ANIMAL HEALTH SURVEILLANCE

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PREFACE

This issue of *Animal Health Surveillance Quarterly* (AHSQ) is the first since my appointment as Australia's Chief Veterinary Officer. It gives me great pleasure to welcome readers to this issue.

The response to the incursion of equine influenza into New South Wales and Queensland has continued to be a major focus of Australia's veterinary authorities. It is very gratifying to see the effectiveness of the response, with the incursion contained and no new cases reported since 25 December 2007. Planning is now focusing on the clearance of previously infected areas, with the accelerated program expected to lead to all areas being declared free from infection by the middle of 2008. Comprehensive surveillance programs are a key component of this program. A detailed report on the incursion and the Australian response is provided in this issue of AHSQ.

While a large proportion of resources are targeted at equine influenza, work in other areas must be maintained, and this AHSQ reports on a variety of other activities. Of particular interest is the report on the recent audits and evaluations of Australia's animal health systems by trading partners. These audits are a constant check on the quality of Australia's systems, including surveillance programs, and ensuring that we meet the requirements of trading partners provides a critical impetus to maintaining and enhancing our portfolio of surveillance activities.

Other topics in this issue include highlights of disease surveillance activities, items of interest from States and Territories, and summaries of disease monitoring and surveillance programs reported to Australia's National Animal Health Information System (NAHIS). Only summary information is recorded in NAHIS; detailed data are maintained by the source organisations.

The information in AHSQ is accurate at the time of publication, but minor discrepancies may occur because of the short reporting and production time. AHSQ is also available on the Animal Health Australia website (http://www.animalhealthaustralia.com.au/status/nahis.cfm).

Andy Carroll, Australian Chief Veterinary Officer

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Australia appoints Chief Veterinary Officer

In December 2007, the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) appointed a new Chief Veterinary Officer (CVO), Dr Andy Carroll.

After graduating from The University of Queensland in 1978, Dr Carroll worked for the Queensland Government as a District Veterinary Officer in Rockhampton, Emerald and Chinchilla. During this time, he worked on the Brucellosis and Tuberculosis Eradication Campaign and developed an interest in herd health improvement, research and livestock disease monitoring. He achieved a Master of Veterinary Science degree through James Cook University in 1985.

Dr Carroll has worked in DAFF since 1985, mostly within the Australian Quarantine and Inspection Service. He has held the positions of National Manager for Cargo Management and, since 2004, the National Manager for Border, where he was responsible for the management of quarantine issues associated with international mail, airports (aircraft, passengers and accompanied baggage), quarantine detector dogs and the Northern Australia Quarantine Strategy.

As Australian CVO, Dr Carroll aims to work collaboratively with stakeholders to strengthen Australia's animal disease prevention, preparedness and response capabilities. With his team in the Office of the Chief Veterinary Officer of DAFF, he will work to support and enhance trade and market access for Australia's animals and animal products, and contribute to sustained productivity and economic viability of Australia's animal-dependent industries. Ancillary goals are the protection of Australia's natural environment and a focus on veterinary public health, particularly zoonotic diseases.

Contributed by: Jill Mortier, Office of the Chief Veterinary Officer, Australian Government Department of Agriculture, Fisheries and Forestry

Equine influenza in Australia — update

Background

Equine influenza (EI) was diagnosed for the first time in Australia in August 2007, with the outbreak contained to New South Wales and Queensland. The response was immediate and aimed to contain and eradicate the disease. Measures included an immediate standstill on all horse movements, quarantine of infected premises, cancellation of horse events, movement controls, biosecurity measures and legal declaration of control areas/zones allowing enforceable orders to be made. Vaccination was subsequently implemented in buffer zones to aid control.

In New South Wales, the disease was confined to an area that included Sydney, the Hunter Valley and a north-eastern corridor up to the Queensland border. In Queensland, the disease was confined to the south-east corner of the State.

The Australian EI isolate was confirmed as most closely related to the Wisconsin strain of the virus.

Response update

At the height of the outbreak in October and November 2007, nearly 10 000 properties were infected in New South Wales and Queensland. However, the control measures implemented by State veterinary authorities and the actions of Australian horse industries and individual horse owners were effective in containing the disease.

In the 6 weeks before 25 December 2007, the number of infected properties declined rapidly. The following table provides detailed figures for the end of December.

State	Infected premises	Dangerous contact premises	Suspect premises	Resolved premises
NSW	680	248	136	6109
QLD	827	196	380	2400
Other States & Territories	0	0	0	0

Large populations of horses have fully recovered from infection or have been vaccinated, and no new infected premises have been reported in any jurisdiction since 25 December 2007. The geographical size of the infected area has decreased by 47% since late October.

Quarantine, zoning, movement controls and biosecurity measures continue in the remaining infected area.

Vaccination

Strategic targeted vaccination, using a live recombinant vaccine imported for emergency use, began in late September to help eradicate EI. The program aimed to achieve more than 80% coverage in buffer zones around areas where there were high numbers of infected horses. After the initial round of vaccination, New South Wales and Queensland vaccinated further horses to strengthen and extend buffer zones in high risk areas; more than 300 000 doses of vaccine have been distributed in these States.

By the end of December, more than 90% of horses in the buffer zones had received the first vaccination, and nearly 80% had received the second vaccination.

Vaccination was also used to protect horses such as police horses, Olympic competition horses and horses preparing for participation in upcoming race meetings or horse sales. Approximately 13 000 horses have been vaccinated in Victoria and other States for this reason.

The future

The number of infected premises is continuing to rapidly decrease. Any new infections will be quarantined and a full tracing investigation will be conducted.

Substantial changes to movements and zoning have been nationally agreed for implementation in the coming months. These include an increase in low-risk movements as a first step, although movements from infected premises, dangerous contact premises and suspect premises remain prohibited until investigation resolves the status of the premises.

Horse gatherings are being permitted under specific conditions and where organisers register events and implement appropriate biosecurity measures.

Border controls in southern New South Wales will be scaled back as the risk of disease diminishes, although electronic signage with warnings about movement restrictions between New South Wales and Victoria will remain at border crossings, including on remote back roads. Cameras are being used at locations along the border to assist in surveillance and management of permitted movements.

Surveillance activities are being established and will be an increasing focus of activity as eradication progresses. As with vaccination, the use of private practitioners will be necessary to collect samples for laboratory testing.

Planning is under way for collection of surveillance data that will be critical to progress towards zone resolution and proof of freedom from EI.

Arrangements for the reopening of Australia's export market are progressing. A number of countries continue to import horses from Australia in accordance with conditions in place before the outbreak. Biosecurity Australia and the Australian Quarantine and Inspection Service are negotiating conditions with other trading partners. Australia's internationally renowned yearling sales will proceed.

Summary

With no new infections and the geographical distribution of the disease continuing to decline, Australia aims to eradicate EI by the middle of 2008. Australian horse industries and horse owners have been highly supportive of all measures necessary to control and eradicate EI, and continue to support and contribute to eradication efforts.

Control and management measures are expected to be eased over the next few months and surveillance activities implemented to allow Australia to demonstrate freedom from the disease.

Contributed by: Lyndel Post and Scott Porteous, Office of the Chief Veterinary Officer, Australian Government Department of Agriculture, Fisheries and Forestry, and Animal Health Australia

Equine influenza postscript — 25 February 2008

With no new infected premises diagnosed since 25 December 2007, focus of the national EI response has been on surveillance, testing and eradication activities around the infected premises in New South Wales and Queensland — see table below. As a result of this work, New South Wales and Queensland no longer have any premises classed as infected. The 22 remaining suspect premises are under investigation.

State	Infected premises	Dangerous contact premises	Suspect premises	Resolved premises
NSW	0	0	0	6654
QLD	0	0	22	3897

Approximately 170 000 horses have received a primary course (two injections) of live recombinant vaccine to support the eradication of the disease, limit production losses and protect important community assets.

The success of the eradication effort has allowed the horse industry to progressively return to normal activities while effectively managing the risks. This has enabled events including yearling sales and equestrian and racing events to proceed.

The National Management Group (the committee overseeing the national EI response) has approved an accelerated plan to eradicate EI from Australia.

Activities of the Animal Health Committee

What is the Animal Health Committee?

The Animal Health Committee (AHC) coordinates the development and implementation of Australia's national animal health policies, particularly those relating to livestock production. It provides scientific and technical advice to Australia's Primary Industries Standing Committee (PISC), which supports the Primary Industries Ministerial Council (PIMC).[1]

Membership of the AHC comprises the Australian Chief Veterinary Officer (ACVO), the Chief Veterinary Officers of all the States and Territories and New Zealand, and representatives from the Australian Animal Health Laboratory (CSIRO) and Biosecurity Australia. The Australian Quarantine and Inspection Service and Animal Health Australia participate as observers. The position of the chair of the committee is rotated annually between the CVOs. In 2008, the AHC will be chaired by the ACVO.

The AHC oversees government policy and standards development and implementation in animal health and welfare, domestic animal quarantine and veterinary public health. It also facilitates national consultation with stakeholders and a consistent approach to animal health issues across Australia.

How does the Animal Health Committee operate?

The AHC meets in person and by teleconference. Issues are also addressed by circulation of out-of-session papers. The AHC currently has three permanent subcommittees — the Subcommittee on Animal Health Laboratory Standards (SCAHLS), the Subcommittee on Emergency Animal Diseases (SCEAD) and the Animal Welfare Working Group (AWWG).

SCAHLS establishes, implements and monitors professional and technical standards in Australian animal health laboratories. It facilitates networking between the AAHL, other government laboratories and private and university animal health laboratories.

SCEAD develops operational arrangements relating to emergency animal disease prevention, preparedness and response in accordance with AHC policy, including consideration of cross-border issues, legislation and resourcing.

The AWWG is responsible for the development of national standards for animal welfare. It facilitates the development and implementation of national animal welfare standards. It provides advice to the

[1] Further information about PISC and PIMC is available online at: http://www.mincos.gov.au/pi_standing_committee

AHC on production and nonproduction animal welfare issues of national significance. It also advises the AHC on emerging animal welfare issues.

The AHC also uses a number of working groups to develop policy on specific issues such as:

- export certification for anthrax
- the use of vaccination in the event of an avian influenza incident
- key principles for the national registration of veterinarians.

From time to time, the AHC also establishes technical advisory groups to provide technical advice on specific issues.

Arrangements during emergency animal disease response

In the event of an emergency animal disease response, a parallel committee, the Consultative Committee on Emergency Animal Diseases (CCEAD), is convened. Membership is similar to that of the AHC, with the addition of representatives from affected and unaffected industries.

Animal Health Committee activities over the past 6 months

Preparedness for avian influenza has been a high priority. The AHC has agreed on surveillance goals for this disease and the details of a revised response strategy for avian influenza to be included in the AUSVETPLAN disease strategy manual.

The AHC has also agreed on:

- the revised boundaries for the Australian bluetongue zone
- policy to address Tasmanian devil facial tumour disease
- a process to expedite the endorsement of AUSVETPLAN manuals
- revised national reporting requirements for avian influenza and Newcastle disease in poultry.

Future Animal Health Committee activities

The list of 2008 activities for the AHC is quite extensive. The AHC's sister committee, the CCEAD, is responsible for urgent policy advice relating to the equine influenza (EI) response, but in 2008 the AHC will deal with some EI issues including vaccine policy post emergency, effectiveness of emergency animal disease training, and proof of freedom. Some key non-EI activities for the AHC include:

- a proposal to shift towards eradication from control of enzootic bovine leucosis in the Australian dairy herd
- abattoir surveillance follow-up procedures for ovine Johne's disease
- the review of AUSVETPLAN manuals
- continued development of Australia's foot-and-mouth disease preparedness and response capacity
- a management program for Newcastle disease
- developing a devolved national veterinary laboratory network.

Meetings have been scheduled for February (Canberra), May (Darwin) and September (New Zealand).

Contributed by: Ian Denney, Animal Health Australia

National Arbovirus Monitoring Program

The National Arbovirus Monitoring Program (NAMP) monitors the distribution of economically important insect-borne viruses of livestock and their vectors in Australia. These insect-borne viruses, referred to as arboviruses, include bluetongue, Akabane and bovine ephemeral fever (BEF). NAMP is jointly funded by industry and governments.

This report covers the second half of 2007, when arboviral activity in northern Australia is usually low. Dry conditions prevailed across most of Western Australia except in the south-west from July to September, and in the Kimberley during November and December. In the Northern Territory, normal dry season conditions continued until late in December, when the first monsoonal rain occurred.

Dry conditions continued in Queensland, with more than 60% of the State remaining drought affected. Conditions improved somewhat in spring, when above-average rainfall fell in the central south, with 300–400 mm of rain recorded over the 6 months. The drought situation improved in New South Wales during this period, with the area affected dropping from a peak of 79% of the State to 53% at the end of the year. Significant rainfall was received across New South Wales during November and December, with 'highest on record' rainfall recorded in December in the Walgett, Coonamble, Coonabarabran, Narrabri, Dubbo and Brewarrina Rural Lands Protection Boards in the northern and central parts of the State.

Neither vector activity nor seroconversions to bluetongue or Akabane viruses were detected in the southern states of Victoria, Tasmania and South Australia during the second half of 2007.

Bluetongue virus

In Western Australia, evidence of seroconversion was detected in two herds in the north-west and one herd in the north Kimberley.

In the Northern Territory, bluetongue seroconversions were low until October, when activity occurred in northern sentinel herds at Berrimah, Douglas Daly and Victoria River. Further activity was seen at Beatrice Hill and Katherine in December. All seroconversions were typed as BTV1.

In Queensland, bluetongue virus activity was detected in only three sentinel herds during July–December. All these were in the north: Weipa, Normanton and Townsville.

In New South Wales, a single seroconversion was recorded in the Lismore and Wallangra sentinel herds at end-of-season sampling in July. No other seroconversions have been recorded in sentinel herds during this period.

Akabane virus

In Western Australia, evidence of seroconversion was detected in two herds in the north-west (the same herds as for bluetongue) and in several herds in the Kimberley (where it was more widespread than bluetongue).

In the Northern Territory, Akabane activity was very limited, with single detections at Victoria River and Berrimah.

In Queensland, Akabane virus seroconversions were only detected in three sentinel herds. The distribution of Akabane viral activity was more widespread than for bluetongue, with herds in the west (Mt Isa) and south-east (Taroom) exhibiting virus activity, as well as herds in Townville in the north-east.

In New South Wales, seroconversions were detected in half the Wallangra sentinel herds and a single animal in the Camden sentinel herd at end-of-season sampling in July. A single seroconversion was recorded at Casino (north coast) in November, with most of the herd seropositive at the December bleed. Seroconversions have not been detected in any other sentinel herds.

Bovine ephemeral fever virus

In Western Australia, evidence of seroconversion to BEF was detected on one property south-east of Derby, which was negative for bluetongue and Akabane.

In the Northern Territory, BEF activity was high in a northern herd at Beatrice Hill. Other northern herds (Douglas Daly and Katherine) showed limited activity in December.

In Queensland, BEF seroconversions were detected in seven sentinel herds. These were fairly widely distributed, mainly in northern and central areas, but extending as far west as Mt Isa. One herd, in the south-east at Taroom, had multiple seroconversions. In addition, laboratory tests confirmed that the clinical disease occurred in nine nonsentinel herds.

In New South Wales, seroconversions were recorded in 50% of the Bourke sentinel herd at the end-of-season sampling in July and in the Casino sentinel herd in December.

Insect trapping

In Western Australia, the only vector trapped was *Culicoides brevitarsis*. Collections were made in the Kimberley region at Kalumburu and Broome Common, as well as single specimens at Broome Port and Kununurra.

In New South Wales, light-trap sampling began during October. The first occurrence of *C. brevitarsis* was recorded at Paterson in the Hunter Valley in October. *C. brevitarsis* was recorded on the mid-north coast at Wauchope in November. By the end of December, only a few other sites had returned samples.

In Queensland, *C. brevitarsis* was the only vector collected in this period. It was collected at the usual coastal and near-coastal sites where it has been previously recorded throughout the year. However, it was rare inland, and in the southern areas of the State was collected no further inland than Taroom.

In the Northern Territory, *C. brevitarsis* was abundant and widespread in all the northern sites. Single insects were collected at Hudson Creek (the Darwin Port monitoring site) from October to December. *C. actoni* was found at the most northerly sites of Beatrice Hill and Berrimah, with low numbers of *C. fulvus* at Beatrice Hill and Douglas Daly. *C. wadai* was not collected.

Additional information can be found at Animal Health Australia's website.[2]

Contributed by: NAMP coordination committee

[2] http://www.animalhealthaustralia.com.au/programs/adsp/namp/namp_home.cfm

Recent audits and evaluations of Australia's animal health systems

Australia's major trading partners continue to periodically audit and evaluate Australia's animal and public health control and inspection systems. These regular evaluations of national sanitary and phytosanitary measures for agri-food exports are an important element of Australia's trading partners' risk-analysis process. Countries may legitimately use risk analysis in their policy formulations that directly apply to animal health and sanitary controls of international trade in animals, animal-derived products, animal genetic material and animal feedstuffs.

The purpose of the audits and evaluations is to provide the importing country with confidence in the Australian Government Department of Agriculture, Fisheries and Forestry as the competent authority with responsibility for ensuring or supervising the implementation of animal health and welfare measures, international veterinary certification and other standards and guidelines.

In the past quarter, the following trading partners have visited Australia:

- Israel — the Israeli veterinary authority checked Australia's live animal export system. This evaluation focused on cattle and sheep health protocols and veterinary certificate issues, including pre-export quarantine period and laboratory testing methods and standards. The Israeli visitors examined live export systems and had discussions with Australian and State government officials and industry representatives in Perth, Canberra and Sydney to gain a greater understanding of the health conditions for animals exported to Israeli, to ensure their requirements are being met.
- Taiwan — the Taiwanese veterinary authority conducted an audit of Australian meat establishments producing pork, ratite and red meat. The audit also examined the residue control and testing system in Australia.
- Russia — Russian veterinary officials conducted an audit of export meat establishments and included visits to farms and a saleyard, examining all links in the food chain, from farm to carton.

In the coming months, Australia is scheduled to have visits from authorities in the European Union, Indonesia, Thailand and the Philippines to review the Australian meat production system. Meetings are also planned between New Zealand and Australia (the Consultative Group on Biosecurity Cooperation, Technical Working Group on Animal Health) to discuss animal health and biosecurity issues related to the trade in animals and animal products between the two neighbours.

Updates on these audits will be provided in subsequent editions of *Animal Health Surveillance Quarterly*.

Contributed by: Andrew Cupit and Laura Timmins, Biosecurity Australia and the Australian Quarantine and Inspection Service, Australian Government Department of Agriculture, Fisheries and Forestry

Australian Wildlife Health Network

Australia recognises the importance of monitoring wildlife health to address the impact that diseases and mass mortalities in wild fauna can have on livestock, human health, agriculture, aquaculture, biodiversity and trade.

The Australian Wildlife Health Network (AWHN) is a national initiative that links Commonwealth, State and Territory agriculture, public health and veterinary agencies and laboratories; wildlife, conservation and environmental agencies; and overseas wildlife health centres in Canada, the United States, New Zealand, India and Europe. The network has a major focus on human and animal health issues associated with free-ranging populations of wild animals.

Key activities of the network include:

- operating a national database of wildlife health information
- monitoring field investigations of disease incidents
- identifying surveillance and research needs and priorities
- preparing and responding to a wildlife health emergency
- providing education and training in wildlife health.

Further information about the AWHN is available at http://www.wildlifehealth.org.au.

Avian influenza in wild birds

Six wild bird mortality events were investigated between October and December 2007; all were atypical of avian influenza (AI). AI was specifically excluded as the cause of four of the events, and exclusion testing was not warranted in the remaining two events. The events included the deaths of eight domestic and wild ducks in Queensland (aetiology unknown); an Australian raven (*Corvus coronoides*) in Western Australia (nonpurulent encephalitis); 25 Australian white ibis (*Threskiornis molucca*) in Queensland (botulism confirmed by enyme-linked immunosorbent assay [ELISA]); 500 juvenile short-tailed shearwater (*Puffinus tenuirostris*) along the eastern south coast of Western Australia; 1000 juvenile shearwaters in coastal South Australia; and reports of similar die-offs in Victoria, Tasmania and New South Wales. Die-offs in shearwaters can be seasonally common and probably relate to the inability to satisfy energy requirements during critical times, such as migration.

As part of Australia's AI surveillance program, wild bird sampling occurred at sites in New South Wales, the Northern Territory, Queensland, South Australia, Victoria and Western Australia. Swabs (cloacal, faecal and oropharyngeal) and blood samples were collected from approximately 4010 wild birds. The majority of samples were collected from waterbirds (e.g. ducks and waders). No AI viruses have been detected.

Other avian investigations

Victoria is currently investigating a case of avian pox in a crimson rosella (*Platycercus elegans*). Samples have been forwarded to the Australian Animal Health Laboratory for further testing. Psittacine beak and feather disease was diagnosed on clinical signs in three wild sulfur-crested cockatoos (*Cacatua galerita*) and a rainbow lorikeet (*Trichoglossus haematodus*), and metabolic bone disease was diagnosed radiographically in four Australian magpies (*Gymnorhina tibicen*). Victoria had a case of chlamydophilosis in a crimson rosella (*P. elegans*), diagnosed by a positive Clearview antigen capture test and necropsy lesions. Chlamydophilosis was also diagnosed in New South Wales, in a captive little lorikeet (*Glossopsitta pusilla*) by an Immunocomb antibody test. New South Wales is investigating the suspected poisoning of birds, including kookaburras, galahs, magpies and rosellas, in Sydney.

Leishmaniasis

The Northern Territory has a novel *Leishmania* species that caused cutaneous leishmaniasis in captive red kangaroos (*Macropus rufus*) in 2000. As a result of further research, the same species has now been identified in six captive northern wallaroos (*M. robustus*) in the Northern Territory. A simple Protein A ELISA has also identified circulating antibodies to *Leishmania* antigens in other captive

species — agile wallabies (*M. agilis*), antilopine wallaroos (*M. antilopinis*) and northern wallaroos (*M. robustus*) — from the Northern Territory.

Salmonellosis in reptiles

Salmonella subsp. IV was isolated from a python (species not recorded) with spinal osteomyelitis from Queensland. *Salmonella* subsp. IIIb was isolated from a lowland copperhead (*Austrelaps superbus*) in Victoria.

Marsupial investigations

Tasmania identified toxoplasmosis-based on clinical signs, pathology and serology, in a Bennett's wallaby (*Macropus rufogriseus*) in November 2007. Tammar sudden death syndrome (TSDS), caused by viruses of the *Orbivirus* genus (family *Reoviridae*), is suspected as the cause of the death of two Tammar wallabies (*M. eugenii*) in New South Wales. Gross pathology included congested lungs and a mottled liver. Virology testing is in progress. In Victoria, a brushtail possum (*Trichosurus vulpecular*) with renal disease was negative for leptospirosis.

Frog investigations

In New South Wales, seven striped marsh frogs (*Limnodynastes peronii*) were found dead in a pond, with two remaining frogs alive but immobile. The two immobile frogs were submitted for necropsy and testing. On histopathology, there was evidence of multisystemic foci of nonsuppurative inflammation. One frog also had an area of extensive necrosis in a cervical vertebral body with numerous single-celled parasites present. The parasites are undergoing identification. Two green tree frogs (*Litoria caerulea*) with deep dorsal and/or leg ulcers were also submitted for testing from separate locations in the State. Fungal hyphae and intracellular bacteria were identified in the deep wounds.

The information in this report is based on that submitted by network subscribers and network State and Territory coordinators. The network would like to thank all those who submitted information for this report.

Contributed by: Chris Bunn, Office of the Chief Veterinary Officer, Australian Government Department of Agriculture, Fisheries and Forestry, and Leesa Haynes, Projects Coordinator, Australian Wildlife Health Network

Aquatic animal health

Successful genome sequencing of the abalone viral ganglioneuritis virus

Scientists have successfully sequenced the genome of the virus affecting abalone off Victoria's south-west coastline. The Fisheries Research and Development Corporation has funded continuing research as a collaborative endeavour between the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australian Animal Health Laboratory and Primary Industries Research Victoria (PIRVIC).

This research confirms that the virus is a unique strain that has previously never been sequenced.

Scientists are continuing to investigate characteristics of the virus, and develop a diagnostic test that will allow authorities to test wild abalone populations for the virus to determine the extent of its presence. Several primers have been identified that will be useful in developing a polymerase chain reaction (PCR) test; work is underway to validate the PCR test and bring it into operation.

Revision of AQUAVETPLAN manuals

AQUAVETPLAN, the Australian Aquatic Veterinary Emergency Plan, is a series of manuals that outline Australia's approach to national disease preparedness and propose the technical response and control strategies to be activated in a national aquatic animal disease emergency.

The Aquatic Animal Health Committee has endorsed the revision of a number of AQUAVETPLAN manuals. They are the disease strategy manuals for furunculosis and infectious salmon anaemia, operational procedures manuals for destruction and disposal, and the management manual for control centres.

Contributed by: Ingo Ernst, Office of the Chief Veterinary Officer, Australian Government Department of Agriculture, Fisheries and Forestry

State and Territory reports

In Australia, the States and Territories are responsible for animal disease control within their borders. National animal health programs are developed through consultation at the Animal Health Committee and are managed by Animal Health Australia.

New South Wales

Contributed by: Rory Arthur, Department of Primary Industries

Equine fescue oedema

Dr Chris Bourke, Principal Research Scientist at Orange Agricultural Institute, will shortly publish a report of a new disease in horses that he discovered in the quarter: equine fescue oedema.

Farms with affected horses were located at Scone, Cootamundra and Albury in New South Wales, and at Kangarilla in South Australia. The Cootamundra farm had seen the same syndrome, for the first time, in some of its horses in spring 2006. Affected horses on all farms were grazing mixed pastures, but the common factor was a particular type of perennial tall fescue grass, *Festuca arundinacea*, known as a Mediterranean, winter-active, tall fescue type.

The fescue content of toxic pastures varied between 95% and less than 10%. In pastures of lower fescue content, there was a preference for grazing fescue because it was green and leafy when other pasture grasses (e.g. ryegrass) had started to dry off. The risk period was late September to early December (i.e. full leaf to early seed head development stage).

All toxic pastures involved endophyte-infected fescue, and preliminary investigations suggest that the endophyte is *Neotyphodium coenophialum*. Mediterranean-type winter-active fescues are not the natural host for *N. coenophialum*; consequently, it is feared that the combination of this particular endophyte and a Mediterranean-type fescue may have resulted in the production of a new toxin to which horses are particularly susceptible.

The majority of affected horses have been brood mares in pasture paddocks with foals at foot. Out of the 49 adult horses that grazed toxic pastures on the four farms, 41 became intoxicated and 2 subsequently died. Affected suckling foals were also reported on some farms. Clinical cases first appear about 3 to 6 days after horses start grazing the pasture. If they are immediately moved off, most affected animals will return to normal within another 3–7 days, but some may require supportive therapy in the form of plasma administration, and some may die despite this treatment. Some affected horses may take up to 28 days to recover.

Affected horses become lethargic, depressed and inappetant, and are inclined to be recumbent. Most develop mild to moderate swelling of the head and neck as a result of gravity-dependent subcutaneous oedema. Concurrently, they develop oedematous thickening of the wall of the right dorsal colon, which is visible on ultrasound images of the abdomen. They go on to develop oedema of the chest and belly (ventral oedema), including accumulation of fluid within the abdominal cavity. Whereas the head and neck oedema quickly resolves, the ventral oedema can persist for several weeks. Protracted weight loss and associated anoestrus are risks for affected lactating mares. Secondary inflammatory changes, such as peritonitis, are possible in some animals.

The outstanding and consistent finding is a drop in total plasma proteins due to an albumin decline, with values as low as 27 g/L (normal range 52–72 g/L). If the albumin drop is too severe, the horse will die before plasma administration can restore it. During the recovery phase, plasma proteins may not return to normal for several weeks. In some affected horses, the biochemical and haematological changes can develop quite suddenly and return to normal quite quickly once the horses are moved off the pasture.

The most likely pathogenesis for this toxicosis is a primary vasculopathy resulting in effusion and oedema. In the horse, this type of injury is

characteristically expressed in the colon and the subcutis. In some affected mares, it also appears to have been expressed in the reproductive tract.

This toxicosis shares some clinical features in common with phenylbutazone poisoning, equine-type arsenic poisoning, oak poisoning, walnut poisoning, yellow-wood poisoning (nephrosis form) and African horse sickness.

Nosema ceranae in bees

The microsporidian *Nosema ceranae* has been detected in adult bee samples from beekeepers based in New South Wales, as well as in Queensland and Victoria.

As *N. ceranae* is a newly recognised pathogen of honeybees in Australia, the full effects of infection have not been determined in this country. However, overseas it has caused gradual depopulation, higher autumn–winter colony deaths and low honey production. It is considered to be more pathogenic than the endemic *N. apis*, which has been long recognised worldwide.

The Rural Industries Research and Development Corporation has funded the Elizabeth Macarthur Agricultural Institute to determine the extent of infection in beehives in Australia. To date, beekeepers have submitted samples as follows: New South Wales 44 samples (3 positive), Queensland 45 samples (27 positive) and Victoria 44 samples (2 positive). *N. ceranae* has not been detected in 24 samples from Western Australia, 19 samples from Tasmania and 8 samples from South Australia. The survey is due to be completed by June 2008.

Botulism in cattle

Cattle on extensive rangeland on the Murrumbidgee River in the Riverina Rural Lands Protection Board region were affected by a syndrome characterised by limb weakness, flaccid paralysis and death within 3 days. A provisional diagnosis of botulism was made, and no new cases occurred from a week after vaccination.

The Angus herd on extensive rangeland (native grasses, forbs and shrubs) in the western Riverina was lightly stocked. One paddock had a history of occasional cattle deaths without a cause being identified, and the owner had earlier in the year placed phosphorus blocks in the paddock. In October 2007, 15 of 200 adult cows in this paddock and 5 of 200 heifers in an adjoining paddock were affected.

Affected animals were in sternal recumbency and alert, and most had kinked necks. With encouragement, they would attempt to stand but appeared too weak. One attempted to charge. There was variable flaccid paralysis of the tongue; some had reasonable muscle tone but others were completely flaccid. Temperatures were in the normal range. Necropsy showed no gross or microscopic abnormalities.

Serum phosphorus was within the normal range. No *Clostridium botulinum* toxin was detected from serum, liver or ruminal contents.

Botulism was diagnosed on the basis of the history and the flaccid paralysis.

The entire herd was vaccinated against *C. botulinum* types C and D toxin. Two more animals were affected in the week following the initial vaccination, but no more cases were seen in the month after that.

Equine influenza

This reports refers to equine influenza (EI) in New South Wales. For a national report see p. 2, and for the Queensland report see p. 15.

As reported last quarter, EI was confirmed in New South Wales on 25 August 2007 and subsequently also in Queensland. A movement standstill was immediately imposed and an eradication program implemented in accordance with AUSVETPLAN. By the end of September, about 25 000 horses had been exposed on more than 2800 infected premises in the State.

The number of cases increased rapidly early in the quarter, reaching a peak of about 1000 new cases in the first few weeks of October. Spread continued to occur, mainly through close contact and over short distances. However, outbreaks at Forbes, Wellington and Grenfell were attributed to human assistance over longer distances.

New cases declined substantially from mid-October, to about 50 per week during November, and declined further to fewer than 5 per week during early December. The last new case was reported on 22 December 2007. A total of about 6100 premises were declared as infected during the outbreak.

Extensive surveillance occurred during October and November to confirm that previously infected or

suspect infected areas were free from EI. These included progression of much of the amber zone (low risk of infection) to green (areas apparently free from EI) and of outlying red (areas with active infection) zones to amber and green. By the end of December, about 35 000 polymerase chain reaction (PCR) tests had been done, of which 3900 were positive, while 15 000 out of 42 000 enzyme-linked immunosorbent assay (ELISA) tests were positive. The high ELISA-positive rate was because of extensive testing of known infected properties to demonstrate that all horses had become infected and were immune.

Critical components of the response strategy included:

- Immediate implementation of a complete standstill on horse movements following confirmation of the first case. This allowed restriction of infection to northern and eastern New South Wales and southern Queensland. If this standstill had been delayed, infection would have been much more widespread and possibly have extended into other States.
- Implementation of a State-wide zoning strategy to allow the management of movements and risk in different parts of the State. Zoning was important in allowing some movements to continue in areas where this was appropriate, while prohibiting or controlling movements in other areas, fostering cooperation from the horse industry.
- Rapid introduction of vaccination as a means of control.
- Ongoing support of the various horse industry sectors for the program and their compliance with movement and biosecurity requirements.

Anthrax

Thirteen properties were diagnosed with anthrax during November and December 2007. Three of these were sporadic incidents in the usual anthrax-endemic districts of Condobolin (two properties) and Forbes (one property). In Condobolin in November, one case involved the death of 38 out of 620 sheep, and a second case involved the death of 2 out of a herd of 94 cattle. The third property, in the Forbes district, lost 3 out of 220 cattle in December.

In late December, an outbreak occurred in the Hunter district. This involved 10 properties and the loss of 47 cattle and 1 horse by the end of the month. This outbreak was outside the usual anthrax-endemic area, but there were anecdotal reports of anthrax occurring in the 1940s and documented in the 1870s. It is thought that recent heavy rains and flooding in the area may have exposed old cattle graves. The most recent previous large-scale anthrax outbreak in the State occurred in 1973, in the Gwydir River area, following similar circumstances of heavy rain and floods.

All cases have been managed according to the New South Wales Department of Primary Industries anthrax policy. Properties were placed in quarantine, carcases burnt and sites disinfected, and all at-risk stock were vaccinated. In the case of the Hunter outbreak, there was also widespread vaccination on neighbouring properties. Several exposed personnel were advised to seek medical attention, but no cases of human infection were reported.

Calf scours and mortalities

High rates of calf mortality associated with severe calf scours occurred in the Hume Rural Lands Protection Board. In five cases, losses ranged from 7% to 30%. Heaviest losses were in calves less than 7 days old but deaths were also common in calves as old as 2–3 weeks. Pathogenic *Escherichia coli* was diagnosed as the most likely cause in 2–3-day-old cases, but rotavirus and cryptosporidia were also isolated from affected calves over 1 week old. Stress due to unseasonal weather and very heavy fly levels appear to have been initiating triggers and transmission factors. Early fluid intervention was helpful in most outbreaks, but antimicrobial therapies were of little value.

Possible haemonchosis in grazing camels

In December 2007, camels in the north-east of the State had difficulty gaining weight, and showed recurrent diarrhoea and oedema of the pedestal and limbs, as well as dirt eating, difficulty rising from a crouched position and pale mucous membranes. Skin problems were common, and there was a history of swollen heads similar to bighead in horses, and shifting leg lameness.

Faecal eggs counts for four camels were 400, 1600, 2360 and 6420 eggs per gram, and a larval differentiation on pooled samples revealed 42% *Haemonchus* and 58% *Trichostrongylus*. No stomach or liver fluke eggs were seen. Fenbendazole and ivermectin anthelmintics were used for internal

parasite control, with ivermectin greatly reducing faecal egg counts.

All four camels were anaemic, with packed cell volumes of 8, 14, 14 and 25%. *Trypanosoma evansi* was excluded as a cause of the anaemia.

There was a concurrent copper poisoning due to excessive supplementation with copper sulfate.

Northern Territory

Contributed by: Francois Human, Department of Primary Industry, Fisheries and Mines

Botulism in heifers

A property in the south-western Katherine region reported deaths in approximately 100 heifers from a herd of 2700 over a 2-week period during December 2007. Sick animals showed classic signs of botulism. No gross lesions or pathological changes were seen on two necropsies. Haematology and serum clinical chemistry results did not reveal any significant abnormalities. The cattle were vaccinated against botulism but were approaching the period in which a booster was required. The property did not use mineral supplementation, and there had been recent fires in the paddock where the affected heifers had been grazing. Seventy vaccinated heifers had died in the same paddock the year before, and type D botulinum toxin was suspected as the cause. Blood samples were collected subsequently from a cross section of the herd. Serology results indicated a higher level of type D antibodies than type C antibodies to *Clostridium botulinum*. It is suspected that the amount of botulinum toxin consumed exceeded the level of antibody protection from previous vaccinations and led to the outbreak.

Goats with urinary calculi

On a station in the Katherine region, two male animals in a feral goat herd of 500 showed depression and apparent difficulty urinating. A necropsy on one severely affected animal revealed the presence of urinary calculi in the kidneys, haemorrhage surrounding the urethra and a necrotic penis. On histological examination, a necrotising bacterial posthitis was diagnosed. *Arcanobacterium pyogenes* was cultured from the lesion in the penis and prepuce, but was most likely a secondary invader.

The urinary calculi are likely to have been caused by an imbalance of calcium and phosphorus originating from consuming a combination of bore water and concentrated supplements. The owner treated goats that were affected with urinary acidifiers and did not lose more animals from urinary calculi. The onset of the wet season also alleviated the problem as fresh surface water became available and reduced the animals' consumption of bore water.

Oodiniosis in farmed barramundi

A seasonally recurrent parasitic disease caused by a dinoflagellate protozoan parasite of the family Oodinidae, commonly known as 'oodiniosis', has emerged over the past 3 years as a major threat to the farming of barramundi in the Northern Territory. The disease is characterised by the sudden onset of clinical signs; affected fish show inappetence and prefer to swim in shallow water or near the water surface. A high morbidity — up to 100% of fish — is typical. The disease usually occurs in the colder months of the dry season; however, a recent occurrence has been associated with heavy post-cyclonic rain and lowering of pond temperature. The parasite targets the gills. Infection results in severe generalised hyperplasia and hypertrophy of the respiratory epithelium, causing respiratory and metabolic dysfunction. Affected fish may show no gross lesions. The disease is readily diagnosed on wet mount examination of gills, which show large numbers of the dinoflagellate. Treatment and control are problematic under the large-scale pond culture systems used for farming of barramundi in the Northern Territory.

Queensland

Contributed by: Greg Williamson, Queensland Department of Primary Industries and Fisheries

Cattle

Ephemeral fever

A serious incident of cattle morbidity characterised by weakness, paresis and recumbency occurred in a herd of 3000 cattle in Emerald shire. Fifty cattle were affected, with 30 animals dead. Bovine ephemeral fever (BEF) virus was detected by polymerase chain reaction (PCR) testing. Most affected animals appeared to be heavier steers.

Another diagnosis of BEF was made on a property in Roma shire by PCR testing, with only one bull affected. The bull was purchased at a sale in Rockhampton and overnight trucked to Injune, near Roma, 3 days before developing symptoms of recumbency with increased respiratory rate and fever.

Five other cases of BEF were diagnosed in the State during the quarter, in Gympie, Kilkivan, Rockhampton, Mareeba and Monto shires.

Salmonellosis

Eight cases of salmonellosis were diagnosed throughout the State in the quarter. In Beaudesert shire, there was a case of *Salmonella* Dublin and one of *S*. Mbandaka (group C). *S*. Give was isolated from a case in Laidley shire. In Rosalie shire, there was a case of *S*. Typhimurium.

Salmonella Virchow was isolated in faecal samples from two droughtmaster steers with anaemia, diarrhoea and anorexia in Cooloola shire. Booringa, Warwick and Wambo shires had cases from which untyped *Salmonella* spp. were isolated. Typical clinical symptoms included diarrhoea, dehydration, fever, proteinuria and anaemia.

A notable case in a herd of 120 beef cattle in Warwick shire involved three deaths among the four animals affected with diarrhoea.

Blackleg

Blackleg was diagnosed as the cause of the sudden death of a 9-month-old dairy heifer and sickness in another, out of 50 dairy heifers at risk on a property in Cooloola shire. The sick heifer had swollen shoulder muscles. A sample of skeletal muscle was positive for *Clostridium chauvoei* on fluorescent antibody testing. Histological examination of the spleen showed marked autolysis.

Pimelea poisoning

There were three investigations of pimelea poisoning in western Queensland (Tambo and Aramac shires), with six reported deaths. Animals examined presented with diarrhoea, severe oedema of the face and ventral areas, and weight loss. Generalised oedema was a consistent feature at necropsy. Rumen contents and tissues from freshly dead animals were sent to the pimelea project officer at Biosecurity Sciences Laboratory, Yeerongpilly, for chemical analysis and histology. Histological examination showed vascular expansion and oedema, consistent with pimelea poisoning. The species was identified as *P. simplex*.

Lantana poisoning

Lantana poisoning was diagnosed in three cases, two in Caloundra shire and one in Wondai shire — both areas where *Lantana camara* is very common.

In Caloundra shire, there were two deaths and nine animals affected with oedema and jaundice. Histological examination of liver samples revealed various pathological changes ranging from individual cellular necrosis to irregular patches of coagulative necrosis, predominantly mid-zonal. There were also binuclear hepatocytes. Kidney samples exhibited acute nephrosis with tubular necrosis and granular and hyaline casts in the distal tubules.

The affected cattle in Wondai shire suffered more from cutaneous changes, including photosensitivity and oedema. Four animals died and eight were affected. Typical histological changes for lantana poisoning were seen in the liver and kidneys.

Bracken fern poisoning

Ptaquiloside poisoning was suspected of causing the death of a 15-month-old steer out of 50 at risk on a property in Cooloola shire. Clinical signs of dehydration, fever, bloody fetid faeces and recumbancy were observed. The animal had access to young bracken fern. Haematological findings of neutropaenia supported the diagnosis.

Another case in a cow in Caloundra shire, which died after a rapid deterioration in condition and copious nasal and intestinal haemorrhage, was strongly suspected to be bracken fern poisoning. Histology revealed necrotic changes in the liver and kidneys and a lack of neutrophils in the tissues.

Other plant poisonings

In all, 23 cases of plant poisoning in cattle were investigated during the quarter. This was due to high rainfall and rapid growth of pasture, including some toxic plants.

In one case, plant poisoning was suspected to have caused the deaths of 6 cows out of 40 cattle at risk on a property in Beaudesert shire. Clinical signs of recumbency with nasal discharge, drooling saliva and hypothermia were observed. Histopathology revealed severe, acute necrosis of periacinar hepatocytes. The pathology was consistent with poisoning by toxins of plant origin, particularly those in *Cestrum parqui* (green cestrum), other species of *Cestrum*, *Trema tomentosa* (poison peach) and the cotyledonary stages of *Xanthium occidentale* (Noogoora burr) and *X. spinosum* (Bathurst burr).

Horses

Equine influenza

This reports refers to equine influenza (EI) in Queensland. For a national report see p. 2, and for the New South Wales report see p. 11.

In Queensland, the EI outbreak began in late August 2007 and reached a peak at the beginning of November with more than 2200 infected properties recorded in the south-east of the State.

Disease control measures and strict horse movement restrictions contained the outbreak to this south-east region. The EI virus was dispersed via movement of horses, people and equipment, as well as windborne spread over short distances. Epidemiological analysis of the course of the outbreak is still in progress.

Typical clinical signs in infected animals were fever, a dry and persistent cough and serous nasal discharge turning purulent in the event of secondary infection. Morbidity rates on infected premises were usually 100%, with rapid spread and a recovery period of 2–4 weeks.

Following the investigation of infected properties, laboratory testing of horses and the lapse of time to allow for all infected animals on the property to recover, it was possible to declare infected premises as resolved. By the end of the quarter, only a few hundred infected premises remained. There have been no new cases of infection detected since 25 December 2007.

The components of the Queensland EI eradication program that have led to the current situation include:

- implementation of two vaccination buffer zones to guard against wider lateral spread of infection
- strategic vaccination of high-risk groups of horses and horses within strategic geographic areas — this has prevented widespread infection in defined groups, such as horses in racing and brood-mare farms, and halted the spread of infection from small acreage areas; no infection has been detected on farms after 14 days following the first dose of vaccine
- vaccination of approximately 62 000 horses in Queensland
- strict movement controls within and out of control zones (red and amber zones) — movements have been controlled by permit on a risk-assessment basis; movement of horses out of the red zone is being managed through establishment of approved quarantine facilities
- movement controls actively enforced with signage and compliance monitoring
- biosecurity protocols actively promoted at the property and industry levels within all sectors using a variety of extension methods
- education and support for horse owners using Industry Liaison Officers, community resource centres established near six infection clusters and industry groups; the Department of Primary Industries and Fisheries call centre has handled more than 80 000 EI-related calls
- compulsory registration of horse properties.

Sheep

Polioencephalomalacia syndrome

In Warwick shire, three sheep died and two others were affected with nervous signs from an at-risk group of 1000. All sheep had been fed on grain for about 80 days before clinical signs appeared. Affected sheep exhibited inappetance, shaking and recumbency before death.

On necropsy, the brain appeared swollen with flattening of the gyri. On histological examination, brain sections had marked multifocal subacute polioencephalomalacia.

The most common cause of polioencephalomalacia in feedlot animals is thiamine deficiency due to proliferation of thiaminase-producing ruminal microrganisms associated with concentrate diets. Total dietary levels of sulfur greater than 0.4% dry matter also produce polioencephalomalacia.

Pigs

Enterotoxic colibacillosis

Oedema disease and septicaemic colibacillosis were the cause of death of ten 4-week-old pigs out of 600 at risk on a piggery in Kilkivan shire. Clinical signs of lethargy and sudden deaths were observed. The dead animals had widespread oedema, and culture of the small and large intestine and lungs produced an almost pure growth of haemolytic coliforms.

Poultry

Fowl cholera

One property in Cambooya shire lost 54 layers from 3000 at risk, with birds suffering an acute febrile syndrome with oedematous conjunctiva and head droop.

All birds were in light body condition with a mild peritoneal effusion indicating peritonitis. Ovaries were flaccid and had injected blood vessels. Some birds had periorbital swelling due to caseous exudates in the conjunctival sac. Other gross pathological features included severe fibrinous peritonitis with extensive abdominal adhesions. There were no gross pathological changes in internal viscera.

Sections of abdominal viscera showed a severe subacute fibrinous peritonitis. Sections of eye revealed a severe fibrinous kerato-conjunctivitis, and there was a severe acute necrotising salphingitis.

Culture of peritoneal fluids and the infraorbital sinus produced heavy and pure growth of *Pasteurella multocida*.

South Australia

Contributed by: Celia Dickason, Department of Primary Industries and Resources

Neospora abortions in dairy cattle

Over a 2–3-week period in December 2007, 9 of 250 cows aborted in a dairy in the south-east. All the cows were late pregnant and of mixed ages, with some still in milk and others having dried off. Foetal tissues and fluids, as well as blood samples, were collected from five of the cows for an abortion investigation. No significant pathogenic bacteria were isolated from the foetal lung, stomach contents or the placenta. All results were negative for *Brucella abortus* and pestivirus, and there were only low titres for *Leptospira* spp.

Four of the blood samples tested positive for *Neospora caninum*. Histopathology of the tissues collected also demonstrated lesions consistent with neosporal abortion. *N. caninum* is a protozoan parasite with a canine definitive host. In this particular case, the definitive host could have been dogs or, more likely, foxes. The dairy property is located near a large forested area, increasing the possibility of foxes entering the property. There is no current treatment for neosporosis. Control measures include removal and disposal of placentas, aborted foetuses and dead calves from the paddocks, and reduction of canine faecal contamination of cattle feed. In addition, culling of cows that have aborted due to neosporosis should be considered, because such cows are likely to abort in subsequent pregnancies.

Oleander poisoning in cattle

In November 2007, a cattle producer from the Barossa region reported the sudden death of 10 pregnant cows overnight, with the other 8 cows in that herd being unwell. The ill cattle were lethargic and reluctant to move, and some had diarrhoea. Further investigation revealed that on the previous evening a neighbour had fed his garden prunings (mainly oleander [*Nerium oleander*]) to the cattle (with the owner's permission). Oleander is known to be a highly toxic plant, but due to the ongoing drought conditions, the stock had readily eaten the foliage.

No necropsies were carried out, and treatment consisted only of providing access to hay and water, and keeping the sick animals on their feet. There were no further deaths, and the remaining 8 animals recovered fully. The point-source nature of the event, and the history of exposure of hungry cattle to a large quantity of lethal oleander leaves, led to a diagnosis of oleander poisoning.

Septicaemia in lambs

A farmer at Peake in the Murray Mallee region lost 128 out of 231 Merino x Dohne wether lambs, and 57 out of approximately 230 ewe lambs, over a period of 6 weeks, beginning in early November 2007; 46 wether lambs died in the first 2 weeks alone. Four weeks earlier, the lambs had been weaned, shorn and drenched for worms, and then the ewes and wethers separated. The wethers were sent to an unimproved property about 50 kilometres away, where they dropped condition significantly over a 3-week period.

Due to a suspected lice outbreak, the producer brought the wether lambs back to the Peake property, where they were plunge dipped with the rest of the sheep on the property. The ewe and wether lambs were the last to go through the dip, and the majority of deaths began to occur within the following week.

Clinical signs included rapid loss of condition and lethargy. Necropsies revealed enlarged, flabby hearts with significant pericardial effusion. Subcutaneous abscesses were present on areas where grass seeds had penetrated the skin, with associated lymphadenopathy. Heavy growths of *Arcanobacterium pyogenes* were cultured from lesions. The lambs were treated with long-acting penicillin and were moved to better pastures, where they gradually improved over the next 7 weeks.

The cause of the lamb losses appears to be the result of a combination of management decisions. The rapid loss of condition of the lambs probably led to a compromised immunity and, combined with a heavy seed infestation and plunge dipping, septicaemia.

Blackhead in growing turkeys

An outbreak of blackhead (histomoniasis) occurred in a flock of 60 growing turkeys in a northern Adelaide high school farm project. Ten birds died suddenly over a week in early November. Birds showed signs of weakness, yellow diarrhoea and sudden death. Necropsy revealed liver damage with circular areas of severe hepatic necrosis, and concentric caseous plugs were found in the caeca.

Some of the turkeys had been put in a shed that had housed chickens for many years, and this was the likely cause of the outbreak. Chickens are relatively immune to this disease, whereas turkeys are susceptible. Medical options to treat this disease are limited, so the solution was to remove the turkeys from the shed and not restock this area with turkeys. With increasing free-range production and limited medical treatments, it is possible that this disease could become more common, especially if people are unaware of the risks of spread of this disease from chickens to turkeys.

Erysipelas in free-range laying hens

During late October 2007, an outbreak of erysipelas occurred in a flock of 3500 free-range layers in the Mount Compass area. Over a 2-week period, 30 birds died suddenly in a pen of 400.

Necropsies of the dead birds showed very few gross lesions, with some resorption of maturing yolks on the ovum, suggestive of systemic involvement. Microbiological culture results from bone marrow gave a heavy pure growth of *Erysipelothrix rusiopathiae*. The flock was treated with chlortetracycline, and mortalities stopped, egg production recovered and shell quality improved. The birds in the pen that was worst affected had full beaks and were suffering pecking injuries. Future placements have been vaccinated and appear to be responding well.

This disease needs to be considered as a differential diagnosis when sudden deaths occur on free-range farms.

Cholera outbreak in commercial quail

More than 200 birds in a flock of 5000 growing quail outside Adelaide died suddenly in late November 2007. The deaths occurred within a few hours in one pen in a shed of housed quail of different ages. Necropsy showed no gross lesions apart from enlarged, pale spleens. Bone marrow culture showed a heavy growth of *Pasteurella multocida*. The flock was depopulated, the sheds were thoroughly cleaned and disinfected, and rodent control was stepped up.

In such outbreaks, it can be very difficult to determine the initial source or cause.

Tasmania

Contributed by: Mary Lou Conway, Department of Primary Industries and Water

Cerebrocorticonecrosis in dairy cows

Neurological signs described as a jittery gait and apparent lack of awareness were reported in 6 cows out of 450 in northern Tasmania. The cows grazed pasture top dressed with superphosphate and nitrogen 3 weeks before the first signs were observed. There was no response to treatment with vitamin B1 and calcium–magnesium combinations. Vaccination with 7-in-1 was up to date.

One typical case was necropsied. The animal was 27 months old. The carcase was dehydrated and had minimal fat reserves, but was otherwise unremarkable apart from apparently hypertrophic adrenal glands and some parasitic damage to the abomasal mucosa. Histologically, the major pathology was in the midbrain (bilaterally symmetrical malacia associated with axonal swelling lateral to the ventricles) and cerebral cortex (cerebrocortical necrosis and malacia associated with necrotic neurons and marked vascular hypertrophy and hyperplasia). Obex, medulla and cerebellum were all normal. A diagnosis of cerebrocorticonecrosis of several days standing was made. The disease is believed to have been due to high dietary intake of sulfur from the recent top dressing. Insufficient rainfall (in volume and duration) had fallen to wash the fertiliser into the soil.

Infectious bovine rhinotracheitis-associated reproductive loss in a dairy herd

Purulent metritis and vaginitis with concurrent conjunctivitis were recorded in a north-west dairy herd of 81 synchronised heifers. Fifteen heifers were affected 12 days after the introduction of bulls. Eventually over 80% were affected, as were all 8 bulls (penile lesions). The bulls were relatively young — each year, 50% are routinely culled, with first-season bulls being introduced as replacements.

Infectious bovine rhinotracheitis (IBR) virus infection was suspected. While IBR is relatively common in respiratory disease investigations in the area, the genital manifestation is unusual. IBR virus was isolated from affected animals, and a greater than 3-fold increase in titres to IBR over 3 weeks was detected in a sample of affected heifers. Seven of the 8 bulls did not show an increasing titre, indicating prior exposure to the virus and thus the probable source of the outbreak.

The heifer herd subsequently underwent resynchronisation, artificial insemination and ‘clean up’ with new bulls. Pregnancy diagnosis revealed 68 of 81 heifers, or 84%, to be pregnant within the normal projected calving period (6 weeks), with 7 late and 6 empty. While this was better than expected, the manager generally expects around 95% to calve on time.

A herd of 350 mature cows on the same property was not affected. These had been synchronised and artificially inseminated. Serological surveillance of the older cow herd will assess whether airborne transmission from the heifers has produced sufficient immunity to make vaccination unnecessary.

Suspect immuno-hypersensitivity in sheep

A small proportion of a group of 150 3-year-old Coopworth–Drysdale-cross ewes were observed with ill-thrift, and the occasional death prompted an investigation. The property was in the Launceston area. The sheep were on pasture with no concentrate supplementation. Five years earlier, there had been

an introduction of sheep from an ovine Johne's disease (OJD) infected property — thus OJD was suspected. One typical case was presented for necropsy 10 days after being treated with a benzimidazole drench.

Apart from mild thickening of the terminal ilium, there was no gross pathology. The major findings on histology were inflammatory changes at all levels of the gut, particularly at the colon and ileum, with large numbers of eosinophils consistent with an allergic hypersensitivity reaction, and the presence of plasma and lymphoid cells with an immunological reaction. A superficial rumenitis was also found. There were no signs indicative of OJD on histology or serology, nor were there significant results from parasitology or microbiology. There were a small number of strongylids in the faeces, which may indicate a degree of drench resistance.

The conclusion was that the animal was probably suffering from a hypersensitivity reaction to some ingested substance or recently reduced parasitic burden. It was recommended that the sheep be moved to a new paddock and feed type to reduce exposure to the unknown inflammatory agent(s).

Victoria

Contributed by: Cameron Bell, Department of Primary Industries

Equine influenza surveillance activities

In response to the equine influenza (EI) outbreak in Queensland and New South Wales in August 2007, the Victorian Department of Primary Industries (DPI) has undertaken extensive surveillance for early detection, if an incursion did occur, and to demonstrate absence of the disease.

During the quarter, nasal swabs were collected from 273 horses in Victoria and all tested negative for EI by real-time polymerase chain reaction. Since the start of the EI outbreak to 31 December 2007, a total of 691 horses were sampled and tested negative for EI. This surveillance has complemented strict controls imposed on the movement of horses and equipment into Victoria from infected States.

To further enhance these surveillance activities, a sentinel practice scheme began during the quarter, involving 15 veterinary practices across the State. As at 31 December 2007, 1470 properties had been visited by veterinarians from the participating practices. A total of 30 904 horses were recorded on these properties, with 72 horses reported as having nonspecific respiratory signs. Signs suspicious of EI were observed in 6 of the 72 horses, but EI was excluded in each case by laboratory investigation. Additionally, Racing Victoria Limited and Harness Racing Victoria have each been keeping about 5000 horses in active racing under continuous surveillance, and have detected no sign of EI.

Bronchopneumonia caused by *Mannheimia haemolytica* in dairy heifers

A 14-month-old Friesian heifer in a herd of 23 was found dead on an agistment block in west Gippsland at the end of November 2007. A few days later, the remaining heifers were affected with a dry cough and high temperatures of more than 40°C, and when moved or handled, some showed laboured breathing. A few had a serous nasal discharge and enlarged submandibular lymph nodes.

All the heifers were treated with tilmicosin (an antibiotic), and heifers displaying respiratory stress received ketoprofen (a nonsteroidal anti-inflammatory, analgesic and antipyretic) and other supportive treatment.

Necropsy examination of a second dead heifer revealed lungs severely consolidated, with virtually no normal lung tissue left. There was a moderate amount of fibrin on the lung and pleural surfaces, and yellow fluid within the thoracic cavity.

Differential diagnoses included *Mycoplasma* spp., *Mannheimia* (*Pasteurella*) spp., *Haemophilus somnus*, bovine respiratory syncytial virus (BRSV) and parainfluenza-3 virus (PI3). A heavy growth of *M. haemolytica* was isolated from the lungs, which had histological evidence of severe diffuse fibrinous bronchopneumonia.

Stressful events (e.g. transportation) and viral infection (e.g. infectious bovine rhinotracheitis [IBR] virus, BRSV or PI3) may predispose cattle to infection with *M. haemolytica*.

Polioencephalomalacia in dairy heifers

Eight 6-month-old heifers from a herd of 90 Friesian and Friesian-cross heifers died over a 2-week period on a south-west Victorian property in November 2007. The heifers had been grazing a mixed, improved pasture in the same paddock for the previous 2 months and had adequate water. They had access to lick blocks containing 15% sulfur and trace elements. There was a significant rain event of more than 100 mm over a period of 2 days, 1 week before the first death. Initial clinical signs included blindness, high stepping, circling and separation from the herd, followed by deterioration over several days to recumbency, coma and death. Three moribund heifers were euthanised and necropsies performed. Histopathology of the brain confirmed polioencephalomalacia (PEM), with laminar necrosis of the cerebral cortex and sections of the cerebral cortex fluorescing under ultraviolet light. Serum sulfate levels were within normal limits, and lead poisoning was excluded. The supplementary sulfur intake and the rain event may have caused the deaths, because excessive dietary sulfur can contribute to PEM. Early clinical cases were treated with daily thiamine (vitamin B1) injections.

Unusual presentation of actinobacillosis ('wooden tongue') in Angus cattle

In August 2007, on a property in central Gippsland, nine cows and one bull in a 100-cow Angus herd were affected by swellings under the jaw that had appeared over several weeks. The animals were restricted to one of two grazing groups on the property. The animals were grazing short pasture with a predominance of thistles (species unknown) and hawthorn (*Crataegus monogyna*). Physical palpation and examination revealed chronic cellulitis, fibrosis and abscessation of tissues of the upper neck. An abscess was drained and samples were submitted to the laboratory; however, there was no bacterial growth on culture, and courses of short and long-acting tetracyclines made no discernible difference to the swellings.

In November 2007, one of the originally affected animals died from a clostridial infection, and samples of the affected neck area were opportunistically submitted for histopathology, revealing a multifocal pyogranulomatous lymphadenitis with club-forming colonies typical of *Actinobacillus lignierisi*, the agent causing actinobacillosis or 'wooden tongue'.

The ingestion of prickly herbage during the winter, when the cattle were grazing on short pasture, may have damaged the lining of the mouth cavity, pharynx and larynx, allowing the bacterium to establish infection in an unusually high percentage of animals.

Orchitis in Border Leicester rams

During October 2007, 5 Border Leicester rams in a central Victorian mob of 35 rams had hot, swollen testicles; two of the animals had pus discharging from the testes and scrotum. The condition was noticed at shearing, and all the rams displaying testicular abnormalities were serologically negative for ovine brucellosis. The two rams that had a pus discharge were necropsied, one of which had approximately 80% of the lungs comprising multifocal, hardened, pus-filled abscesses. A heavy growth of *Arcanobacterium pyogenes* was isolated from testicles of both rams. The epididymides were damaged to the point of nonfunctioning. Four of the five infected rams were young and had been purchased from the same property earlier in the year. Only one ram of the five originally affected rams survived, with the other two found dead in the paddock.

Suspected *Eperythrozoon ovis* in Merino-cross ewe weaners

Eperythrozoon ovis was suspected as the cause of death of 20 out of 600 first-cross ewe weaners in central Victoria in October 2007. The mob had been mulesed, marked, drenched and vaccinated, and placed on a paddock of clover, rye and native grass 4 weeks before the deaths. They were then moved gradually to the shearing shed over a 6-day period. A tail to the mob was noticed, with some animals going down and not rising when approached. The weaners were anaemic on clinical examination. Two affected lambs had extremely low packed cell volumes (PCV) and red cell and haemoglobin counts. A necropsy was performed on one lamb, and abnormalities observed on histopathology were either secondary to the severe anaemia or incidental. *E. ovis* was not seen in the smears submitted, but could not be excluded because of the extremely low PCV and the transient nature of the parasitaemia. Deaths continued for about 3 to 4 weeks after the initial yarding but were minimal once the mob was left undisturbed.

Listeriosis in Merino ewes

Thirteen mixed-age Merino ewes out of a flock of 500 died over a 3-week period on a property in south-west Victoria in July 2007. The ewes were rotationally grazing short clover (*Trifolium* spp.) and capeweed (*Arctotheca calendula*) pasture. Deaths occurred in two paddocks where there was no rotting vegetation present and silage was not fed. Listeriosis, a notifiable disease in Victoria, was diagnosed on clinical signs (unilateral facial paralysis) by a private veterinarian, and no further cases were detected or available for laboratory confirmation after the initial clinical diagnosis. Dental work had recently been performed on the ewes and was presumed to have been a predisposing factor, coupled with grazing short pasture.

Zinc deficiency in grower pigs

A central Victorian private veterinarian found that 10% of 1000 Large White–Landrace cross growers aged 18–22 weeks had dermatitis. These animals were treated with antibiotics for general dermatitis but did not respond over a 3-week period. Some typically affected pigs, necropsied on farm, had grossly enlarged kidneys. The Victorian Pig Health and Research Unit (PHRU) examined 200 affected pigs at the abattoir. While 60 of the 200 had severe skin lesions, with most requiring trimming of the carcases, none of the animals had any gross visible lesions of the kidneys. Histological findings of parakeratotic hyperkeratosis with secondary pyoderma (and zinc-responsive dermatitis), together with low serum levels of zinc, led to a diagnosis of parakeratosis due to zinc deficiency. Parakeratosis presents as a generalised, nonpruritic, crusting dermatosis of growing pigs. It seems that zinc may have been omitted from the premix for the finishers. The omission proved costly, because the zinc deficiency led to a lowered immune response, allowing nonspecific septicaemia to occur, and a second abattoir condemned 40 of 150 of these animals. Porcine dermatitis and nephropathy syndrome (PDNS) was specifically excluded. PDNS-affected animals present with a systemic vasculitis, with the main effects in the skin and kidneys. Sporadic cases of PDNS have been reported in Australia.

PHRU has diagnosed lameness and broken limbs due to calcium deficiency on one property, and lameness and posterior paralysis due to vitamin A deficiency recently on another farm. These latter diseases are rarely seen, but are more likely to occur during drought.

Avian paramyxovirus-3 exclusion on a turkey breeder property

Avian paramyxovirus-3 (APMV-3), a virus exotic to Australia, was ruled out as a cause of egg drop in a flock of 1550 hens and 140 tom turkeys on a property in central Victoria. APMV-3 is closely related to Newcastle disease (APMV-1) and can cause a drop-off in egg production of around 30% for 6–8 weeks in turkeys. Private veterinary investigation was undertaken into the cause of a large (35%) decrease in egg production for a 2-week period. There were no other signs of illness detected, and the property had exemplary biosecurity. Investigation and repeat sampling of the affected flock by serum and choanal swabs tested by haemagglutination inhibition at the Australian Animal Health Laboratory (Geelong) excluded APMV-3. A detailed history revealed that staff changes in mid-April 2007 may have led to several days of prolonged photoperiod in the growing turkeys. This would promote early maturation and commencement of lay, followed by a short drop-off, as seen in this case. No further incidents or drop-offs in egg production have occurred since.

Western Australia

Contributed by: Fiona Sunderman, Department of Agriculture and Food

Laboratory testing was conducted on 247 investigations of animal disease during the quarter. There were 24 investigations of suspected nationally notifiable diseases, although only one, equine herpesvirus 1 abortion, was confirmed. Twenty-three disease investigations were a category 1 alert (low index of suspicion). They mostly involved routine exclusion of avian influenza and Newcastle disease in disease investigations in avian species; porcine reproductive and respiratory syndrome exclusion in pigs; and equine influenza,

vesicular stomatitis and equine viral arteritis exclusion in horses. A diagnosis of an endemic disease or cancer was made in all cases where the animal was ill.

Cattle

Suspect botulism in cattle

An outbreak of mortalities in cows and calves on a Karridale property was thoroughly investigated in October 2007. The outbreak was biphasic, with deaths occurring during the second half of August (four cows and five calves) and the latter part of September (eight cows and five calves). Typically, the animals died during the night and were found the next morning with minimal evidence of struggling. Those that were found alive were in lateral recumbency, and deteriorated and died within 24 hours after struggling and thrashing just before death. A third syndrome was seen in animals that staggered, fell down and remained in sternal recumbency, unable to rise. This progressed to lateral recumbency and eventual death. All three affected mobs appeared 'fatigued' and stood up when disturbed. However, they lay down again sooner than might be expected; some appeared agitated. No histological lesions have been found in tissues from three dead animals. Tests showed no significant abnormal biochemical parameters, and tests for botulinum toxin in rumen samples from two of the cows were negative. Except for one animal, sera collected from 20 or so cattle on the property were negative for antibody to *C. botulinum* toxins type C and D. Botulism is still suspected, despite negative results, for the following reasons:

- some of the area that the cattle are on is low-lying swampy country
- similar cases have been investigated and diagnosed as botulism in the past
- cattle are extremely sensitive to botulinum toxin
- the negative bioassay results on the two rumen samples may have been due to degradation of the toxin or because it had passed further down the alimentary tract
- no other disease has been indicated by a range of diagnostic tests.

Some of the cattle have now been vaccinated and deaths have stopped.

Copper deficiency in heifers

Biochemical analysis of 2 first-calf heifers from a group of 10 on a farm at Denmark indicated both were deficient in copper. The animals were showing signs of rapid weight loss, watery diarrhoea and ulceration/dermatitis of the nose. They had previously been de-wormed with Cydectin. Histological examination of samples from one heifer revealed acute liver necrosis and degeneration of hepatocytes, indicating an acute incident compared to the much more chronic clinical condition of the other heifer. The cause of the change in the liver is uncertain. The liver enzymes gamma glutamyl transferase (GGT) and glutamate dehydrogenase (GLDH) were both elevated; in addition, creatinine (CK) and alanine aminotransferase (ALT) values were elevated, consistent with a long period of recumbency. Impaired renal function was suggested by elevated plasma creatinine and urea values; the heifer was also hypocalcaemic and hypoalbuminaemic.

Sheep

Helminthosis and necrotising enteritis

Helminthosis caused 30 deaths out of 850 weaners in October 2007 and resulted in ongoing weaner ill-thrift at a property in Pingelly. Some weaner deaths were still occurring in December. Severe transmural rumenitis was diagnosed. Histopathological changes were associated with encysted helminths. Bacterial culture of faecal samples from several weaners failed to yield significant isolates. However, it is very likely that parasitism combined with secondary bacterial enteritis was responsible for the lesions.

Ovine listeriosis

A single ewe hogget on a Lower Kalgan farm was found circling, uncoordinated, drooling and blind. Listeriosis was suspected and confirmed by histopathological examination. The hindbrain contained marked perivascular lymphoid cuffing and multifocal extensive areas of gliosis centred on the cranial medulla, where there were extensive areas of malacia with massive gitter cell infiltration. An unusual finding in this case was marked glycosuria.

Clover-associated ovine infertility

Aged ewes from Esperance presented with a history of poor fertility and conception rates of less than 50%. Ten cervixes were submitted for

histopathological examination. Changes consistent with long-term ingestion of oestrogenic clover were evident in four, and less obvious degenerative changes were evident in the other six cervixes.

Iceplant poisoning

Slender iceplant (*Mesembryanthemum nodiflorum*) poisoning was diagnosed after weakness and deaths in weaner Merinos on lupin stubble were investigated at Merredin. Affected weaners were bloated and became weak. Necropsy of one sheep revealed a heavy burden of *Nematodirus* sp. There was also evidence of mild lupinosis in the liver section and, most importantly, widespread renal oxalate crystal formation that often obstructed tubules or resulted in tubular epithelial necrosis. The renal damage was considered secondary, as the primary problem would have been hypocalcaemia due to ingestion of slender iceplant.

Pigs

Porcine streptococcal meningitis

A piggery at Wannamal, with a history of meningitis 3 weeks after weaning and with poor responses to treatment, has been diagnosed with porcine streptococcal meningitis. *Streptococcus suis* was recovered from another property that received pigs from the same source. Two weaners were submitted for examination, and necropsy revealed purulent meningitis in both. *S. suis* type II was obtained from cultures of the brain and tonsil of both pigs. *S. suis* is ubiquitous in the upper respiratory tract and tonsils of pigs, so the mere presence of the bacterium is not a sufficient reason for development of meningitis. It is likely that an unidentified stress factor initiated the process.

Horses

Equine herpesvirus 1 abortion

Equine herpesvirus 1 (EHV1) was confirmed as the cause of a late-term abortion without premonitory signs in an 8-year-old thoroughbred mare. This was the fourth abortion in a group of six pregnant mares on a property just south of Bunbury. Blood was submitted for examination from the mare and foetus; heart blood, stomach contents, pleural fluid and fixed lung, liver and kidney were submitted from the foetus. The lung and liver histopathologic lesions were highly suggestive of EHV1 abortion. The mare was serologically positive for both EHV1 and EHV4. Foetal heart blood was negative for EHV antibody but virological culture of pleural fluid yielded a cytopathic agent in a rabbit kidney cell line. The culture sample tested positive for EHV1 by polymerase chain reaction, thus confirming the diagnosis. No further action was required.

Avian

Encephalitis in a raven

West Nile virus was ruled out in a case of encephalitis in a raven. A juvenile raven with neurological signs was submitted by a wildlife carer for necropsy. The lesion was considered to be inflammatory although the pathogenesis of the bilateral malacic lesions (usually attributed to hypoxia) may have been due to vitamin E deficiency. Suggested aetiological diagnoses were toxoplasmosis, or West Nile or Kunjin virus infections; however, immunohistochemistry tests were negative for these pathogens.

Quarterly disease statistics

Control activities

Ovine brucellosis

Contagious epididymitis, caused by *Brucella ovis*, is present in commercial flocks at a low level that varies around the country. Voluntary accreditation programs (usually in stud flocks) for ovine brucellosis freedom are operating in all States. Table 1 shows the number of accredited flocks at the end of the quarter.

Table 1 Ovine brucellosis accredited-free flocks at 31 December 2007

State	Free
ACT	0
NSW	871
NT	0
QLD	59
SA	514
TAS	0
VIC	512
WA	185
AUS	2141

Johne's disease

In Australia, Johne's disease occurs primarily in dairy cattle and sheep, and to a lesser extent in beef cattle, goats, deer and camelids. Infection with sheep strains occurs to varying extents across the sheep-producing regions of southern Australia but has not been detected in Queensland. Cattle strains are endemic in south-eastern Australia but surveillance programs have not identified endemic infection in Queensland, Western Australia or the Northern Territory, and active measures are taken to stamp out any incursions. Table 2 shows the number of herds and flocks known to be infected.

Table 2 Number of herds or flocks infected with Johne's disease at 31 December 2007[3]

State	Cattle	Deer	Goat	Sheep	Total
NSW	114	1	8	1286	1409
QLD	0	0	1	0	1
SA	74	1	1	73[a]	149
TAS	16	0	3	58	77
VIC	868	2	4	500	1374
WA	0	0	0	18	18
AUS	1072	4	17	1935	3028

a Eight of these flocks are infected with 'c' strain.

New approaches based on risk assessment and management have been developed to control Johne's disease. Market assurance programs are in operation for cattle, sheep, goat and alpacas; the numbers of herds or flocks that have reached a status of monitored negative 1 or higher are shown in Table 3.

[3] Data for this table were misprinted in AHSQ Volume 12 Issue 3. The correct data for 1 July to 30 September 2007 can be found in the online version of this issue (http://www.animalhealth australia.com.au/status/ahsq.cfm)

Table 3 Herds or flocks with a market assurance program status of at least monitored negative 1 at 31 December 2007

State	Alpaca	Cattle	Goat	Sheep	Total
NSW	116	465	34	323	938
NT[a]	0	0	0	0	0
QLD[a]	0	0	0	0	0
SA	27	198	12	198	435
TAS	2	112	8	31	153
VIC	20	287	2	93	402
WA	0	0	0	0	0
AUS	165	1062	56	645	1928

a Herds or flocks in free or protected zones have a status of monitored negative 1 or better because of the zone status.

Lists of beef, goat and alpaca herds and sheep flocks assessed in the market assurance programs are available at: http://www.animalhealthaustralia.com.au/programs/jd/maps.cfm.

Information about components of the National Johne's Disease Control Program can be obtained from State coordinators and Animal Health Australia's Johne's Disease coordinator, David Kennedy (02 6365 6016).

Enzootic bovine leucosis

Enzootic bovine leucosis accreditation programs have been operating in the dairy industries in Queensland and New South Wales for several years. Victoria, South Australia and Western Australia are undertaking a program of bulk milk testing of all dairy herds. Table 4 shows the number of dairy herds tested free from enzootic bovine leucosis at the end of the quarter.

Table 4 Dairy herds tested free from enzootic bovine leucosis at 31 December 2007

State	Infected	Non-assessed	BMT[a] negative	Provisionally clear	Monitored free	Total
NSW	0	37	27	0	838	902
NT	0	0	0	0	0	0
QLD	2	0	0	0	670	672
SA	1	0	1	0	338	340
TAS	0	486	0	0	0	486
VIC	34	62	1838	29	2855	4818
WA	0	0	0	0	195	195
AUS	37	585	1866	29	4896	7413

a Bulk milk test

Laboratory testing

Table 5 shows the results of serological testing for a range of viral diseases from routine laboratory submissions for the quarter.

Table 5 Serological testing from routine submissions to State laboratories

	Akabane[a]		Bovine ephemeral fever[a]		Bluetongue[a]		Enzootic bovine leucosis		Equine infectious anaemia		Equine viral arteritis	
	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve
Oct–Dec 2006	7493	439	1931	313	10896	365	1946	8	1254	2	386	13
Jan–Mar 2007	2924	304	1512	227	10267	177	2099	1	1172	1	468	2
Apr–Jun 2007	2199	634	1204	254	5572	326	864	0	1360	0	748	6
Jul–Sep 2007	1833	428	1096	173	2231	237	4076	0	858	0	405	23
Oct–Dec 2007												
NSW	634	53	358	9	6143	28	3648	0	106	0	58	2
NT	435	118	434	63	349	41	0	0	10	1	0	0
QLD	441	149	459	132	453	100	51	0	77	0	0	0
SA	72	0	72	3	72	0	12	0	0	0	0	0
TAS	1	0	0	0	0	0	2	0	0	0	0	0
VIC	131	0	97	0	138	0	170	0	39	0	55	0
WA	114	6	0	0	118	12	0	0	4	0	3	1
AUS	1828	326	1420	207	7273	181	3883	0	236	1	116	3

a http://www.animalhealthaustralia.com.au/programs/adsp/namp/namp_home.cfm

Surveillance activities

National Transmissible Spongiform Encephalopathies Surveillance Program

The National Transmissible Spongiform Encephalopathies Surveillance Program (NTSESP) is an integrated national program jointly funded by industry and governments to demonstrate Australia's ongoing freedom from bovine spongiform encephalopathy and scrapie, and to provide early detection of these diseases should they occur. Table 6 summarises the activity of the program over the past five quarters. All specimens tested were negative for transmissible spongiform encephalopathies. Information about the NTSESP is available at http://www.animalhealthaustralia.com.au/aahc/programs/adsp/tsefap/ntsesp.cfm.

Contact: Duncan Rowland, Animal Health Australia's NTSESP National Coordinator

Table 6 Transmissible spongiform encephalopathy surveillance

	Oct–Dec 2006		Jan–Mar 2007		Apr–Jun 2007		Jul–Sep 2007		Oct–Dec 2007	
State	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep	Cattle	Sheep
NSW	24	65	15	33	18	18	19	8	13	12
NT	3	0	0	0	2	0	19	0	4	0
QLD	50	11	44	13	37	6	63	10	36	2
SA	3	41	4	18	9	24	2	10	2	2
TAS	1	7	2	0	4	1	2	1	1	1
VIC	15	44	28	21	29	17	19	48	29	22
WA	5	92	9	18	14	19	6	34	5	19
AUS	101	260	102	103	113	85	130	111	90	58

Bovine brucellosis

Although bovine brucellosis is now exotic to Australia, surveillance is maintained through abortion investigations and miscellaneous testing of cattle for export or other reasons. As shown in Table 7, 57 abortion investigations were performed during the quarter, all with negative results for bovine brucellosis.

Table 7 Surveillance for bovine brucellosis

	Abortion		Other reasons	
	Tests	+ve	Tests	+ve
Oct–Dec 2006	167	0	2383	0
Jan–Mar 2007	78	0	1632	0
Apr–Jun 2007	62	0	3161	0
Jul–Sep 2007	96	0	7553	0
Oct–Dec 2007				
NSW	0	0	2927	0
NT	0	0	0	0
QLD	0	0	217	0
SA	5	0	0	0
TAS	0	0	1	0
VIC	0	0	128	0
WA	52	0	581	0
AUS	57	0	3854	0

Tuberculosis

Australia was declared free from bovine tuberculosis (TB) on 31 December 1997, exceeding the World Organisation for Animal Health (OIE) requirements for declaration of country freedom. The last outbreaks of TB were detected in buffalo in January 2002 and in cattle in December 2000, and trace-forward and trace-back slaughter were carried out according to the Tuberculosis Freedom Assurance Program (TFAP).

All Australian laboratories supporting TFAP are accredited for veterinary testing by the National Association of Testing Authorities under ISO/IEC 17025. Laboratories approved for culture of Mycobacterium bovis must pass an external quality assurance program run by the Australian reference laboratory for TB on an annual basis.

The National Granuloma Submission Program has been the major surveillance tool for TB since 1992. Tables 8 and 9 summarise the positive test results from the program.

Table 8 National case register for bovine tuberculosis

State	2003	2004	2005	2006	2007
NSW	0	0	0	0	0
NT	0	0	0	0	0
QLD	0	0	0	0	0
SA	0	0	0	0	0
TAS	0	0	0	0	0
VIC	0	0	0	0	0
WA	0	0	0	0	0
AUS	0	0	0	0	0

Table 9 Results of the National Granuloma Submission Program

	Oct–Dec 2006	Jan–Mar 2007	Apr–Jun 2007	Jul–Sep 2007	Oct–Dec 2007
Submitted	209	178	214	234	192
TB +ve	0	0	0	0	0

Salmonella surveillance

The National Enteric Pathogen Surveillance Scheme (NEPSS) is operated and maintained on behalf of the Australian Government and State and Territory governments by the Microbiological Diagnostic Unit at the University of Melbourne. Data on isolates of salmonellas and other pathogens are submitted to NEPSS from participating laboratories around Australia. Quarterly newsletters and annual reports of both human and nonhuman isolates are published, and detailed data searches are provided on request to NEPSS. Table 10 summarises *Salmonella* isolations from animals notified to NEPSS for the quarter.

Contact: Diane Lightfoot, National Enteric Pathogen Surveillance Scheme, Microbiological Diagnostic Unit, University of Melbourne

Table 10 *Salmonella* notifications, 1 October to 31 December 2007

	Birds	Cats	Cattle	Dogs	Horses	Pigs	Sheep	Other	Total
S. Bovismorbificans	0	1	5	1	3	1	0	0	11
S. Dublin	0	0	17	0	0	0	0	0	17
S. Infantis	0	0	4	1	0	0	0	0	5
S. Typhimurium	3	3	29	3	10	3	1	0	52
Other	11	5	16	9	8	11	1	12	73
Total	14	9	71	14	21	15	2	12	158

Northern Australia Quarantine Strategy

In recognition of the special quarantine risks associated with Australia's sparsely populated northern coastline, the Australian Quarantine and Inspection Service conducts an animal disease surveillance program as an integral component of the Northern Australia Quarantine Strategy (NAQS). The NAQS surveillance program provides early warning of disease threats to livestock industries and, in some cases, to human health. NAQS surveillance activities include both offshore and onshore components. Information is derived from the use of sentinel animals, structured surveys and opportunistic sampling. Table 11 summarises NAQS activity in Australia over the past five quarters.

Contact: Jane Parlett, Australian Quarantine and Inspection Service, Australian Government Department of Agriculture, Fisheries and Forestry

Table 11 Summary of recent NAQS activity in Australia

	Oct–Dec 2006		Jan–Mar 2007		Apr–Jun 2007		Jul–Sep 2007		Oct–Dec 2007	
Category	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve
Aujeszky's disease	225	0	0	0	0	0	0	0	0	0
Australian bat lyssavirus	2	0	1	0	0	0	1	0	0	0
Avian influenza — highly pathogenic	1835	0	0	0	32	0	364	0	1036	0
Classical swine fever	225	0	0	0	107	0	158	0	183	0
Japanese encephalitis	71	0	45	0	15	0	0	0	8	0
Surra — *Trypanosoma evansi*	185	0	156	0	96	0	23	0	82	0

Ports Surveillance Program

The Ports Surveillance Program is conducted for *Culicoides* and screw-worm fly by Biosecurity Australia, and for exotic bees and bee mites by Product Integrity, Animal and Plant Health, in the Department of Agriculture, Fisheries and Forestry. Seaports, particularly those servicing returning livestock vessels and those dealing with high-risk deck cargo, such as timber, mining equipment and containers, are considered to be high-risk locations for incursions of such pests. The program increases the capacity to detect any incursions at an early stage, and this in turn increases the probability of a successful eradication program. The *Culicoides* surveillance also supports the livestock export trade by confirming the continuous or seasonal absence of *Culicoides* vectors at ports from which livestock are loaded. Table 12 shows the number of times that insect trap sites at seaports were inspected for specific exotic insects or mites in the Ports Surveillance Program (Ports) and the NAQS surveillance program. No detections were recorded.

Contact: Iain East, Office of the Chief Veterinary Officer, and Howe Heng, Biosecurity Australia, both of the Australian Government Department of Agriculture, Fisheries and Forestry

Table 12 Ports Surveillance Program: number of inspections of insect traps

		Oct–Dec 2006	Jan–Mar 2007	Apr–Jun 2007	Jul–Sep 2007	Oct–Dec 2007
Ports	Asian bees	17	12	32	20	18
	Varroa mites	26	22	26	10	24
	Asian mites	26	22	26	10	24
	Tracheal mites	21	22	20	9	22
	Culicoides sp.	28	27	29	28	24
	Screw-worm fly	20	21	21	23	19
NAQS	Screw-worm fly	45	45	45	45	45

Avian influenza

Australia is currently free from highly pathogenic avian influenza (HPAI). A number of low pathogenic subtypes of avian influenza have been found in wild birds. Please consult the Australian Wildlife Health Network report in this publication for information on avian influenza in wild birds. During the quarter, 447 birds from 46 laboratory submissions were tested for avian influenza; there were no positive results (Table 13). Tests include c-ELISA, hemagglutination inhibition, reverse-transcriptase polymerase chain reaction (RT-PCR) and virus isolation.

Table 13 Number and type of positive results of avian influenza testing, 1 October to 31 December 2007

H5 positive	H7 positive	Positive for a non-H5, non-H7 strain
0	0	0

Newcastle disease

Australia is currently free from virulent Newcastle disease (VND) or exotic Newcastle disease (END), even though precursor viruses are present in Australia. Vaccination against VND using a combination of live lentogenic virus (V4) and a killed vaccine is required in all Australian jurisdictions. The National Newcastle Disease Management Plan 2005–07 is managed by a steering committee of a set reference group. During the quarter, 84 birds from 15 laboratory submissions were tested for ND; there were no positive results (Table 14).

Table 14 Number and type of positive results of Newcastle disease (ND) testing, 1 October to 31 December 2007

Virulent strain of ND virus	Peats Ridge strain of ND virus	Lentogenic V4 or V4-like ND virus	Other paramyxovirus
0	0	0	0

Zoonoses

The National Notifiable Diseases Surveillance System (NNDSS) of the Communicable Diseases Network Australia collects statistics about many human diseases. A summary of information about five important zoonoses is submitted to the National Animal Health Information System (NAHIS) each quarter (see Table 15).

Contact: National Notifiable Diseases Surveillance System, Australian Government Department of Health and Ageing (http://www9.health.gov.au/cda/Source/CDA-index.cfm)

Table 15 Notification of zoonotic disease in humans

	Q4 2006	Q1 2007	Q2 2007	Q3 2007	Q4 2007	Current quarter (October–December 2007)							
			AUS			ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Brucellosis	10	14	8	10	8	0	0	0	8	0	0	0	0
Chlamydophilosis	46	33	26	19	29	0	7	0	1	0	0	19	2
Leptospirosis	15	48	34	9	16	0	1	0	6	0	0	7	2
Listeriosis	13	18	8	9	17	0	6	0	2	5	0	3	1
Q fever	104	120	122	112	115	0	58	0	39	5	0	10	3

National Residue Survey

During the fourth quarter of 2007, 3856 samples were collected and analysed in the National Residue Survey Random Monitoring Program (see Table 16). Eight samples were found with residues above the relevant standard in the Australian Food Standards Code.

One sample of cattle fat had a deltamethrin residue over the Australian maximum residue limit (MRL) of 0.5 mg/kg. This sample contained 2.7 mg/kg. A trace-back investigation is currently being conducted by the relevant State department.

Four samples of sheep liver had cadmium levels above the maximum level (ML). Cadmium residues above the ML are a common finding in older sheep across southern Australia. While these cadmium detections were above the ML of 1.25 mg/kg for sheep liver, they were below the action level of 2.5 mg/kg required to initiate a trace-back investigation.

A fifth sample of sheep liver had cadmium at a level of 2.8 mg/kg, and a trace-back investigation found that the residue resulted from a history of regular phosphorus fertiliser use on the pastures grazed by the animal concerned. This is not an uncommon situation, and leads to the build-up of cadmium in the liver of aged animals. For this reason, no offal from aged sheep slaughtered within Western Australia is used for human consumption.

Two samples of pig liver contained residues of lead at 0.55 mg/kg and 0.64 mg/kg, both of which are above the MRL of 0.5 mg/kg. Trace-back investigations are currently under way.

Contributed by: Jim Derrick, National Residue Survey, Australian Government Department of Agriculture, Fisheries and Forestry

Table 16 National Residue Survey (each pair of figures gives the number of residues above the maximum residue limit, or the maximum level, and the number of samples tested)

		NSW		NT		QLD		SA		TAS		VIC		WA		AUS	
Anthelmintics	cattle	0	60	0	3	0	79	0	10	0	1	0	21	0	9	0	183
	pigs	0	26	0	0	0	21	0	5	0	0	0	12	0	2	0	66
	poultry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	sheep	0	159	0	0	0	28	0	79	0	4	0	95	0	124	0	489
	other	0	2	0	0	0	2	0	0	0	0	0	3	0	2	0	9
	Total	0	247	0	3	0	130	0	94	0	5	0	131	0	137	0	747
Antimicrobials	cattle	0	94	0	1	0	108	0	20	0	0	0	56	0	8	0	287
	pigs	0	61	0	0	0	54	0	22	0	0	0	48	0	18	0	203
	poultry	0	32	0	0	0	19	0	16	0	0	0	24	0	7	0	98
	sheep	0	70	0	1	0	12	0	20	0	0	0	57	0	56	0	216
	other	0	1	0	0	0	4	0	3	0	0	0	4	0	0	0	12
	Total	0	258	0	2	0	197	0	81	0	0	0	189	0	89	0	816
Growth promotants	cattle	0	85	0	3	0	113	0	18	0	8	0	19	0	14	0	260
	pigs	0	38	0	0	0	31	0	15	0	3	0	25	0	16	0	128
	poultry	0	4	0	0	0	2	0	2	0	0	0	1	0	1	0	10
	sheep	0	92	0	0	0	19	0	35	0	2	0	51	0	63	0	262
	other	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2
	Total	0	219	0	3	0	166	0	70	0	13	0	97	0	94	0	662
Insecticides	cattle	1	190	0	0	0	125	0	33	0	8	0	53	0	22	1	433
	pigs	0	16	0	0	0	12	0	7	0	0	0	19	0	10	0	64
	poultry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	sheep	0	152	0	0	0	34	0	70	0	3	0	119	0	144	0	522
	other	0	2	0	0	0	7	0	0	0	0	0	0	0	1	0	10
	Total	1	360	0	0	0	178	0	110	0	11	0	191	0	177	1	1029
Metals	cattle	0	20	0	0	0	31	0	7	0	2	0	13	0	5	0	78
	pigs	0	18	0	0	0	20	0	9	0	1	0	12	2	12	2	76
	poultry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	sheep	0	31	0	0	0	6	0	6	0	2	0	31	5	115	5	201
	other	0	1	0	0	0	7	0	3	0	0	0	1	0	4	0	16
	Total	0	70	0	0	0	64	0	25	0	5	0	57	7	136	7	371
Miscellaneous	cattle	0	15	0	1	0	27	0	7	0	1	0	10	0	1	0	62
	pigs	0	19	0	0	0	11	0	9	0	0	0	17	0	10	0	66
	poultry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	sheep	0	40	0	0	0	7	0	12	0	1	0	20	0	23	0	103
	other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	74	0	1	0	45	0	28	0	2	0	47	0	34	0	231
Total		1	1228	0	9	0	780	0	408	0	36	0	712	7	667	8	3856

Suspect exotic or emergency disease investigations

There were 192 investigations of diseases, suspected to be either exotic or a possible emergency, reported during the quarter, as shown in Table 17. These data do not include the sampling activities conducted in New South Wales and Queensland as part of the response to the equine influenza outbreak. More details about some of these investigations can be found in the State and Territory reports.

Table 17 Exotic or emergency disease investigations reported, 1 October to 31 December 2007

Disease	Species	State	Month	Response code	Finding
Aujeszky's disease	Porcine	WA	Nov	3	negative
Brucellosis — bovine (*B. abortus*)	Bovine	QLD	Oct	2	negative
Equine herpesvirus 1 — abortigenic and neurological strains	Equine	WA	Oct	2	positive
Equine influenza	Equine	NT	Oct	2	negative
	Equine	QLD	Oct	2	negative (2 unrelated investigations)
	Equine	SA	Oct	3	negative (31 unrelated investigations)
	Equine	SA	Nov	3	negative (23 unrelated investigations)
	Equine	SA	Dec	3	negative (8 unrelated investigations)
	Equine	TAS	Oct	1	negative (11 unrelated investigations)
	Equine	TAS	Oct	2	negative
	Equine	TAS	Oct	3	negative (3 unrelated investigations)
	Equine	TAS	Oct	5	negative (4 unrelated investigations)
	Equine	TAS	Nov	2	negative
	Equine	VIC	Oct	3	negative (34 unrelated investigations)
	Equine	VIC	Nov	3	negative (31 unrelated investigations)
	Equine	VIC	Dec	3	negative (15 unrelated investigations)
	Equine	WA	Oct	2	negative (4 unrelated investigations)
	Equine	WA	Nov	2	negative (4 unrelated investigations)
	Equine	WA	Dec	2	negative
Equine viral arteritis	Equine	WA	Nov	2	negative
Foot-and-mouth disease	Bovine	NSW	Nov	2	negative
	Bovine	TAS	Oct	3	negative
Hendra virus	Equine	NSW	Oct	2	negative (2 unrelated investigations)
	Equine	NSW	Nov	2	negative (3 unrelated investigations)
	Equine	QLD	Dec	3	negative
Porcine reproductive and respiratory syndrome	Porcine	WA	Nov	3	negative
	Porcine	WA	Dec	3	negative (2 unrelated investigations)
Rabies	Canine	WA	Nov	3	negative
Vesicular stomatitis	Equine	WA	Nov	3	negative
West Nile virus infection — clinical	Avian	WA	Oct	3	negative

Key to response codes
1: Field investigation by government officer; 2: Investigation by State or Territory government veterinary laboratory; 3: Specimens sent to the Australian Animal Health Laboratory (or CSIRO Division of Entomology); 4: Specimens sent to reference laboratories overseas; 5: Regulatory action taken (quarantine or police); 6: Alert or standby; 7: Eradication

NAHIS CONTACTS

The National Animal Health Information System (NAHIS) collects summaries of animal health information from many sources. Please contact the relevant person below if further details are required. NAHIS is on the internet (http://www.animalhealthaustralia.com.au/status/nahis.cfm).

Name	Role	Phone	Fax	email
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Neville Spencer	National Granuloma Submission Program	02 6271 6650	02 6272 5442	neville.spencer@aqis.gov.au
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Jenny Hutchison	National Surveillance Coordinator	02 6287 4483	02 6287 4468	jenny@ausvet.com.au
Jane Parlett	Northern Australia Quarantine Strategy	02 6272 3494	02 6272 3468	jane.parlett@aqis.gov.au
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EMERGENCY ANIMAL DISEASE WATCH HOTLINE — 1800 675 888

The Emergency Animal Disease Watch Hotline is a toll-free telephone number that connects callers to the relevant State or Territory officer to report concerns about any potential disease situation. Anyone suspecting an exotic disease outbreak should use this number to get immediate advice and assistance.

For information about the Emergency Animal Disease Watch Hotline, contact Scott Porteous, Animal Health Australia.

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