Under the Australian constitution, state and territory governments are responsible for animal health services within their respective borders (jurisdictions). The governments develop and administer legislation governing the surveillance, control, investigation and reporting of disease and chemical residues and contaminants, as well as legislation relating to animal welfare. The governments deliver their services through government-appointed or government-accredited animal health personnel (district veterinarians, regional veterinary officers and local biosecurity officers). They also provide extension services to industry and the community.

The ‘State and territory reports’ summarise disease investigations undertaken within jurisdictions and describe a selection of interesting cases. A comprehensive summary of suspect exotic or emergency disease investigations is reported in Table 17 of ‘Quarterly statistics’.

Unless otherwise stated, disease events involving wildlife are reported by Wildlife Health Australia.

**New South Wales**

Animal disease surveillance in New South Wales comprises active (deliberately initiated) field and laboratory investigations, as well as examination of nongovernment sources of passive data derived from analysis of investigations activated by others, such as private veterinarians.

During the quarter, New South Wales Government veterinarians investigated approximately 600 significant disease incidents to rule out emergency or notifiable diseases as early as possible and to provide assurance of disease status and prevalence on a district basis.

Approximately 40 government veterinarians, located around the state on a geographical and enterprise-risk basis, defined the disease status of their districts by conducting on-property disease investigations, visiting and inspecting high-risk enterprises, meeting with intensive industry veterinarians, collaborating with private veterinarians and analysing data generated from laboratory reports.

Targeted syndromes included sudden death, high mortality, high morbidity or suspicious signs indicative of a notifiable or emergency disease.

During the same period, the State Veterinary Diagnostic Laboratory processed approximately 850 submissions for laboratory diagnosis from both government and private veterinarians.

**Thiamine deficiency in cattle grazing turnips**

A cattle producer in the Upper Hunter reported nervous system signs and several unexplained deaths in a herd of 120 mixed breed yearling cattle grazing a paddock of turnips, oats and rye.

Four steers had died in the preceding 3 weeks but their deaths had been attributed to bloat and had not been investigated further. When five more steers showed marked neurological signs, the farmer called in the District Veterinarian.

The animals appeared blind and were excitable—running into fences and waterways—or lethargic. On closer examination, they had brain-related blindness: no menace reflex (response to a hand moved rapidly close to the eye) but a positive palpebral reflex (blinked when touched on the inside corner of the eye). There was also some muscle trembling and grinding of teeth.

The paddock had been recently sown to turnips and intensively grazed for the previous 6 weeks, but it had a long history of cultivation and grazing without any problems. No sources of lead or plants toxic to the liver were found. The cattle had some access to silage, so listeriosis was considered, as well as hypomagnesaemia (low blood magnesium levels). However, because turnips dominated the available forage, a presumptive diagnosis of polioencephalomalacia (PEM) due to...
excessive sulfur intake from was made. PEM is a softening of the brain’s grey matter associated with a deficiency of thiamine (vitamin B1), problems metabolising this vitamin or high dietary levels of sulfur.

The herd was removed from the crop and affected cattle were given hay and vitamin B injections daily for several days. The cattle improved dramatically over the following 48–72 hours, with only one steer showing a delayed recovery of several weeks.

**Abortion due to ovine brucellosis**

Ovine contagious epididymitis (caused by *Brucella ovis*) is a known cause of ram infertility that has plagued the Australian sheep industry for decades. Stud rams go through a rigorous accreditation process for studs to be placed on the NSW Ovine Brucellosis Accreditation Scheme list of accredited flocks.

Rarely, *B. ovis* can also cause abortions in ewes.

A producer in the Riverina grew concerned when he noticed a few aborted foetuses in his lambing paddock. He thought most of the ewes had been vaccinated against *Campylobacter* spp., abortion for the previous 4 years although the vaccination history was not certain.

From one ewe that had potentially not been vaccinated against *Campylobacter* spp., two aborted near-term foetuses were collected and sent to the Elizabeth Macarthur Agricultural Institute (EMAI) for analysis. Growth of *Campylobacter* spp. was found and deemed the cause of these abortions.

One week later, Riverina Local Land Services (LLS) veterinarians were called out to investigate abortions in two other groups on the same property. Another fresh foetus was taken for analysis at EMAI. Possible causes for late-term abortions in this case were *Campylobacter* spp., toxoplasmosis, brucellosis, listeriosis and *Chlamyphila abortus* (cause of enzootic abortion). Samples were checked against each of the above diseases and a diagnosis of brucellosis was made by *B. ovis* specific polymerase chain reaction (PCR). Testing for other organisms was negative.

After thorough examination, about 60% of the rams on the property were found to have lesions consistent with OB on either one or both testicles. A further 25% had extremely high titres in serology testing. All these rams were culled and removed immediately from the flock. The remaining rams were re-tested at 4–6 week intervals; they were also separated into two smaller groups to make the eradication and salvage program easier. Unfortunately, Brucella antibody titres were sporadically detected in these rams. The owner opted to remove all these rams from his property and buy-in new ram stock before the next joining season.

**Photosensitisation in sheep**

In late April and early May 2015, outbreaks of photosensitisation in sheep were reported in the mid-Murray Valley of New South Wales.

Several flocks between Barooga and Corowa and within 40 km of the Murray River were affected. Outside this area of approximately 80 × 40 km no incidents were reported.

The disease was diagnosed by government and private veterinarians on eight landholdings—several of them on multiple sites up to 30 km apart—and anecdotal reports indicated that quite a few other flocks were affected.

The area received several significant rainfall events during the summer of 2014–15, as well as 30–50 mm of rain during the second half of April 2015. The April rain was followed by several mild (> 20°C) sunny days. All the photosensitisation seemed to occur over a few days to a little more than one week after this April rain.

Merino, crossbred and Awassi sheep—adults, unweaned lambs and weaned lambs—were all affected. The incidence in affected flocks ranged from 50 to 100%. In almost all the affected flocks, sheep in adjoining paddocks were unaffected. In one case, the affected and unaffected groups had been split only 2 weeks before the event. In two cases, single sheep had gotten through a fence into the paddock where photosensitisation was occurring and were affected, whereas the sheep in the paddock they came from were unaffected.

Clinically affected sheep had severe inflammation of the muzzle, eyelids, coronets, udder and groin. The inflammation progressed rapidly to scabbing and ulceration. In two flocks, secondary infection with *Staphylococcus aureus* caused multiple micro-abscesses under the skin.

The involvement of the hooves was unusual and severe. Some affected sheep were severely lame, with a few walking on their front legs only. Necropsies revealed that these sheep had severe inflammation of the sensitive layers of the hoof.

Another unusual feature of this incident was the relative lack of swelling under the skin of the ears, although the ear skin appeared more fragile than usual.

In affected Awassi sheep, there was a clear demarcation between affected unpigmented skin and unaffected pigmented skin.

The progress of the condition varied. In some flocks, the disease went through inflammation, ulceration, sloughing and regeneration of the affected skin with little apparent long-term damage apart from some loss of body condition. In contrast, in three of the eight flocks investigated, 5–15% of the affected sheep died.

Continued on page 10.
The causes of death varied. Some pregnant ewes died of pregnancy toxoaemia. Some young lambs died of mummifying and exposure because their mothers wouldn’t let them suckle their inflamed teats. Some sheep died of pneumonia and septicaemia caused by *S. aureus*, presumably derived from the micro-abscesses under the skin. These deaths stopped following antibacterial therapy.

Serum enzyme and histopathology examinations of several of the affected flocks showed that there was no liver pathology.

There was no apparent difference in plant species between paddocks where 100% of the sheep were affected and adjoining paddocks where no sheep were affected. There was also no correlation with the plant species present in paddocks on different properties where 100% of the sheep were affected. All paddocks contained a mix of summer-active native perennial grasses and winter-active introduced annual grasses and legumes. The winter-active annuals had germinated and were actively growing and the summer-active perennials had become active again.

This incident appears to have been primary photosensitisation caused by unidentified compounds in plants that were growing rapidly after significant rain and mild weather. The government veterinarians in the Murray Local Lands Services are conducting further investigations to identify the cause of the problem.

**Humpy back in sheep but foot-and-mouth disease excluded**

In April 2015, a District Veterinarian was called to investigate weakness and ataxia in full-wool adult Merino sheep of both sexes that were being mistered for shearing at a property west of Warren in Western New South Wales.

Twenty out of 300 sheep were affected and the owner first suspected Barber’s pole worm (*Haemonchus contortus*) despite a dry summer and drenching 2 months beforehand with a short-acting combination wormer. There were no deaths. Some mildly affected sheep seemed to recover when left behind in the paddock.

Four adult Merinos were examined in the yards where they were receiving nursing care. They were depressed, hunched and ataxic in all four legs (most severely in the hind legs). The worst-affected animal would stumble forward and land on its face if moved quickly in the yards. It had ulcerations at the front of the mouth. Rectal temperatures ranged from 40 to 41°C. Blood testing revealed normal calcium levels and elevations in the enzymes that indicate muscle damage (consistent with lying down). Foot-and-mouth disease (FMD) and vesicular stomatitis virus were excluded via PCR testing, virus isolation and antigen-capture enzyme linked immunosorbent assay (ELISA) testing at Australian Animal Health Laboratory.

The paddock was dry, with an almost pure growth of *Solanum esuriiale* (wild tomato) following recent rain. At this time of year, *S. esuriiale* is known to cause a staggering and neurological syndrome in sheep, locally known as ‘humpy back’. This was presumed to be the cause of the syndrome. The exact toxin in the plant and the mechanism of the disease are largely unknown. The mouth ulcerations were probably self-trauma from staggering and falling forward.

**Green cestrum toxicity after a flood in the Hunter**

Early in May 2015, just 2 weeks after a major flood in the Hunter River in New South Wales, a property in the Gresford area reported that four bullocks had died over the previous week with no clinical signs and another one was down. All the cattle had been grazing in the same paddock. The paddock had a plentiful supply of feed with a mix of kikuyu, a small amount of clover and couch.

The bullocks had not been vaccinated in the past 12 months but were in very good condition (body condition score 3–4). The other bullocks all appeared in good health.

The bullock that was down was struggling to get up. It was aggressive, could stagger only a very short distance and had muscle twitches. The bullock was groaning occasionally with abdominal pain and was drinking copiously.

The deceased bullocks had died 3 or 4 days beforehand and had deteriorated very quickly. With flooding, rapid new growth of feed and no recent history of 5-in-1 or 7-in-1 vaccination, there was concern that the sudden deaths were due to enterotoxaemia. There was also concern that the affected live bullock could have bovine ephemeral fever (BEF), as we had received reports of a suspected case in the Hunter Region a few days beforehand.

After a paddock walk, the possibilities increased. Two toxic plants—mother-of-millions (*Bryophyllum sp.*) and green cestrum (*Cestrum parqui*)—were identified in the paddock.

There was a thick growth of mother-of-millions on the hill crest and down to the river. The plants were in flower but appeared to be reasonably untouched by the livestock. Livestock would have to eat about 5 kg of the plant before poisoning could occur. This did not appear to be the case.

Down by the river, there was a dense growth of green cestrum plants. These plants had obviously been eaten and there had been a lot of fresh, lush growth since the floods.

Carboxyparaquin, the poison in green cestrum, causes severe liver damage. The signs seen in the bullocks were typical for green cestrum poisoning, with diarrhoea, stagger, irritability, lying down, abdominal pain and convulsions in some cases but sudden death with no signs in others.

All cattle were removed from the source and there were no further problems. At last report, the bullock that was down had improved slightly.

**Actinobacillosis in beef cattle**

District veterinarians were called to investigate reports of cattle with excessive drooling, swelling and open lesions around the jaw and neck on an extensive grazing property near Walgett in North Western New South Wales.

About 50 animals were affected in a group of 600 Angus steers aged 1–3 years. The animals had been grazing an oat crop for past 3 weeks, during which time the problem had noticeably worsened. Before the oats, they had been grazing 3-year-old wheat stubble and had been weaned early because of prolonged drought on the property.

The worst-affected animals were standing with their necks outstretched and having difficulty breathing. Many animals had large masses, predominantly under the jaw, and some also had lesions on their flanks.

Examination of the worst-affected animals showed large, firm granulomatous masses, mainly around the jaw and upper neck. The masses ranged from golf-ball to tennis-ball size (5–15 cm in diameter) and were free moving (unattached to bone). Some were open with a bloody or purulent discharge, whereas others were closed with no sign of external injury. Most of the affected animals also had some degree of ‘bottle jaw’ (swelling under the skin of the neck). Affected cattle had elevated temperatures, ranging from 39.5 to 40.6°C, and several had open wounds in their mouths from the eruption of their adult incisor teeth. Several animals had mild
swelling of the tongue and reduced muscle tone, causing the tongue to protrude. One animal had a small (5 cm diameter) granulomatous mass under the tongue. Biopsies collected from several animals were sent to the State Veterinary Diagnostic Laboratory for testing; they returned a pure growth of *Actinobacillus lignieresii*. This bacterium causes a condition commonly known as 'wooden tongue', as severe lesions can render the tongue immobile and cause difficulty eating and subsequent loss of condition or death. *A. lignieresii* is normally present in the mouth but can invade the tissues after trauma caused by abrasive foods or the action of the teeth while chewing.

Routine biochemical blood testing revealed no abnormalities. Antibiotic sensitivity testing of the cultured bacteria revealed sensitivity to some common antibiotics, including tetracyclines. The animals were treated with long-acting oxytetracycline and removed from the oat crop.

### Importance of vaccination for ovine Johne’s disease

In December 2014, ovine Johne's disease (OJD) was diagnosed in a rising 3-year-old home-bred Merino ram on a property north-west of Albury in southern New South Wales.

Although this area is known to have a high prevalence of OJD, this particular property had been tested free of the disease (MN2 status) as part of the SheepMAP program until 2007. After 2007, all lambs born on the property had been vaccinated against OJD (Gudair®). The property had had no new introductions of sheep until 2013 because the management used artificial insemination instead of buying-in rams. The infected ram had been in good condition when turned out with the ewes in November but after just 4 weeks, it had developed chronic scours and was in poor condition.

The ram was euthanased for necropsy examination by government veterinarians from Murray Local Lands Services and was found to have a thickened ileum and jejunum, which is consistent with OJD. Johne's disease was confirmed by finding signs of the bacteria in intestinal samples.

This ram had been bred on the property in 2012 and kept, along with five other ram lambs, as a breeder. After the initial diagnosis, another of these six rams was diagnosed with OJD at a necropsy in March 2015 and another died in June 2015 after showing signs consistent with OJD. A further ram was culled because of hoof lesions during a footrot eradication program. Two rams remain on the property.

No sheep were introduced to the property when these rams were young and at risk of picking up the infection.

Apart from a 6-year-old downer ewe found in June 2015, the owner has not observed any other animals with signs consistent with OJD. This included the 300 ewes that had been born on the property at the same time as the infected rams.

Because the lambs had been divided at weaning and the ewe and ram lambs had then been run separately, it's possible that the rams were exposed to a high load of OJD bacteria but the ewe lambs were not.

When the ram diagnosed in March 2015 was examined for a positive Gudair vaccine reaction (a raised lump that is very common after the vaccine), none was found. The LLS veterinarian suspected that the ram had not been vaccinated with Gudair, as previously thought.

The owner has confirmed that it is possible that these six rams had accidentally missed being vaccinated with Gudair; this would have made them the only sheep on the property not protected by vaccination and would have accounted for the high rate of infection in this group.

This case highlights the importance of vaccinating with Gudair on properties in an area known to have a high prevalence of OJD. The high mortality rate in young rams (which were likely to have been the only unvaccinated sheep on the property) was not seen in the vaccinated sheep.

It is worth noting the rapid rate of infection between the time the farm exited the SheepMAP program as MN2 status in 2007 to having 50% mortality in a cohort of presumably unvaccinated rams before 3 years of age.
During the quarter, Berrimah Veterinary Laboratories processed approximately 267 submissions for laboratory diagnosis. Approximately 58% were for disease investigations, 30% for targeted surveillance programs and the remainder for research, regulation, quality assurance, health certification and export testing.

National Arbovirus Monitoring Program (NAMP)

A new serotype of bluetongue virus (BTV) not known to have previously occurred in Australia, BTV-5, was detected in a sentinel herd in the Northern Territory in April 2015. BTV-5 is not known to cause disease in cattle and this finding was not associated with any disease symptoms. The detection of BTV-5 was made by routine surveillance under the National Arbovirus Monitoring Program (NAMP), which highlights the importance of the NAMP in Australia's ability to continuously monitor the health status of livestock. BTV is an insect-borne viral disease primarily of sheep, occasionally goats and deer and, very rarely, cattle. The disease is noncontagious and is only transmitted by insect vectors. Since the 1970s, 12 of the 24 BTV serotypes found worldwide have been identified in the Northern Territory. BTV-8, currently the only serotype known to cause disease in cattle, was first detected in Europe in 2006 and is only known to have previously occurred in Australia, BTV-5, was detected in a sentinel herd in the Northern Territory in April 2015. BTV-5 is not known to cause disease in cattle and this finding was not associated with any disease symptoms. The detection of BTV-5 was made by routine surveillance under the National Arbovirus Monitoring Program (NAMP), which highlights the importance of the NAMP in Australia's ability to continuously monitor the health status of livestock. BTV is an insect-borne viral disease primarily of sheep, occasionally goats and deer and, very rarely, cattle. The disease is noncontagious and is only transmitted by insect vectors. Since the 1970s, 12 of the 24 BTV serotypes found worldwide have been identified in the Northern Territory. BTV-8, currently the only serotype known to cause disease in cattle, was first detected in Europe in 2006 but does not occur in Australia.

Salmonellosis in a Brahman heifer

Salmonellosis was diagnosed in a Brahman weaner heifer on a cattle station in the Darwin region. During a muster, approximately eight out of a group of 60 weaners were found dead in a paddock and another heifer was noted as unusually quiet and becoming recumbent once yarded. Botulism was initially suspected and all weaners were immediately vaccinated for botulism. Following 3 days of recumbency, anorexia and constipation, the heifer had not improved and was euthanased, at which time a small amount of blood-tinged watery faeces was collected. Necropsy showed haemorrhage of the gall bladder wall and intestinal mucosa. The omasum was compacted with dirt and the intestinal contents were watery and blood tinged. *Salmonella enterica* serotype Saintpaul was isolated from culture of the liver, spleen and faeces. BEF was excluded by PCR testing and serology.

There had been no phosphorus supplementation on the property over the wet season and the weaners had recently been observed eating the droppings of an unusually large flock of cockatoos roosting in the paddock. The bird flock moved on and no further losses were reported. It was likely that phosphorous deficiency and concurrent stress of mustering were significant contributing factors in the development of clinical salmonellosis, which is an unusual finding in extensive beef herds.

Suspected plant toxicity in heifers

A helicopter pilot observed approximately 20 dead cattle in a paddock of 400 heifers during first-round mustering on a property in the Barkly region. Cattle are produced in the Northern Territory under extensive rangeland conditions where the size of paddocks can be as large as several hundred square kilometres requiring use of light aircraft to muster animals in to yards for management. Some heifers in the paddock showed mild signs of ataxia and others recumbency during the muster. One affected heifer examined was dehydrated, anxious and mildly ataxic in the hindlimbs. Euthanasia and necropsy revealed a dry, impacted omasum (consistent with dehydration), abomasal ulceration and an empty bladder. There was no histological evidence of kidney, liver or gastrointestinal disease, which may be associated with plant toxicity. However, examination of the paddock revealed a native plant, *Pterocaulon sphacelatum* (applebush), not known to be toxic and usually unpalatable to livestock to be heavily grazed, despite ample feed being present. Common poisonous plants to the area, endemic diseases, including botulism, BEF, and the emergency disease bovine spongiform encephalopathy were excluded. Recent unseasonal rain may have been a contributing factor in this case with the growth of fresh new plant material.

Nasal adenocarcinoma in a cow

A 6-year-old Brahman cow in moderate condition was euthanased after displaying unilateral epistaxis. No other clinical signs were observed and the cow was in early pregnancy. Necropsy examination revealed a firm yellow–pink mass that protruded from the left alar fold, filling the nasal conchal sinuses and extending into the palatine sinus.

Mixed bacteria including *Escherichia coli*, *Enterobacter agglomerans*, *Klebsiella ozaenae*, *Streptococcus equinus* and probable *Bacillus* sp. were cultured from the lesion. Histopathology revealed the lesion to be neoplastic in nature, along with severe pyogranulomatous rhinitis and rare Splendore–Hoeppli phenomenon (in vivo formation of intensely eosinophilic material around microorganisms). Special stains performed on sections of the nasal mass were negative for fungal agents and acid-fast bacteria. Histopathology also revealed aortic mineralisation consistent with an age-related change and mild lymphocytic encephalitis in a section of the caudal medulla. TSE was excluded.
Subacute lead toxicity in a Dexter cow

A Dexter cow on a small rural property in the Darwin region was reported to be walking through fences after two other cows on the same property had died in previous weeks. The affected cow was found to be in good condition, depressed, blind and stiff-gaited. The cow was euthanased and necropsy revealed a number of foreign bodies in the rumen and reticulum, including short metal wires, plastic, rubber tubing and cotton rope. The management history indicated that cattle, although in good condition, were not receiving phosphorus supplement. Phosphorus is a critical mineral element that is deficient in Territory soils and required by cattle to prevent pica. Histopathology revealed a mild chronic hepatitis, mild subacute superficial reticulitis and an apparently innocuous Sarcocystis sp. infection of heart and skeletal muscle. TSE was excluded. Referral testing of blood, kidney and liver samples showed lead levels within toxic ranges, confirming the diagnosis of subacute to chronic lead toxicity.

Worm burden in imported sheep

Sudden death in a one-year-old Damara–Dorper ram was investigated in the Darwin rural area. A small mixed flock of sheep had been transported to the Northern Territory from Western Australia 5 weeks previously. The owner noted no preceding illness before the ram was found dead in a paddock. No other sheep or alpacas on the property were affected. The property was extremely water logged and the sheep had access to leaves of northern ironwood (Erythrophleum chlorostachyum). Examination several hours post-mortem revealed the affected ram was in good body condition but the carcase was pale. No toxic plants could be found in the ruminal contents although the large intestine contained thin red–brown material and sand. No signs of haemorrhage were observed. A faecal worm egg count revealed a burden of 26 040 eggs/g although there was insufficient faeces available to undertake larval culture for definitive nematode egg identification. Due to the wet environmental conditions, the extremely high faecal egg count and the severely anaemic carcase, Barber’s pole worm (Haemonchus contortus) was suspected. The other sheep were drenched immediately and there have been no further losses.

A separate flock of 18 Boer goats and 10 Damara sheep was diagnosed with haemonchosis and coccidiosis following chronic ill-thrift and diarrhoea, which failed to improve after deworming with a number of anthelmintics. Diagnosis was made on the basis of clinical anaemia and elevated faecal worm egg and coccidial oocyst counts. PCR testing for ovine Johne’s disease was negative and melioidosis was excluded by serology. The animals recovered after treatment with a narrow-spectrum anthelmintic not previously used on the property.

Eyeworm in a chicken flock

Acute blindness was observed in young chickens introduced to a free-range flock over a period of several weeks. Older hens were also found to be blind and may have been blind for up to 4 months previously. Around 25% of the flock displayed conjunctival oedema and ocular discharge. Two hens were euthanased and necropsy revealed an eye worm infection, most likely Oxyspirura sp. Management advice was given to reduce the presence of cockroaches (intermediate host). Treatment with an anthelmintic drench resulted in recovery of the affected birds.

Coccidiosis in a poultry flock

Sudden death of three chicken pullets, one duck and one guinea fowl was reported in a backyard flock in the Darwin rural area. Adult chickens in the flock were not affected. Haemorrhagic droppings were observed in the cage. No prior worming or coccidiostat treatments had been given. Necropsy of the birds revealed varying degrees of emaciation, soiling of vent feathers and enteritis. Faecal specimens from the least decomposed carcases were positive for coccidian oocysts. Various numbers of intraepithelial coccidian schizonts and microgamonts were demonstrated in histological sections of small intestine from one chicken pullet. Avian influenza and Newcastle disease were excluded. Advice was given to treat the flock with a coccidiostat.
During the quarter, Queensland’s Biosecurity Science Laboratory received 1087 terrestrial animal submissions for laboratory diagnosis. Approximately 63% of these were for disease investigations and the remainder came from surveillance programs (13%), regulatory activities (11%) and health checks (13%) for export, movements and accreditation programs.

Biosecurity Queensland provides subsidised laboratory services to the submitter whenever an emergency, exotic, emerging, significant endemic or significant zoonotic disease is a potential diagnosis. During the quarter, Biosecurity Queensland received 665 accessions from clinically ill animals for disease investigation. Each accession may involve samples relating to one or multiple animals.

Cattle (326) accounted for 49% of disease investigation submissions, reflecting the size and economic significance of Queensland’s cattle industry. Other submissions were for horses (172), wildlife (14 bats, 4 wild birds, 1 fox, 4 macropods and 1 coral), pigs (22), bees (26), aquatic animals (13), commercial birds (23), sheep (18), goats (18), cameldids (16) and others (2 dogs, 1 donkey, 4 caged birds) (Figure 1).

Avian mycobacteriosis in captive native birds

In May 2015, individual birds of several avian species (bar-shouldered dove, pied imperial pigeon, wonga pigeon, and buff-banded rail) were found dead, emaciated or with ill-thrift at a zoo in north Queensland. The facility encloses a mixed population of native animals (avians, reptiles and marsupials). Occasional bird deaths had occurred over a period of several weeks.

A private veterinarian undertook a necropsy of one dead bird (buff-banded rail) and sent samples to a private veterinary laboratory. The laboratory reported suspicion of avian tuberculosis based on gross pathology and histopathology (multifocal granulomatous hepatitis with numerous intralesional acid fast, gram positive bacilli). Bacterial culture conducted by the private laboratory produced no significant growth.

Formalin-fixed samples were sent to the Animal Health Laboratories in Perth for PCR testing. Wax block fixed tissue was produced no significant growth. Formalin-fixed samples were sent to the Animal Health Laboratories in Perth for PCR testing. Wax block fixed tissue was also sent to the Victorian Infectious Disease Reference Laboratory for further testing at the national Mycobacterium Reference Laboratory. Both laboratories confirmed diagnosis of Mycobacterium avium.

Avian tuberculosis is a notifiable disease in Queensland and Australia. Mycobacterium avium complex (MAC) is recognised as an environmental bacterium able to survive for long periods in soil and faeces. Zoonotic infection with the MAC occurs primarily in people caring for caged birds. No human infection was associated with this incident.

Biosecurity measures have been implemented at the zoo, including movement control, tracing and infection control, to reduce the risk of contact with susceptible species, including humans. An interagency group that includes Queensland Health and Workplace Health and Safety Queensland has been overseeing work practices and risk management at the facility.

Klebsiella septicaemia in piglets

Over a period of 5 weeks at a piggery in the Western Downs region, there were numerous incidences of sudden death in a population of 400 pre-weaned piglets (21–25 days old). Losses started after introduction of enteric vaccination, with one to two deaths per week for the first 2–3 weeks, peaking at about 10 to 12 deaths per week during weeks 4–5. Affected piglets appeared healthy and in good condition. There was no evidence of diarrhoea or ill-thrift.

Necropsy and histological examination of three piglets revealed bacteria in tissues morphologically similar to the Klebsiella pneumoniae subsp. pneumoniae that was isolated in pure moderate growth from lung, liver, peritoneum and small intestine. The findings support a diagnosis of acute septicaemia due to K. pneumoniae.

No Klebsiella organisms were isolated in subsequent testing of vaccine-related products and water, including testing of drench guns, vaccine, diluent and drinking water. No point source of infection was identified.

Klebsiella septicaemia is well known as a differential diagnosis of sudden death in pre-weaned pigs in the United Kingdom but is seldom described in Australia. The organism is a part of the normal gut flora of healthy pigs and is present in the environment. A private veterinarian is advising the piggery on treatment, biosecurity and control options.
Biosecurity SA (BSA) subsidises clinical disease investigations when an emergency disease is considered possible. During the quarter, BSA subsidised 157 submissions for laboratory diagnosis through the state veterinary laboratory. Most of these submissions were investigations by private veterinary practitioners (76%), with the remainder by BSA staff. Most of the submissions processed by the state veterinary laboratory were for sheep (59) and cattle (51); others included pigs (33), domestic birds, including poultry (13), dog (1) and goat (1) (Figure 2).

Disease events occurring in wildlife are recorded in a national database managed by Wildlife Health Australia and are reported separately. No exotic or emergency animal diseases were diagnosed in South Australia during the quarter.

### **Cattle**

#### **Foot-and-mouth disease exclusion in dairy cattle**

Australia is free from FMD. As part of our continuous vigilance to detect incursions of disease, BSA funds testing to rule out FMD when a producer reports a greater than 5% drop in milk production in a dairy cattle herd. This occurred in late June 2015 in a dairy herd on the Fleurieu Peninsula.

Eleven cows from a herd of 150 became dull and off milk. Three cows were affected during the first week and a further eight were affected 48 hours prior to veterinary attendance. The cows were all between 3 and 4 years old.

Clinical examination revealed no pyrexia or any other signs of infectious disease. No diarrhoea was observed, but affected animals had poor rumen contractions and fine muscle tremors. PCR testing for FMD antigen and competitive-ELISA testing for FMD antibody were negative. The presumptive diagnosis was hypomagnesaemia. Supplementation with magnesium salts was advised and no further cases were reported.

### **Salmonellosis in weaner calves in the Murray Mallee**

In May 2015, a producer in the Murray Mallee reported deaths of about 12 of his recently weaned, hand-raised dairy calves. The calves were aged between 12 to 16 weeks and deaths had occurred over the previous 2 weeks.

The producer purchased 20 calves during their first week of life from a number of regional dairy farms. They were transported to the property where they were housed in sheds and fed on milk replacer and electrolyte supplements. The calves were weaned at 6 weeks of age and moved into a nearby paddock. They were fed exclusively hay provided once daily, during which time they were closely observed.

Around 4–6 weeks after weaning, some calves were found dead with no apparent prior illness or were observed to be lethargic and inappetent 1 day prior to death. No other signs were observed and there were no signs of struggle noted around the carcases. Deaths had occurred at a rate of about one animal per day for the previous 2 weeks.

Necropsy and histopathology examination revealed inflammatory responses in the gastrointestinal tract, including suppurative ileitis and colitis. The diagnosis of salmonellosis was confirmed with positive culture of *Salmonella oranienburg* from the small intestine. Treatment included antimicrobial therapy of the remaining animals and control strategies included advice on minimising the source of infection and promoting good calf immunity.

*Continued on page 16.*
Sheep

**Epididymitis caused by Escherichia coli**

In June 2015, about four of 200 young Dorset rams (12 months old) on the Fleurieu Peninsula were reported to have swollen testicles. They had been tested negative for *Brucella ovis* in April 2015. Examination revealed enlarged testicles and epididymides, as well as excess fluid palpable around each testicle. Testicular fluid aspirates from two affected rams were positive on culture for *Escherichia coli*. Tests were negative for *Brucella ovis*, *Actinobacillus seminis* and *Histophilus somni*.

Although not commonly isolated from testicles, *E. coli* is capable of causing lesions and epididymitis that is clinically indistinguishable from that caused by *B. ovis*. Migration of the *E. coli* from the preputial cavity, along the urethral lumen and into the epididymis occurs mostly in young, sexually active rams on a high plane of nutrition.

The *E. coli* was sensitive to a number of broad-spectrum antimicrobials and therapy was successful in these animals.

Pigs

**Multi-factorial disease in piglets**

A pig producer in South Australia’s northern region reported an increase in mortalities in 7–10-week-old pigs with more than 10 of 500 dead. About 10% of this age group were also losing body condition. The pigs that survived this challenge recovered and continued to grow but ended up being small for their age.

An investigation with repeated sampling and testing identified a number of pathogens, including *Streptococcus suis*, *Salmonella* spp. and *Escherichia coli*.

An underlying *S. suis* meningitis was diagnosed in affected pigs, which further reduced appetite and feed intake, leaving the animals predisposed to the proliferation of *E. coli* and the establishment of *Salmonella* spp. with subsequent scouring.

In-feed medication was used in both the creep and weaner rations to target the meningitis and prevent the establishment of salmonellosis, which has significantly reduced both mortalities and morbidities.

This multifactorial disease event is worth noting for its complexity, with three pathogens acting in concert to cause illness and mortality.

**Decreased growth rates and mortalities in grower pigs**

During May and June 2015, a pig producer near Adelaide reported a reduction in growth rates and an increase in mortalities in grower pigs nearing market weight. Younger pigs were not affected.

Multiple visits were made to the farm to collect a range of samples. Typically the pigs showed extensive lesions consistent with *Mycoplasma* spp. pneumonia with a secondary acute bacterial infection. No pericarditis or pleurisy was observed. A significant number of affected pigs had died due to blood loss from severe gastric ulceration and intestinal volvulus.

*Pasteurella* spp. and *Streptococcus suis* cultured from lung samples were considered responsible for the observed lung pathology, as well as some mortalities and the reduction in growth rates.

Investigations revealed a failure of the liquid feeding system, which had recently been repaired. The pigs had subsequently over-eaten their fluid feed, likely leading to the intestinal engorgement and volvulus. Common predisposing factors for gastric ulceration include finely ground feed with high levels of wheat and liquid feeding of pigs.

A vaccination program for mycoplasmosis was instituted to prevent primary lung damage. Management was changed to reduce the feeding issues and reduce stresses predisposing to respiratory disease outbreaks. No further issues have been reported.
During the quarter, Animal Health Laboratories processed approximately 347 submissions for laboratory diagnosis (Figure 3), which was similar to previous quarters. There was an increase in ill-thrift investigations in cattle (17.0% of submissions in this quarter compared to 8.8% in the previous quarter and 6.9% in the same quarter last year).

Although climatic conditions during the quarter were colder, and drier in some areas, than average, there were sufficient relatively warm days to induce pasture mycotoxicoses in grazing ruminants, of which two cases are described below.

Nationally notifiable diseases ruled out by laboratory testing included anthrax and bovine cysticercosis, which are described below.

**Figure 3** Submissions of laboratory samples in Tasmania for disease investigation, by animal type, April–June 2015

At necropsy, acute bovine liver disease was suspected but histological changes indicated a chronic hepatopathy, most likely due to plant poisoning or mycotoxicosis. *Pithomyces chartarum* spore counts from the affected paddock taken on the day of the necropsy indicated a moderate risk of sporidesmin toxicosis (facial eczema).

**Bovine cysticercosis exclusion in a beef cow**

A small pale nodule was found in the cheek muscle of a cow at a local meat processing facility and submitted for exclusion of bovine cysticercosis (caused by *Cysticercus bovis*, the intermediate stage of the human tapeworm, *Taenia saginata*). A schwannoma (small benign nerve sheath tumour) was diagnosed on histology.

**Sudden death in beef heifers associated with hypomagnesaemia**

Eleven 18-month-old beef heifers in the last trimester of pregnancy were found dead over a 36-hour period on a property in the Midlands region. The animals had been introduced 12 months previously as two groups from different properties and were due to calve in August. They were on ryegrass pasture with lick blocks available and had broken into a shelter belt of trees 3 days prior to the onset of sudden deaths, which coincided with several particularly cold days.

The animal submitted was in good body condition and pregnant. Rumen contents were predominantly grass species with some *Acacia* spp. and *Banksia* spp. evident. Although autolysis of the carcase limited testing, hypomagnesaemia was diagnosed on the basis of low magnesium in the aqueous humour.

Although the heifers were 6–8 weeks from calving, pregnancy combined with the sudden feed change and colder weather are considered to have been contributing factors to the event. The magnesium level in the lick block was low and not considered to be protective in such circumstances. Apart from one additional death 24 hours after the majority of affected animals were discovered, no further deaths occurred.

The investigation was partially supported by the National Significant Disease Investigation Program.

Continued on page 18.
Significant mortality in dairy calves

A significant mortality event involving a group of seventy 5–6 week old dairy heifers with respiratory distress was reported from the North West region. The calves were on pasture and being fed grain and fresh milk.

Initially, 24 calves were affected and 15 died within the first 4 days despite antibiotic treatment. Necropsies revealed abnormality confined to the respiratory tract.

Histology confirmed a pleuropneumonia due to *Mannheimia haemolytica* infection. Serology of affected and unaffected calves indicated that pestivirus, also known as bovine viral diarrhoea virus (BVDV)\(^\text{11}\), was circulating in the group. It was concluded that the concurrent pestivirus infection produced immunosuppression and exacerbated the pneumonia. The antibiotic treatment was changed with rapid effect in the remaining calves.

\(^{11}\) Only BVDV Type 1 (BVDV-1) is present in Australia. The severe BVDV-2 form in Europe and North America has not been found in Australia.

Suspected facial eczema in Merino weaners

About 5% of a 300-head flock of 6-month-old Merino weaners on a property in the north of the state were reported to have swelling and crusting of the ears and face. A weaner with marked lesions was submitted for necropsy. Hepatogenous photosensitisation was diagnosed. While the liver pathology was not suggestive of sporidesmin toxicity (facial eczema), spore counts for *Pithomyces chartarum* on the pasture indicated a high risk for facial eczema.
During the quarter, the Victorian Department of Economic Development, Jobs, Transport and Resources (DEDJTR) recorded 672 clinical disease investigations. These included DEDJTR-subsidised investigations undertaken by private veterinary practitioners, investigations undertaken by DEDJTR staff, including those for targeted surveillance programs, and reports of notifiable diseases received from private veterinarians and laboratories. Of the 644 completed investigations, 82% were confirmed by laboratory testing.

Most of the clinical disease events recorded during the quarter involved cattle (Figure 4).

Nonspecific combinations of clinical signs were most commonly observed, followed by signs associated with the gastrointestinal tract, central nervous system and respiratory tract. Gastrointestinal diseases were the most commonly diagnosed diseases in cattle and goats. Diseases associated with central nervous system were the most commonly diagnosed diseases in sheep. In poultry, the most commonly diagnosed disease was respiratory, with five laboratory-confirmed cases of infectious laryngotracheitis on properties located in Gippsland and south-west Victoria. There were also three unrelated, laboratory-confirmed cases of strangles in horses this quarter; all located in southern Victoria.

Cases of clinical disease with no final diagnosis were reviewed in the context of the surrounding circumstances and exotic or emergency diseases were excluded where appropriate. Any exotic or emergency animal disease exclusions are routinely recorded in the table of suspect emergency animal diseases (Table 17).

Cattle

Anthrax excluded as the cause of sudden death of cattle

Nitrate/nitrite poisoning was diagnosed as the cause of the overnight deaths of 27 out of 90 yearling Angus heifers on a farm near Hamilton in south-west Victoria in June 2015.

On 1 June, the heifers were yarded and a pour-on worm drench (Eprinex) was applied. They were also injected with selenium (Selevin LA) and copper (Coppernate) and vaccinated against pestivirus or BVDV (Pestigard). The cattle were yarded from about 10:00 am to 5:00 pm. They were then placed in a fresh paddock sown with ryegrass and clover and containing plenty of capeweed (Arctotheca calendula). The paddock had been fertilised with approximately 20 kg/ha nitrogen (as urea) on 12 May 2015.

The next morning (2 June), 27 heifers were found dead. The surviving cattle were slowly moved out of the paddock and into a smaller holding paddock. These heifers appeared healthy but a significant number were observed to be scouring with watery green faeces. The heifers were observed to eat cereal hay when it was fed and no further mortalities were recorded.

The dead cattle were all in reasonable body condition (body condition score 2–3 out of 5). There were no obvious signs of struggling and most cattle had blood oozing from the upper exposed eyes, presumably as a result of predation. The vulval mucosae had a brownish discoloration.

Blood collected from a dead heifer tested negative for anthrax using the ICT. A necropsy was conducted on two heifers and gross inspection revealed pulmonary congestion with froth in the trachea and some endocardial haemorrhage. Samples submitted to AgriBio Bundoora showed positive nitrite in the aqueous humour from all three cattle tested. Rumen contents submitted from one necropsied heifer were positive for nitrate but negative for nitrite. Histopathology revealed acute pulmonary congestion and oedema and epicardial and sub-epicardial haemorrhage in one heifer, and multifocal endocardial haemorrhage and oedema in the other. There was no histological evidence of copper or selenium toxicity. A diagnosis of nitrate/nitrite poisoning was made based on the positive aqueous and rumen biochemistry.

Both ryegrass and capeweed are considered plants that can accumulate toxic levels of nitrate. The rapid pasture growth following the autumn break and the recent top dressing with urea may have contributed to the increase in plant nitrate levels. Two frosts in a row, followed by overcast conditions on 1 June, may have increased plant nitrate content. The movement of presumably hungry cattle onto a fresh paddock is likely to have resulted in toxic levels of nitrate consumption. The producer was advised to monitor weather conditions and feeding schedules in the future.

Continued on page 20.
**Foot-and-mouth disease exclusion in a Hereford heifer**

FMD was excluded as the cause of hypersalivation in a 4-month-old Hereford heifer on a hobby farm near Wodonga in north-east Victoria in April 2015. The heifer presented with hypersalivation and mild weight loss but no lameness. The owner reported that the clinical signs had been present for approximately 48 hours. The property had no stockyards so the heifer was tranquillised with xylazine using a dart gun. On close inspection of the mouth, no oral lesions were seen. However, wrapped around the base of the tongue was a green plastic band, which was removed. It was surmised that the physical irritation caused by the presence of the green plastic band had led to the heifer’s clinical signs. This case highlights the importance of carrying out a thorough clinical examination when FMD is a differential diagnosis in a disease investigation.

**Blue–green algae poisoning in Friesian bulls**

From a group of seventy 18-month-old Friesian bulls, three died within 24 hours in April 2015 on a property near Moe in West Gippsland. Necropsy of one of the bulls revealed a swollen pale liver with rounded edges and a mottled appearance. All other organs appeared grossly normal.

An examination of the water troughs found the water to be fresh and clean, however water in a dam accessed by the bulls 2 days earlier was found to be covered with blue algal scum. Samples of this dam water were collected and the tentative field diagnosis was blue–green algae (cyanobacteria) poisoning.

Histological examination confirmed severe acute periacinar necrosis of the liver, which is consistent with but not unique to blue–green algae poisoning. Laboratory testing confirmed the presence of *Cyanobacteria* spp. in the dam water.

It is likely that other bulls that had access to the same dam would have sustained some degree of hepatic damage that may impact their future growth rate. The producer was advised to prevent cattle access to the dam during the algal bloom and to treat the bloom if possible. Several chemicals can be used to control blue–green algae, including calcium hypochlorite, Cupricide (a chelated copper product) and the herbicide, simazine.

**Neospora-induced abortion in Friesian dairy cows**

Mid-term abortions were reported in four cows from a herd of 400 Friesian milkers in south Gippsland in early April 2015. The farmer had not previously observed abortions in his herd.

Initially only uterine fluid, placenta and serum were obtainable by the private practitioner and results were inconclusive. One week later, a 40 cm foetus in good condition was aborted. The foetus was submitted to AgriBio where histopathology confirmed lesions of encephalitis and myocarditis consistent with *Neospora caninum*.

Neospora abortions have been linked to BVDV infection but a BVDV serum indirect fluorescent antibody tests (IFAT) from the cow was negative, as was a pan-pestivirus PCR from the foetus. Cultures for *Brucella* spp., *Campylobacter* spp., fungal species and *Salmonella* spp. and serology for *Leptospira* spp. antibodies were also negative.

Two resident farm dogs were tested for Neospora antibodies using a serum Immunoglobulin G (IgG) IFAT and found to be seronegative. The farmer reported that he had never seen wild dogs in the area. Foxes have not been shown experimentally to shed Neospora oocysts and current opinion is that foxes are not a definitive host. The farmer chose not to test the herd for neosporosis due to financial constraints. The source of the infection in this case is as yet unknown.

Currently, there is no treatment for neosporosis in cattle and no vaccine is available. Cows infected with *N. caninum* have an increased risk of abortion and often pass the infection on to their progeny. This disease causes significant economic losses that are potentially underestimated due to the insidious nature of the infection and reluctance to test the herd, given no treatment is available. Management includes the prevention of canids from contaminating feedstuffs and test-and-cull protocols. The use of beef bull semen—especially Limousin with its low seroprevalence of *N. caninum* infection—has been reported experimentally to dramatically reduce the risk of abortion in Neospora-infected dairy cows.
**Sheep**

**Suspected dermatosparaxis in White Dorper lambs**

Suspected dermatosparaxis was reported in two out of 84 White Dorper lambs on a property near Rutherglen in north-east Victoria in May 2015. The producer had seen similar cases in May 2014.

The lambs presented with thin friable skin that was easily torn when the lambs were being handled at marking. Necropsy also revealed pale friable skeletal muscles and pale, almost-white lungs. Histology of the skin revealed the dermis to be expanded by abundant proteoglycans separating fibroblasts and making differentiation of collagen difficult. These changes are characteristic of dermatosparaxis, an inherited collagen dysplasia. All other samples collected were normal except for a pale liver from one lamb, which had multiple small focal aggregates of neutrophils and lymphocytes.

Dermatospraxis is a genetic autosomal recessive disease that has been reported in White Dorpers in South Africa and Australia. It is a connective tissue disorder that results in the deposition of abnormal collagen in the skin. It is caused by a mutation in the procollagen N-proteinase gene (ADAMTS-2), which results in defective processing of type 1 procollagen that makes up collagen. Collagen is responsible for skin integrity and without it, the skin loses strength and becomes fragile.

A genetic test is available through the Elizabeth Macarthur Agricultural Institute (EMAI) laboratory in New South Wales using a drop of blood to identify potential carriers of the disorder.

The producer was advised to access dermatosparaxis-negative rams for the next breeding season and to talk to the breed society to see if there is any accreditation system in place to identify dermatosparaxis-free studs.

**Horses**

**Traumatic stomatitis in horses**

Sixteen of 24 leisure horses developed stomatitis within 48 hours of being introduced to a pasture in suburban Melbourne in late May 2015.

Early lesions consisted of brown-coloured depressions in the mucosa of the gums, lips and rostral tongues, which developed into ulcers typically 1–2 cm in diameter over 24–48 hours. In one case, a 10 × 4 cm ulcer occurred on the dorsal tongue. The ulcers healed over a period of 10–14 days. Several horses had mild diarrhoea but none were febrile.

Blood samples from seven affected horses were tested negative by PCR testing and serology for vesicular stomatitis and equine herpesvirus 4. Virus isolation tests were also negative. Histology on a biopsy obtained from a 1 day-old lesion showed a small necrotic lesion with a diffuse inflammatory response with oedema in the subcutis.

It is suspected that the lesions were caused by the horses attempting to eat a sharp plant material that contained a locally reactive chemical, although nothing matching this description was found during a pasture examination. Other possible causes considered were exposure to hairy caterpillars or fungi, although the histopathology did not support such causes.
During the quarter, the Department of Agriculture and Food WA (DAFWA) Animal Health Laboratories (AHL) received approximately 630 submissions for laboratory diagnosis. Approximately 46% were for disease investigations and the remainder were from single disease herd tests (18%), targeted surveillance programs (12%), accreditation programs (12%), parasitology (8%), export testing (3%) and regulatory activities (1%).

Bluetongue disease excluded in sudden deaths in lambs
In April 2015, a private veterinarian investigated a report of sudden death in sheep in the Central Agricultural region. The sheep had been grazing a blue lupin paddock over the preceding 2 months and had recently experienced an extreme storm. The producer reported that 52 ewes from a group of 560 died suddenly.

During the on-farm investigation, a necropsy on one animal showed petechial haemorrhages throughout the body with apparent bruising around blood vessels in the connective tissue and evidence of jaundice. Histopathology revealed extensive areas of haemorrhage and necrosis in the walls of arteries. Other findings were liver damage with necrotic hepatocytes and significant presence of macrophages (Küpffer cells) containing golden cytoplasmic pigment, which is considered characteristic for lupinosis.

Due to the vascular pathology, testing was undertaken at the Australian Animal Health Laboratory (AAHL) for bluetongue disease, which returned negative results. The DAFWA AHL tested for Salmonella spp. and annual ryegrass toxicity (ARGT), which were negative. Lupinosis was determined as the final diagnosis based on the history, the on-farm investigation and laboratory findings.

DAFWA continues to advise producers and private veterinarians of the clinical signs of bluetongue disease, which may present similarly as endemic disease and should be considered as part of routine disease investigations. Investigation and testing for bluetongue disease is of particular importance in continuing to demonstrate disease freedom as part of market access for live animal exports.

Avian influenza and Newcastle disease excluded in poultry
In May 2015, DAFWA received notification via the emergency animal disease hotline of increased mortality on a fancy bird property in peri-urban Perth. Approximately 70 poultry had died, with clinically affected poultry showing respiratory signs. The at-risk population was estimated at 500.

DAFWA veterinary officers visited the property, which consisted of a mixture of fancy-breed chickens and ducks; some kept in pens and others in hutches. Moderate audible coughing was evident when walking through the shed. Approximately 10 birds were observed with periorcular swelling and ocular discharge and 10–20 birds showed signs of lethargy and were slow to rise when stimulated.

Samples were taken to exclude avian influenza (AI) and Newcastle disease (ND), which were confirmed negative at the DAFWA AHL and AAHL. The on-farm investigation and laboratory results determined that endemic disease, such as infectious laryngotracheitis, and nutritional issues were the most likely cause of the clinical signs.

DAFWA provided the owners with advice on good biosecurity practices and endemic disease management and of the importance of prompt investigation of disease indicative of emergency animals diseases, such as AI and ND.
Oriental theileriosis investigated in cattle

DAFWA has been working with private veterinarians and producers after the recent detection of oriental theileriosis or ‘bovine anaemia due to Theileria orientalis group’ (BATOG) in the South West Agricultural region, where it has previously not been diagnosed.

*Theileria orientalis*, the blood parasite that causes ‘benign theileriosis’, has been present in Australia for more than 100 years but it has rarely caused disease. Australia is free from East Coast fever (*Theileria parva* infection) and Mediterranean theileriosis (caused by *Theileria annulata*), which are diseases listed by the World Organisation for Animal Health (OIE).

Since late 2005, the incidence and severity of cattle disease cases in Australia due to *T. orientalis* infection have increased. DNA testing in these cases revealed the presence of *Theileria* spp. strains previously undetected in Australia. Further research has shown that one of these variants, *T. orientalis* ikeda, is likely responsible for the change in severity of infection.

BATOG was first detected in Western Australia’s lower Great Southern region in May 2013 but had not been diagnosed outside of this region.

In May 2015, a private veterinarian investigated a report of a collapsed 6-year-old dairy cow in the South West Agricultural region. The producer reported that the cow had calved 12 weeks ago and gradually lost condition.

On examination, the cow presented with anorexia and the mucous membranes appeared jaundiced. Blood samples were taken for haematology and the observed changes were consistent with severe anaemia. The liver enzymes were elevated, indicating possible hepatic damage due to hypoxia.

Copper levels were within normal limits and leptospirosis was also ruled out as a cause of disease. Haematology found *Theileria*-like inclusion bodies in the red blood cells and further PCR testing confirmed the detection of *T. orientalis* ikeda.

DAFWA also worked with a private veterinarian on another property in the South West Agricultural region where *T. orientalis* ikeda had been detected after investigation of abortions.

On-farm investigation included sampling of aborted foetuses and dams. *T. orientalis* ikeda was detected by PCR testing and determined a potential contributing factor of abortion. *Listeria monocytogenes* was also cultured from the lung, liver and stomach contents of the foetus and the histopathological findings were typical of listeriosis. DAFWA AHL tested for *Brucella abortus* and *Neospora caninum* and both were confirmed negative.

DAFWA advised private veterinarians and producers in the region of the increased geographical distribution of *T. orientalis* ikeda and the clinical signs and management options for BATOG. DAFWA continues to encourage disease investigations into abortion cases to rule out reportable diseases, such as B. abortus, to continue to be confident of the country’s disease-free status, which is important from a trade, animal and public health perspective.