat was suffering from a **multifactorial diarrhoea**. The cat was wormed and treated with a course of metronidazole and azithromycin. The diarrhoea stopped and the owner reported that the cat now had much more energy than previously.

Two 2-month-old Burmese kittens (a male and a female) with no abnormal clinical signs were tested because a littermate had died, with necropsy findings suggesting lipaemia and a cardiac defect. There was a marked increase in triglycerides, at 20.54 mmol/L in the female and 14.59 in the male (reference range 0.11–1.42). Haematology tests on the female revealed anaemia (haemoglobin 63 g/L; reference range 80–140, and haematocrit of 0.15; reference range 0.24–0.45). PCR for *Mycoplasma* spp. was negative. The kitten was tested again 16 days later and triglycerides were within normal range, at 0.89 mmol/L. This was therefore considered to be a case of **transient hyperlipidaemia and anaemia syndrome**. The cause is not known (Blackstock 2009).

A faecal sample was tested from a 1-year-old cat from Southland that had had diarrhoea for 5 days. **Salmonella Typhimurium phage type 160** was isolated, confirming a diagnosis of **salmonellosis**.

Reptilian

A five-year-old bearded dragon (*Pogona* sp.) from Auckland was lethargic and off-colour. Examination of a blood smear revealed a white blood cell count of $2,368 \times 10^9/L$, with the majority of the white cells ($1,941.8 \times 10^9/L$) being intermediate to large mononuclear cells with a high nuclear to cytoplasm ratio. This was consistent with **acute leukaemia** of possible monocytic, lymphoid or granulocytic origin. There are several previous reports of leukaemia in bearded dragons in scientific literature.

A 4-year-old female bearded dragon housed in a cage with three others was found dead. Necropsy revealed a very large gall bladder but no gross lesions. Culture of the contents of the gall bladder yielded a heavy growth of *Salmonella* **Wangata**, a bacterium usually found in poultry. A presumptive diagnosis of **salmonellosis** was made.

Guinea pig

An adult female guinea pig from Auckland was unwell for 3 days then died while having a seizure. It had recently weaned a litter of pups. Histopathological examination revealed, within the lungs, kidney, liver, intestines, brain, heart, stomach and pancreas, numerous epithelial and mononuclear cells with intranuclear or intracytoplasmic eosinophilic viral inclusions. This was considered consistent with guinea pig **cytomegalovirus infection** (cavid herpesvirus-1). There was also a peracute bacterial enteritis. This herpesvirus infection is common in guinea pigs, but is often subclinical or latent. Acute systemic infections can occur in immunocompromised animals, and this can occur in pregnancy. The virus can cross the placenta and cause in-utero infections.

Skin biopsies were examined from an adult guinea pig from Northland with a severe skin condition. There was a severe chronic-active hyperplastic and hyperkeratotic dermatitis with numerous mites, consistent with **acariasis**. The mites were considered most likely to be *Trixacarus caviae* (guinea pig sarcoptic mange mite), which can be zoonotic. Other possibilities include *Chirodiscoides caviae* (guinea pig fur mite), which is not generally considered zoonotic.

New Zealand Veterinary Pathology Bovine

Two calves 2–3 weeks old from a group of about 30 in Waikato presented with a 2–3-days' history of scouring with no pyrexia. Faecal samples from the two affected animals were received and *Salmonella* **Bovismorbificans** was cultured from both. Cryptosporidium oocysts were not detected, both calves were negative for coronavirus and one of the pair was positive for **rotavirus** on ELISA. It is possible that the rotavirus was contributing to clinical signs in one animal.

Several Friesian/Jersey cross calves about 2 months of age in Waikato presented with sudden-onset inappetence, dehydration (hollow eyes), sometimes a mild scour and no pyrexia. Four of 50 were affected, with two deaths. Faeces and blood samples were received from one of the ill calves, along with multiple formalin-fixed samples from one of the dead calves. Faecal analysis revealed light to moderate numbers of **coccidia** oocysts, and faecal culture was negative for *Yersinia* sp. and *Salmonella* sp. Histology of the ileum and colon revealed moderate to abundant coccidial oocysts, macrogamonts, and occasional large schizonts in the mucosa, accompanied by marked necrosis and eosinophilic to lymphoplasmacytic enteritis. A diagnosis of marked **coccidiosis** was made, with associated necrotising enteritis that may also have led to septicaemia in the dead animal.

A single 6-month-old crossbred calf from a group of 30 in Waikato was much smaller than the rest of the mob, with severe emaciation and evidence of chronic scouring. On post-mortem examination the abomasal wall was thickened, with fluid gut contents. Faecal egg count demonstrated severe **endoparasitism**, with 7,500 strongyle eggs per gram. Faecal culture did not yield significant bacterial pathogens, and histopathology of liver, lung, kidney and heart did not reveal any further significant findings.

A mob of 20 beef bulls in the Far North had loss of condition affecting five animals. A pooled liver-fluke antibody ELISA test yielded a high positive result (%S/P > 150%), which is correlated with a high prevalence of **liver fluke** infection (interpreted as > 50 percent of the animals in the pool infected, although this can be skewed, especially in small pools if some individuals have an unusually high burden).

A mob of 40 Friesian calves aged 3–5 months in Waikato had scours, sometimes bloody, affecting six to 10 animals, with one death. Post-mortem examination of the dead calf revealed marked dehydration, with bloody fluid in the large intestine. Faeces were very scant, but a direct smear preparation demonstrated coccidia oocysts. Although tissues for histology were moderately autolysed, vast numbers of coccidial organisms were still visible within

epithelial cells. A diagnosis of severe necrotising enteritis consistent with **coccidiosis** was made. Faecal culture did not reveal significant bacterial pathogens.

A single Friesian cow 7–9 years of age from Whangarei had progressive non-responsive nervous disease. She had been off milk and unusually aggressive, with a drooping right ear and circling to the left. The animal was euthanased and samples were submitted for TSE surveillance. Histology of the brain demonstrated a severe chronic encephalitis, consistent with **listeriosis**.

Two rising-2-year-old Friesian bulls from a mob of 300 in the Far North presented with scouring despite recent drenching. No pyrexia was present. Serum copper levels were decreased in both animals, at 6.5 and 5.0 $\mu\text{mol/L}$ (reference range 8.0–22.0). One animal was also positive on John's ELISA. **John's disease** was diagnosed in one animal. However, the sensitivity for this test in clinically affected animals is 85–90 percent so the result for the other animal may have been a false negative. **Copper deficiency** may also result in scouring in adult cattle, and may have also be contributing in these cases.

Three 2-year-old Holstein-Friesian cows from Matamata-Piako presented with a history of skin lesions, with pruritic alopecic and crusty patches of the face and neck, some with purulent exudate. The condition appeared to be spreading among members of the herd. Smears from the lesions were evaluated cytologically, revealing mixed inflammation with structures consistent with dermatophyte arthrospores in two out of three animals. A presumptive diagnosis of **dermatophytosis** was made, based on these findings, although fungal culture failed to confirm this.

An outbreak of conjunctivitis occurred in rising-1-year-old steers on a farm in Waikato. Conjunctival swabs from three affected animals all yielded a moderate growth of *Moraxella bovis*. This infection is the cause of **pink eye/infectious bovine keratitis**, which occurs most commonly in late spring and summer. Young animals are most susceptible.

A farm in South Waikato had poor growth rates in eight 4-month-old Friesian/Jersey cross calves from a group of 38 animals. Of the affected group, three had increased lung sounds and

two had some degree of scour. Animals had previously testing negative to bovine viral diarrhoea, were regularly drenched with dual oral drench, and received supplementary vitamin B12 and minerals. Faecal analysis showed low numbers of coccidial oocysts in all animals, but a moderate growth of *Yersinia pseudotuberculosis* was isolated from faecal culture of all eight animals. **Yersiniosis** was considered most likely to be the primary disease process, although coccidiosis may have been a contributing factor in some animals. Other infections may also have been present, given the increased lung sounds.

A single adult Friesian cross cow from Horowhenua presented with fleshy swelling of the left side of the face. Wedge biopsies submitted for histopathology revealed extensive pyogranulomatous to eosinophilic inflammation, with club colonies surrounded by Splendore-Hoeppli material. A presumptive diagnosis of **actinobacillosis** was made based on histological findings.

Three calves from a group of 40 in Kapiti presented with increased respiratory rate and effort, lethargy and ataxia. One calf was seizing and was euthanased. Histopathology of the brain revealed areas of laminar cortical necrosis consistent with **polioencephalomalacia**. This lesion can be due to thiamine/vitamin B1 deficiency, which is most commonly seen in well-fed young animals but can also be caused by thiamine deficiency secondary to rumen acidosis. Other causes of polioencephalomalacia include salt poisoning and lead poisoning, and lesions have also been associated with high sulphur intake.

Ovine

A 1-year-old Beltex ram from a group of four in Hamilton died suddenly overnight, and a herdmate had died 1 week earlier following 2 days of illness during which it had failed to respond to empirical treatment with NSAIDs and antibiotics. At postmortem the liver was found to be discoloured orange to brown, with blue to black kidneys and crimson urine. Histology of the liver revealed acute necrotising hepatitis and cholestasis as well as acute haemoglobinuric nephrosis. The liver copper level was 4,300 $\mu\text{mol}/\text{kg}$ (reference range 95–2,000). A diagnosis of **copper toxicity** was made, with histological evidence

that this had led to a haemolytic crisis and subsequent renal injury. The hepatic lesions may have been complicated by a combination of copper toxicity and acute hypoxic injury.

Caprine

A 4-year-old milking goat from Manawatu showed rapid loss of condition and scouring. It was euthanased and post-mortem examination revealed marked mesenteric lymphadenomegaly, sometimes with areas of necrosis. The terminal small intestine was also thickened and appeared corrugated with dilated serosal lymphatic vessels. Histology confirmed granulomatous enteritis and lymphadenitis, as well as multifocal granulomatous hepatitis consistent with **paratuberculosis/Johne's disease**.

Equine

A 7-year-old Warmblood cross mare in Central Hawke's Bay presented with retained fetal membranes after foaling. Biochemistry revealed slightly low serum calcium (2.71 mmol/L , reference range 2.8–3.3) with normal serum albumin and low serum creatinine (85 $\mu\text{mol}/\text{L}$, reference range 97–144), indicating loss of body condition. This degree of **hypocalcaemia** is not associated with hypocalcaemic tetany, but is thought to be a factor in decreased uterine tone or contractility (similar to ileus).

After a 4-year-old Standardbred gelding in Waikato had been grazing on an old shooting range it presented with neurological and respiratory signs. The blood lead level tested on an EDTA sample was 0.48 mg/L (toxic level > 0.33), confirming a diagnosis of **lead toxicity**. The peripheral neuropathy associated with lead toxicosis in horses is thought to be caused by peripheral-nerve segmental demyelination, contributing to the clinical signs noted. Respiratory signs can occur owing to laryngeal/pharyngeal paralysis and dysphagia leading to aspiration pneumonia. In cases of chronic toxicity, where blood lead can be below the level considered toxic, diagnosis can be made by initially treating with calcium disodium EDTA, which chelates the lead from bone and increases the levels in plasma and urine.

A 10-week-old Thoroughbred filly foal in Matamata-Piako presented with increased respiratory sounds, which were found on ultrasound scan to

be associated with cranial lung lobe consolidation and abscessation. Clinical examination revealed mucopurulent tracheal discharge, which on culture yielded a heavy growth of *Rhodococcus equi*. A PCR test for *R. equi* VapA gene (virulence factor) is also available, although this test should not be regarded as a substitute for bacterial cultures, which are required to detect concomitant bacterial infections and for antimicrobial sensitivities.

A 4-week-old Thoroughbred foal in Waikato presented with a markedly enlarged umbilicus, which was unresponsive to antibiotic treatment. Following surgical resection, the umbilical lesion was found to be filled with purulent material that on culture yielded a heavy growth of *Trueperella pyogenes*.

A yearling Thoroughbred filly and a Thoroughbred foal on an Auckland property presented with submandibular abscesses. Bacterial cultures of abscess swabs from both horses yielded light growths of *Streptococcus equi* ssp. *equi*, confirming a diagnosis of **strangles**.

Camelid

A single 9-year-old female alpaca from Napier presented with poor body condition (score 1/5), weakness, pale mucous membranes and increased respiratory rate and noise on auscultation. There were four other alpacas in the group, which were grazed with goats and drenched annually. There was no evidence of scouring, but reduced feed intake had been noted. Clinical signs improved transiently with empirical treatment (antibiotics, anti-inflammatories, vitamin B12), but 5 days later the animal deteriorated. Haematology revealed severe **regenerative anaemia** (haemoglobin 25 g/L , reference range 113–190), numerous nucleated RBCs and moderate polychromasia. Moderate hypoalbuminaemia (25 g/L , reference range 35–44) suggested protein loss (e.g. blood loss, urinary or GIT loss) with concurrent pseudohypocalcaemia caused by loss of some of the albumin-bound fraction of total calcium (1.81 mmol/L , reference range 1.89–2.59). Serum biochemistry demonstrated severe **hypophosphataemia** of 0.18 mmol/L (reference range 1.9–3.4). This could be seen with decreased intake or absorption, and may be seen over winter in thick-

coated alpacas in some areas, owing to hypovitaminosis D. Creatinine was also low (62 $\mu\text{mol/L}$, reference range 72–238), an indication of poor body condition or muscle mass, which was consistent with the clinical history. Faecal analysis showed **strongyle** and *Trichuris* eggs (25 and 50 per gram respectively). Although these are quite low numbers that may not be clinically significant in many species, severe clinical disease has been documented with little or no faecal shedding of egg or oocysts (Cebra & Stang, 2008). Clinical signs were explained by the severe anaemia, which may have been multifactorial in this case. The severe hypophosphataemia may have resulted in extravascular haemolysis, but given the management history, endoparasitism may also have been a factor.

Porcine

A single castrated adult male kunekune pig from Wellington was underweight, with a lesion present in the nasal septum associated with a nose ring. One other pig present on the property showed no signs of illness. The underweight pig was euthanased and the nasal lesion was submitted for histopathology. The formalin-fixed specimen received included a 30-mm-diameter ulcerated area with a protruding multinodular mass measuring 30 x 25 mm. Histopathology revealed **squamous cell carcinoma** with secondary inflammation. Squamous cell carcinoma is uncommonly reported in pigs and usually consists of a primary oral neoplasm that has potential for metastasis to regional lymph nodes and beyond (Kleinschmidt, Puff & Baumgärtner, 2006; Swenson et al., 2009).

Rodent

A single guinea pig from Nelson presented with a well-defined area of alopecia and scaling on the rump, with no fluorescence under Wood's lamp. Skin scraping was negative for mites, and a KOH preparation of a hair-pluck did not reveal fungal hyphae or arthrospores. A fungal culture was performed to confirm, and it yielded a growth of *Trichophyton* sp. Most clinical cases of dermatophytosis in guinea pigs are caused by *T. mentagrophytes*, although *Microsporum canis* may also cause lesions. *Trichophyton* spp. do not fluoresce under Wood's lamp, which explains the negative result in this

case. Dermatophytosis is potentially zoonotic, and spores may persist in the local environment.

Avian

A 23-year-old captive greater spotted kiwi had a 5-day history of inappetance with raspy respiration. Areas of pulmonary haemorrhage and consolidation were identified on post-mortem examination, and fungal culture of lung tissue yielded *Aspergillus* sp., as well as a scant mixed bacterial growth (most likely due to contamination, especially in a post-mortem sample). *Aspergillus* spores can be present in litter or nesting material used by kiwi in captivity – usually only in low numbers but on occasion there may be high environmental loads, increasing the risk of aspergillosis in otherwise healthy animals (Glare, Gartrell, Brookes & Perrott, 2014). It is not known in this case whether the risk may have increased by an underlying disease process or immune suppression.

A conjunctival lump was removed from a 3-month-old kiwi chick in Rotorua. Histopathology of the lesion revealed the tissue to be lined by squamous epithelium with central fibrous tissue containing multiple feather follicles with associated bands of smooth muscle. These findings are consistent with **conjunctival dermoid**, a form of choristoma that has been rarely reported in birds (Busch, 1985). To the author's knowledge, this lesion has not been previously reported in kiwi.

References

- Blackstock KJ, Schoeffler G, Wakshlag JJ, Diep AN, Bauer JE (2012). Transient hyperlipidemia in a litter of kittens. *Journal of Veterinary Emergency and Critical Care* 22(6), 703–709.
- Busch TJ (1985). Bilateral dermoids in a goose. *NZ Veterinary Journal* 33(11), 189–190.
- Cebra CK, Stang BV (2008). Comparison of methods to detect gastrointestinal parasites in llamas and alpacas. *Journal of the American Veterinary Medical Association* 232(5), 733–741.
- Connor HE (1977). The poisonous plants in New Zealand. Second edition, pp. 29–30. Wellington: Government Printer.
- Glare TR, Gartrell BD, Brookes JJ, Perrott JK (2014). Isolation and identification of *Aspergillus* spp. from brown kiwi (*Apteryx mantelli*) nocturnal houses in New Zealand. *Avian Diseases* 58(1), 16–24.
- Kleinschmidt S, Puff C, Baumgärtner W (2006). Metastasizing Oral Squamous Cell Carcinoma in an Aged Pig. *Veterinary Pathology Online* 43(4), 569–573.

Swenson J, Carpenter JW, Ragsdale J, Kuroki K, Ketz-Riley C, Brinkman E, Cole G (2009). Oral squamous cell carcinoma in a Vietnamese pot-bellied pig (*Sus scrofa*). *Journal of Veterinary Diagnostic Investigation* 21(6), 905–909.