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PREFACE

This issue of *Animal Health Surveillance Quarterly* is the first since the journal's inception in 1996 in which this preface has not been written by Gardner Murray. Gardner retired as Australia's Chief Veterinary Officer in July 2006 after serving in the position with distinction for more than 17 years. An article reviewing the many highlights of Gardner's career is included in this issue. As a longstanding friend and colleague, I would like to thank Gardner for his contribution to Australia's animal production industries and his unwavering commitment to effective surveillance to underpin Australia's trading position. I wish him well for his retirement and future endeavours.

The ongoing importance of our preparedness work against potential incursions of avian influenza is also highlighted, with reviews of Exercise Eleusis '05 and the International Avian Influenza Technical Assistance Workshop. Other topics 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 *Animal Health Surveillance Quarterly* 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 (at http://www.animalhealthaustralia.com.au/status/nahis.cfm).

Bob Biddle, Acting Australian Chief Veterinary Officer

CONTENTS

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Gardner Murray moves on

Gardner Murray's term as Australian Chief Veterinary Officer (CVO) in the Australian Government Department of Agriculture, Fisheries and Forestry has recently ended.

James Gardner Murray (PSM, DVMS*hc*, BVMS, HonFRCVS, FAIM, FAICD, FAITM) is Australia's longest-serving CVO, having held this position for more than 17 years. A graduate of the University of Glasgow Veterinary School, Gardner began his career in private veterinary practice in the United Kingdom, before moving to Australia. In 1979, he joined the Australian Department of Primary Industries and Energy. He has played a key leadership role, not only within the department, but also nationally and internationally.

Within the department, Gardner's roles have included veterinary counsellor in Washington; Executive Director of the Bureau of Rural Science; Executive Director of the Australian Quarantine and Inspection Service; and special adviser to government on animal health, public health, animal welfare, emergency management and international trade. The value of his work has been publicly recognised several times. In 1999, the Australian Meat Council awarded him the Distinguished Australian of the Year Award for significant contributions to the Australian economy, particularly through exports of products. In 2001, he received the Centenary Medal for outstanding staff in the Commonwealth Department of Agriculture for his contributions to quarantine, inspection, and pest and disease control/eradication. In 2002, Gardner was awarded the Public Service Medal for outstanding public service in the development and promotion of animal health and food safety standards.

Internationally, Gardner has for many years been an active supporter of the World Organisation for Animal Health (OIE, formerly Office International des Epizooties) in its attempts to establish science-based standards for trade in animals and animal products and to improve animal health information and veterinary services. He has played an important leadership role in the region as President of the OIE Regional Commission for Asia, the Far East and Oceania, and as President of the OIE Sub-Commission for Foot and Mouth Disease in Southeast Asia. In 2003, the OIE recognised his outstanding contribution to international veterinary science with an OIE Gold Medal.

This 'bio' of Gardner would not be complete without mention of personal qualities such as his drive and energy, his sense of humour, and his genuine interest in, and concern for, his staff.

Gardner will continue to be actively involved in Australia's animal health system. He will remain as Australia's Delegate to OIE and continue to fulfil his regional leadership roles. Gardner has a particular interest in strategic planning, risk communication, and the management of change, and no doubt will use his skills to best effect in the coming years.

Dr Bob Biddle has been appointed as Acting CVO until formal recruitment processes can be completed.

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

OIE General Session

The 74th General Session of the World Organisation for Animal Health (OIE, formerly Office International des Epizooties) was held in Paris on 21–26 May 2006. Attendees came from the 167 OIE Member Countries, intergovernmental organisations such as the United Nations Food and Agriculture Organization (FAO) and the World Health Organization (WHO), and many nongovernmental organisations, including the World Veterinary Association.

During the General Session, Australia was officially recognised as meeting its requirements for a country free from bovine spongiform encephalopathy (BSE) and contagious bovine pleuropneumonia (CBPP), in accordance with the provisions of the OIE

Terrestrial Animal Health Code. (Australia has now been recognised by the OIE as meeting its requirements for a country free from all four livestock diseases for which the organisation conducts official assessments: foot-and-mouth disease, rinderpest, CBPP and BSE.)

All chapters of the *Terrestrial Animal Health Code* proposed at the March meeting of the Terrestrial Animal Health Standards Commission were adopted, except for the chapter on glanders. The description of avian influenza in the OIE list of diseases has been changed so that highly pathogenic avian influenza in wild birds is reportable. Chapters on disposal of dead animals and on animal identification and traceability were adopted but will require further development over the coming year.

All proposed changes to the *Aquatic Animal Health Code* were adopted.

A list of antimicrobials of veterinary importance was adopted. An ad hoc group will refine the list and consider breaking it down into subcategories according to type of usage. The list will be used to assist with the work on antimicrobial resistance that is being undertaken by WHO, FAO and the Codex Alimentarius Commission.

Two technical items were presented. The first, presented by Recaredo Ugarte (Director General of Livestock Services, Ministry of Agriculture and Fisheries, Uruguay), was on future approaches to ensure that veterinary education meets societal demands. The second, presented by Francois Le Gall of the World Bank, was on economic and social justification of investment in animal health and zoonoses.

The Working Group on Wildlife Diseases presented a report, and this was followed by lengthy discussion on avian influenza, wild bird sampling techniques, and the need for collaboration between veterinarians and ornithologists.

Elections were held for all positions on OIE Specialist and Regional Commissions. Of particular interest to Australia were the re-election of Dr Gardner Murray, Australia's Delegate to OIE, as President of the Regional Commission for Asia, the Far East and Oceania, and the re-election of Dr Eva-Maria Bernoth as President of the Aquatic Animals Health Standards Commission. (Dr Bernoth is Manager of the Aquatic Animals section of the Office of the Chief Veterinary Officer in the Department of Agriculture, Fisheries and Forestry.)

Contributed by: Jill Mortier, International Coordinator, Office of the Chief Veterinary Officer, Australian Department of Agriculture, Fisheries and Foriestry

Exercise Eleusis '05

Exercise Eleusis '05 was conducted from 29 November to 1 December 2005 to evaluate Australia's capability to manage zoonotic emergency animal disease outbreaks. More than 1000 people participated from national industry groups, and primary industry, human health and supporting agencies in all jurisdictions. The exercise proved to be a highly successful test of Australia's ability to respond to a simulated multifocal outbreak of highly pathogenic avian influenza. It demonstrated that Australia's response arrangements are robust, effective and sound for significant animal health emergencies; confirmed the value of improvements implemented since Exercise Minotaur in 2002; and, as intended, identified aspects for further improvement.

The objectives of the exercise were to test integration of nationwide emergency animal disease arrangements, public communication, and disease control policies and strategies. During the exercise, three States had a simulated outbreak of avian influenza in chickens, as well as some simulated cases of infection in humans. All jurisdictions and peak poultry industry bodies were required to undertake human health and animal disease control activities and participate in national decision making. Governments and industries activated national and whole-of-government emergency arrangements, emergency operations centres and crisis communications teams.

In designing the exercise, it was recognised that simulating an outbreak of avian influenza would be very complex. The success of the exercise was due to

the use of multidisciplinary management and planning, and reporting teams capable of covering all aspects (veterinary, industry, health, social, etc) of a potential disease response. Observers and participants agreed that the exercise was realistic, well designed and professionally managed, and that its objectives were met.

Major outcomes of Exercise Eleusis ’05 included:

- reaffirmation of the value and comprehensiveness of emergency animal disease preparedness in Australia
- confirmation that working nationally is the key to a successful response
- a higher level of awareness of avian influenza and its implications
- broad recognition of the need to continue building Australia’s skills base to ensure that sufficient personnel are available to meet the challenges of a major emergency animal disease
- recognition of the need for a clear national policy and process for assessing and communicating the risk to human health of zoonotic emergency animal diseases
- development of stronger linkages between primary industry and human health agencies throughout Australia
- recognition of the challenge of public communication during a zoonotic emergency animal disease outbreak and the scale of resources required to meet this challenge.

Copies of the Exercise Eleusis ’05 reports can be downloaded from the website of the Australian Department of Agriculture, Fisheries and Forestry.[1]

Contributed by: Peter Koob, Emergency Risk Management Unit, Product Integrity, Animal and Plant Health, Australian Department of Agriculture, Fisheries and Forestry

1. www.daff.gov.au/eleusis

Exercise Wild West

Exercise Wild West was held in Perth on 16–19 May 2006. It was designed to test Rapid Response Team (RRT) and Department of Agriculture and Food, Western Australia (DAFWA) emergency animal disease (EAD) response arrangements. Although most of the 180 participants were from the DAFWA Animal Health area, 36 members of the RRT from departments of agriculture and primary industries in other States and Territories also attended. They were joined by industry representatives from WA Farmers Federation, Pastoralists and Graziers Association of WA, and the pork industry; and representatives from the WA Fire and Emergency Services Authority; WA Police Service; local government; Australian Veterinary Reserve; Australian Department of Agriculture, Fisheries and Forestry; and Animal Health Australia.

During the exercise, participants were provided with a developing scenario of a simulated outbreak of foot-and-mouth disease (FMD) in the Albany and Bunbury regions of Western Australia. The exercise was facilitated by an Exercise Management Team, which was responsible for monitoring and providing the relevant inputs at appropriate times and keeping the exercise on track.

Exercise Wild West was judged to be a success. It provided a realistic opportunity to test RRT and DAFWA EAD response arrangements. It also tested the effectiveness of Western Australian response procedures, particularly with regard to surveillance, carcase disposal, animal welfare and FMD vaccination.

All exercise participants were enthusiastic and gained significant understanding of their roles in an EAD response. DAFWA staff demonstrated a sound technical capability to respond to the initial notification and confirmation of an emergency disease. The exercise confirmed that the capacity to sustain a response would rely on a whole-of-agency response and the involvement of personnel from emergency services, other government departments and external organisations.

Contributed by: Jenny Arkle, Project Manager, Training Services, Animal Health Australia

International Avian Influenza Technical Assistance Workshop

Domestic activities for avian influenza prevention and preparedness have been reported in previous issues of *Animal Health Surveillance Quarterly*. A wide range of people and institutions in Australia are also involved in international activities relating to avian influenza. There is a general recognition that a better understanding of these activities would enhance the efficiency of planning and service delivery in the region.

In this context, a two-day International Avian Influenza Technical Assistance Workshop was convened in Canberra in June 2006. The workshop was co-sponsored by the Australian Department of Agriculture, Fisheries and Forestry; the Australian Department of Health and Ageing; the Australian Agency for International Development (AusAID); and the Australian Centre for International Agricultural Research (ACIAR).

The aim of the workshop was to assemble Australian human and animal health experts to:

- map current and planned support activities for technical assistance with avian influenza, especially in south-east Asia and the Pacific
- plan ways to best deploy Australia's finite pool of avian influenza expertise to maximise synergy and efficiency
- identify possibilities for future coordination and collaboration.

The workshop was attended by a number of individual consultants, and personnel from a wide range of government and nongovernment organisations.

The workshop was successful in improving networking and collaboration between a wide range of parties, and identified a number of recommendations and priorities for future action.

Contributed by: Peter Black, Office of the Chief Veterinary Officer, Australian Department of Agriculture, Fisheries and Forestry

Arbovirus forum

Dr Moira McKinnon, in her three-way capacity as the Chair of the National Arbovirus and Malaria Advisory Committee (NAMAC), Senior Medical Advisor at the Australian Government Department of Health and Ageing (DoHA) and an issues-based knowledge broker for the Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease (AB-CRC) proposed a face-to-face session between AB-CRC arbovirus researchers and NAMAC. The aim was to create a forum for the AB-CRC to obtain input and advice on how useful its research is for end users, and on how best the research outcomes might be adopted by end users.

The half-day meeting, which took place on 7 June 2006 in Canberra, was designed to be an interactive event. The schedule started with a short outline of NAMAC's interest in learning about the breadth and scope of research being conducted within the AB-CRC, and its potential impact on decision making. NAMAC also explained its desire to underpin all policy decisions and strategic planning with good science. The forum was an ideal opportunity for the exchange of information that would help to achieve this.

Eight presentations followed — the first from DoHA, and then seven from AB-CRC researchers:

- Conan Liu — National notifiable disease surveillance systems (NNDSS): current trends
- Scott Ritchie — Can mosquito traps be used for Japanese encephalitis surveillance?
- John Bingham — West Nile virus and little ravens
- Andrew van den Hurk — A tale of *Culex*, West Nile virus and the Asian tiger mosquito, and

studies of the potential colonisation and establishment of *Aedes albopictus* as an arbovirus vector in Australia

- Cheryl Johansen — Application of remotely sensed information for enhanced flavivirus surveillance
- Lorna Melville —Arbovirus surveillance in the Northern Territory
- David Boyle — Arbovirus identification and characterisation using molecular tools
- Roy Hall — Differential diagnosis of indigenous and exotic mosquito-borne viruses in Australia.

Each presenter was asked to include a final slide outlining future directions and the potential for adoption of research findings (including how research findings might help shape future laboratory testing, strategic decisions for surveillance programs and/or policy development).

The forum concluded with a one-hour discussion session, facilitated by Professor Aileen Plant in her capacity as a member of NAMAC and Deputy Chief Executive Officer of the AB-CRC.

Participants agreed that the forum was an invaluable opportunity for key AB-CRC arbovirus researchers to meet with a range of end users — from both animal health and public health areas — from across Australia. They suggested that a second forum be held in 12 months. Further discussion on prioritising of research took place the following day during the NAMAC meeting.

A full copy of the report from the forum, including summaries of the presentations, is available on the AB-CRC website.[2]

Contributed by: Corinna Lange, Communication Officer, Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease

2. www1.abcrc.org.au/uploads/publications/PUBLICATION_256.pdf

National Arbovirus Monitoring Program

The Australian National Arbovirus Monitoring Program (NAMP) is an integrated national program that is jointly funded by industry and governments. The program monitors the distribution of economically important insect-borne viruses (e.g. bluetongue, Akabane and bovine ephemeral fever) and their vectors.

This report covers the first half of 2006, when arboviral activity in northern Australia is expected. Rainfall in the northern halves of the three northern Australian jurisdictions was well above average for the first four months of the year, but has been negligible since April. In contrast, conditions have been dry in the southern halves of the northern jurisdictions and the rest of Australia. In New South Wales (NSW), the proportion of the State in drought increased during the period, and 89% of the State was considered drought affected by mid-June.

Generally, there was an increased level of vector activity and seroconversions in the east of Australia. Neither vector activity nor seroconversions to bluetongue or Akabane viruses were detected in Victoria, Tasmania or South Australia in the first half of 2006.

Bluetongue virus

In Western Australia (WA), seroconversions to bluetongue virus were recorded in the second half of the period in only two herds in the Pilbara. The size of the bluetongue zone in this area was reduced substantially according to the national guidelines.

In the Northern Territory (NT), bluetongue viral activity was widespread in the north, extending to the Barkly Tablelands but excluding the Victoria River district. Seroconversions were recorded in most months.

In Queensland (Qld), bluetongue viral activity was quite high in the northern parts of the State, as expected after the two cyclones and subsequent flooding that occurred. In contrast, bluetongue viral activity was very low in the sentinel herds south of Townsville, reflecting the dry conditions. However, one animal seroconverted in February 2006 in a sentinel herd in the south-east near Goondiwindi. As

this herd had been in the free zone, a change was made to the bluetongue zone map.

In NSW, seroconversions to bluetongue virus were not recorded until April 2006. Transmission appeared to originate from the mid-north coast and extended south to Camden. Although seroconversions were recorded at Paterson, transmission further along the Hunter Valley was not recorded this year. There was also transmission west into the eastern part of the Armidale Rural Lands Protection Board (RLPB) area. A single seroconversion was recorded at Casino (far-north coast) after transmission had already occurred further south on the coast. Seroconversions in the Armidale RLPB and at Camden resulted in an enlargement of the bluetongue zone in NSW. These areas had not been affected for more than 10 years.

Akabane virus

The distribution of Akabane detections was within its known range, but followed an unpredictable pattern around Australia. In WA, seroconversions to Akabane virus were recorded only during the last three months of the period, in the Kimberley and near the Pilbara coast. The geographical distribution of seroconversions was similar to that in the previous year.

In the NT, Akabane activity during the period was lower than usual and was confined to the northern sites.

In Qld, most Akabane viral activity occurred in the north and north-west parts of the State, with 100% of animals seroconverting in some herds. The south-east of the State did record some Akabane viral activity at the beginning of the year, but this decreased towards the end of the period. In comparison, during the summer of 2005, more activity occurred in the southern and mid-central areas, but few herds had seroconversions after March.

In NSW, Akabane viral activity occurred throughout most of the endemic area and south to Camden. There was also transmission on the north-west slopes and into the Armidale area. Although seasonal conditions were poor in many areas, this pattern was slightly more expansive than in 2005.

Bovine ephemeral fever virus

The distribution of bovine ephemeral fever (BEF) detections was within its known range, but followed an unpredictable pattern aound Australia. In WA, the pattern of BEF viral activity was similar to that of bluetongue, with no seroconversions recorded during the first half of the reporting period. In the second half of the period, seroconversions were recorded near Broome and on the north Kimberley coast.

In the NT, BEF viral activity was widespread, and seroconversions were noted in all sentinel herds, including those at Alice Springs.

In Qld, BEF viral activity was restricted to three northern sentinel herds in February and early March 2006. It was more widespread between April and the end of June, with animals in nine herds seroconverting and clinical disease noted in the Townsville sentinel herd.

There was limited BEF activity in NSW during this reporting period. However, in the Bellingen area (mid-north coast), most of the animals in the sentinel herd seroconverted during April and May 2006.

Insect trapping

In WA, nine species of *Culicoides* midges were collected, but the only confirmed vector species was *C. brevitarsis*. This species was only collected in the north-east of the State, as far south as Broome. One specimen of the suspect vector species *C. oxystoma* was collected in Kununurra. Overall, the numbers of specimens collected, of both vector and nonvector species, were lower than in previous years.

In the NT, the distribution, seasonality and numbers of *C. brevitarsis*, *C. actoni*, *C. fulvus* and *C. wadai* were all elevated compared with the 2005 season. As usual, *C. brevitarsis* was the most widespread species, being detected as far south as the Barkly Tablelands. *C. actoni* was the next most widespread, reaching the Victoria River district and Katherine, while *C. fulvus* was only found as far south as Katherine. *C. wadai* was only detected in the three most northerly sites and only in very low numbers.

In Qld, *C. brevitarsis* was collected as usual at coastal and near-coastal sites (except ports) throughout the State. Further from the coast, it was collected at Dalby, Chinchilla and Goondiwindi, but not further inland. This suggests a relatively subdued season for *C. brevitarsis* in inland southern Qld.

C. actoni was collected at Cooktown, and *C. dumdumi* was collected at Cooktown and Bamaga. These species have been recorded previously in these locations.

In NSW, low numbers of *C. brevitarsis* were recorded in February at Nowra, which was the southern extent of its distribution. Numbers at this location peaked in March. Movement up the Hunter Valley was more rapid than in 2005. *C. brevitarsis* was recorded at Scone in January (2 months earlier than last year) and persisted until April. It was found on top of the range at Armidale on one occasion in March. *C. wadai* was not recorded in NSW in the first 6 months of 2006.

Contributed by: Jenny Hutchison, Animal Health Australia's National Surveillance Coordinator, AusVet Animal Health Services

The BioSIRT project

TS Elliot once wrote, 'Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?'[3] This quote aptly summarises the challenge faced by any group involved in the management of an emergency disease response or an endemic disease control program. How do we safely record the mountains of information, and how can we easily access and analyse information associated with the disease event?

For the past 20 years, Australian authorities have used the Animal Health Emergency Information System (ANEMIS), first as a hard-copy filing system and subsequently as a computer-based system. Despite upgrades and the addition of new modules to ANEMIS, the system was starting to show its age. After Exercise Minotaur, the national simulation exercise held in 2002 to test Australia's response capability against an incursion of foot-and-mouth disease, the recommendations included: 'As a matter of urgency, a national information management system linked to an upgraded ANEMIS be developed and used to ensure rapid and accurate transmission of information between field operatives and decision makers in all jurisdictions'.

In late 2002, the Primary Industries Standing Committee formed the National Information Managers' Technical Group (NIMTG) to 'advance the national animal/plant health information capability by creating an efficient and effective management system for emergency incidents and routine surveillance while enabling national and international reporting requirements to assist in maintaining market access'.

The first task for NIMTG was to develop and scope a proposal for a system to replace ANEMIS. A proposal was submitted to the Primary Industries Health Committee in July 2004. The proposed new application, BioSIRT (BIOsecurity, Surveillance, Incident Response and Tracing), contained three key components:

- SQCR — Surveillance, Quarantine, Control and Recovery. This component manages and records routine and emergency regulatory activities, control measures and surveillance on any area of interest (AOI), especially activity surrounding emergency incident management. SQCR contains functions for recording summary information on traces, AOIs, diary and scheduled events, backgrounds, visits, observations, surveys, consumables, samples, diagnosis and status of incidents.
- CRIS — Client and Resource Information System. This component delivers spatial capacity and manages parties and their association with land. While SQCR has the capacity to store details of parties and land as text, CRIS brings the capacity to generate maps and perform other spatial tasks.
- RMP — Resource Management Package. This component manages detailed activities of teams, occupational health and safety, consumables, equipment, contractors, accommodation, etc. While SQCR identifies properties to be dealt with and can record subsequent actions, RMP has much higher capacity, as required for events involving hundreds or thousands of parties.

3. Eliot TS (1934). *The Rock*, Pt. 1

Primary Industries Ministerial Council endorsed the production of BioSIRT, and the Australian, State and Territory governments agreed to provide $1.9 million to fund BioSIRT through a cost-sharing agreement.

A contract has been signed with a Melbourne company, Spatial Vision Innovations, to develop the SQCR and CRIS components. A completed design is due for submission by September 2006. If the design is accepted, the software will be developed and deployed to an Independent Emergency Field System (IEFS) by mid-2007. Integration of BioSIRT into the networks of each of the States and Territories will follow. The IEFS is intended to function as an independent system that can be deployed to remote locations where BioSIRT cannot be accessed over the jurisdictional network because of insufficient bandwidth or for other reasons.

In addition to producing a state-of-the-art system, the BioSIRT developers have paid particular attention to developing a system that is equally applicable to the management of diseases of animals, aquatic animals and plants, vertebrate pests, insect pests, weeds and even contamination/residue events. This has been achieved by enabling a skilled clerical person to select which functions (diary, samples visit, etc), and which information fields within each function, are appropriate for a particular task. Using this flexibility, the clerical person can 'shape' the application, from a simple task such as taking a phone message and passing it on through to a property visit involving dozens of complicated observations and sample gathering for diagnosis.

This has required the use of terms such as AOI (rather than property, holding, farm, pond or road) to ensure that the system can be deployed in all types of emergencies. BioSIRT will also be able to generate maps, rather than requiring the transfer of information to separate mapping programs. The maps can locate surveys, observations and samples, in addition to details of AOIs and surrounding features.

The standardisation of the underlying database — while allowing the application to be 'shaped' to deal with many different emergency and regulatory activities — gives substantial reporting power across multiple incidents, even of different types. The States and Territories and the Australian Government will have a reporting capacity that was previously unavailable.

While all States and Territories will deploy BioSIRT for use in emergency incidents, some jursidictions may continue to use their existing programs for management of endemic disease and pest surveillance and control programs.

With a view to the medium term, BioSIRT will have the potential for integration with other information systems, including the National Animal Health Information System (NAHIS), the National Livestock Identification System, Laboratory Information Management Systems, human resources systems and document management systems. To enable this, BioSIRT is fully compliant with the draft national data standards prepared by Animal Health Australia.

Contributed by: Iain East, Office of the Chief Veterinary Officer, Australian Department of Agriculture, Fisheries and Forestry

Australian Wildlife Health Network

The Australian Wildlife Health Network (AWHN) receives reports of wildlife incidents and definitive diagnoses of cause of death in wildlife in Australia. The network is interested in receiving such reports. For copies of the network newsletter or digests, contact Amy Jones at awhn@zoo.nsw.gov.au. All contributions are recorded in the AWHN database (the Wildlife Health Information System, WHIS[4]). Details about selected incidents are provided below.

The Department of Agriculture, Fisheries and Forestry continues to enhance the surveillance of avian influenza in Australia's wild birds. Since 2004, cloacal swabs and faecal samples have been collected from approximately 8200 wild birds. The majority of samples were collected from shorebirds; approximately 40% were from ducks and magpie

4. http://www.wildlifehealth.org.au

geese (*Anseranas semipalmata*); and a smaller number were from shearwaters and other species. Sampling has occurred, with varying degrees of activity, in all States. All samples have tested negative to H5 and H7 subtypes of avian influenza virus. Only 0.21% of tested samples were positive, to low pathogenic virus subtypes; these were H3N2 and H4N2 from ducks in Victoria, H4N8 from red-necked stints (*Calidris ruficollis*) on the central coast of New South Wales, H11N9 from sharp-tailed sandpipers (*C. acuminata*) on the central coast of New South Wales, and H13N6 from a 3–4-week-old silver gull (*Larus novaehollandiae*) chick from Tasmania (the first report of this subtype in Australia). Avian influenza virus has also been excluded as a cause of the four major wild bird mortalities reported in Australia during the first six months of 2006. Major surveillance activities in wild birds are continuing.

Other key investigations are listed below.

Mortalities/morbidities of unknown causes

Nonsuppurative encephalitis was evident histologically in an Australian raven (*Corvus coronoides*) from Gembrook, Victoria, in early April 2006. Several ravens from this area have previously been diagnosed with nonsuppurative encephalitis. Avian influenza, Newcastle disease and West Nile virus infections have been ruled out. The cause of the encephalitis has yet to be determined.

Exclusion of suspected exotic and OIE list diseases

Avian influenza was excluded as the cause of death in a subsample of about 100, mostly adult, flesh-footed shearwaters (*Puffinus carneipes*) found dead in the Albany area of Western Australia in April 2006. No gross lesions were noted. The cause of death is unknown; however, infectious disease appears very unlikely. Incidental by-catch (i.e. catching of birds in fishing nets) associated with the local pilchard fishery is suspected.

Biodiversity/other

A new steering committee has been formed by the Tasmanian Department of Primary Industries and Water to guide the Devil Facial Tumour Disease (DFTD) Program. The steering committee has representation from the State and Australian Governments, the University of Tasmania and the Australian Wildlife Health Network.

DFTD was first reported in a wild Tasmanian devil (*Sarcophilus harrisii*) in 1996, and has now spread across an estimated 50% of mainland Tasmania. It is estimated that the Tasmanian devil population has been reduced by 40% and is still declining. Studies indicate that the tumour is of neuroendocrine origin and that its cells and chromosomes are similar in all infections studied; the chromosomes of the tumour are markedly different from those of healthy devils. This supports the hypothesis that DFTD may be directly passed from animal to animal by implantation of the cancerous cell line. This may happen when devils bite each other around the face (which happens particularly during feeding and breeding). In June 2006, the devil was listed as vulnerable under Australia's *Environmental Protection and Biodiversity Conservation Act 2004*. Significant funding and resources have been committed by the Australian Government and Tasmanian Government to combat the problem.

Further information on DFTD is available on the Tasmanian Department of Primary Industries and Water website.[5]

Contributed by: Chris Bunn, Office of the Chief Veterinary Officer, Australian Department of Agriculture, Fisheries and Forestry; and Rupert Woods, Coordinator, Australian Wildlife Health Network. The Network would like to thank all those who submitted information for this report.

5. http://www.dpiw.tas.gov.au/inter.nsf/WebPages/JCOK-65X2Y6?open

Aquatic animal health

OIE General Session, May 2006

The 74th General Session of the World Organisation for Animal Health (OIE, formerly Office International des Epizooties) was held in Paris on 24–26 May. At this session, some significant changes were made to the *Aquatic Animal Health Code*.

Two fish diseases (infectious pancreatic necrosis and bacterial kidney disease) were removed from the list, and one fish disease (koi herpesvirus disease, which was placed 'under study' at the 73rd General Session) was added. All three diseases are exotic to Australia.

One mollusc disease (infection with *Mikrocytos mackini* — exotic to Australia) was removed from the list. Another mollusc disease (abalone viral mortality) was added as an 'emerging disease'. It is not known whether the herpes-like virus that has been causing abalone deaths in Victoria since December 2005 would be part of this emerging disease complex, but the initial Victorian incident was reported to the OIE in any case, and updates are being provided.

The meeting clarified that the list of diseases relates to the reporting obligations of OIE member countries, while the disease-specific chapters in the *Aquatic Animal Health Code* serve to assist member countries to develop their import regulations.

It was also clarified that, while the full reference list of aquatic animal species susceptible to a specific disease is given in the *Manual of Diagnostic Tests for Aquatic Animals*, the corresponding chapters in the *Aquatic Animal Health Code* cover only those susceptible species that are traded internationally.

Chapters on the previously de-listed diseases of infection with *Mikrocytos roughleyi*, infection with *Marteilia sydneyi* and infection with *Haplosporidium costale* were deleted from the *Aquatic Animal Health Code*. The chapters on infectious pancreatic necrosis and bacterial kidney disease (which have now been de-listed) were retained, and an updated version of infection with *Mikrocytos mackini* was provided.

Definitions for 'infection' and 'susceptible species' were adopted. This follows years of differences in opinion on what exactly constitutes an infection and what evidence is required to list a host species as susceptible. Because these definitions underpin all trade chapters, agreement constitutes a major step forward.

In relation to administrative matters of the Aquatic Animal Health Standards Commission, Eva-Maria Bernoth (Office of the Chief Veterinary Officer, Australian Department of Agriculture, Fisheries and Forestry) was re-elected as President for a second three-year term, and all other members of the Commission were also re-appointed.

AQUAPLAN stakeholder workshop

AQUAPLAN 2005–2010, Australia's national strategic plan for aquatic animal health, was jointly developed by governments and the aquatic animal industries to build on AQUAPLAN 1998–2003, and to enhance the management of aquatic animal health in Australia. The plan and indicative budget were endorsed by the Primary Industries Ministerial Council in April 2005.

The first AQUAPLAN 2005–2010 Stakeholder Workshop was held in Melbourne on 4–5 April 2006. The aims of the workshop were to monitor progress on the implementation of AQUAPLAN and to assess the plan's continuing relevance. After presentations from key industries on their current status and perceived priorities within the plan, participants worked through the plan, confirming or proposing amendments to the projects underpinning the objectives for each of the plan's seven strategies. Each project was subsequently assigned a priority rating.

The workshop confirmed that a national strategic plan is essential, and that stakeholders remain supportive of the plan's strategies and objectives. The proposed amendments to AQUAPLAN projects and priorities were discussed and endorsed by the Aquatic Animal Health Committee — which has oversight of AQUAPLAN 2005–2010 — at its 10th meeting in June 2006 in Melbourne.

Contributed by: Russell Hunter, Office of the Chief Veterinary Officer, Australian Department of Agriculture, Fisheries and Forestry

State and Territory reports

New South Wales

Contributed by: Barbara Moloney, Department of Primary Industries

Anthrax investigations

One case of anthrax was confirmed during April 2006, when four of 280 beef cattle died on a Hillston district property. A ranger was called by the property manager after three dead cows were found. The following day, a fourth animal was observed to be sick and died within hours. Smears taken from affected animals confirmed the presence of *Bacillus anthracis*. The property was placed under quarantine, carcases were burned in situ, the local Public Health Unit of NSW Health was notified, and all in-contact stock were vaccinated in accordance with New South Wales Department of Primary Industries anthrax policy. Sheep and horses on the property were not affected. Although the property had no known history of anthrax, it is located in the known endemic anthrax area of New South Wales.

Twelve investigations of mortalities during the quarter excluded anthrax as the cause of death. Four of these were in sheep, where diagnoses included infectious necrotic hepatitis (black disease) and pregnancy toxaemia. The remaining eight exclusions were in cattle, where diagnoses were made of either coccidiosis or acute haemorrhagic peritonitis.

Botulism in cattle

A north-coast dairy herd suffered losses of 98 out of 115 head following an outbreak of botulism in late May to early June. The herd had been fed corn silage from a recently opened pit, mixed with some home-grown lucerne silage and purchased whole cottonseed, and fed out from a mixer wagon.

The diagnosis was based on clinical signs before death (recumbency, paresis, dyspnoea) in the absence of lesions on post mortem examination, and history of exposure to suspect feed. However, laboratory tests on samples from feed and dead animals were negative for *Clostridium botulinum* toxins C and D.

All 98 cows were buried in deep clay-lined pits on farm. Milk collection from remaining cows was suspended by the processor until all deaths had ceased. All cattle remaining on the property have been vaccinated, and any introductions will also be vaccinated before entry. Counselling support was sought for the herd owners.

Several cattle from a beef herd near Wentworth died and others showed signs of weakness and recumbency, with difficulty chewing and swallowing. Samples of intestinal contents from affected animals failed to find *C. botulinum* toxin. However, serology on a representative cross-sectional sample of 20 of the herd showed three positive for type D toxin and five positive for type C toxin. This indicated that some of the cattle had been exposed to botulinum toxin in the past, and it was reasonable to suspect that they had also been exposed on this occasion.

Malignant catarrhal fever in cattle

During April 2006, malignant catarrhal fever (MCF) was diagnosed on two neighbouring properties in the Gundagai district. Three head of cattle died on one property, and a diagnosis of MCF was confirmed by a polymerase chain reaction (PCR) test. The cattle had been co-grazing with lambs aged 6–9 months.

Three weeks later, three head of cattle died on a neighbouring property, and were confirmed positive for MCF by PCR. A road separates the two properties, and no stock contact has been identified. The second property also contains sheep. Airborne spread of the virus is suspected.

Leptospirosis in cattle

High leptospirosis microscopic agglutination test (MAT) titres have been recorded at Coonabarabran, Moree, Inverell, Bingara and Casino. These were all associated with recent abortions or stillbirths of calves. In most of these cases, *Leptospira hardjo*

titres were significantly higher than those for *L. pomona.*

The Coonabarabran case showed one titre of 1600 to *L. hardjo* (<50 for *L. pomona*), but there was evidence of exposure to pestivirus. In Moree, there were titres of 800, 1600 and 3200 for *L. hardjo* (<50 for *L. pomona*), some fluke involvement and positive enzyme-linked immunosorbent assays (ELISAs) for Akabane virus. At Inverell, both serovars of *Leptospira*, Akabane and possibly selenium deficiency were involved.

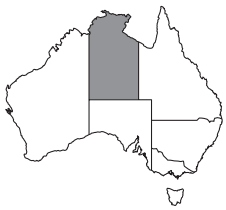
In Casino, investigation into five or six midterm abortions in an unvaccinated beef herd revealed *L. hardjo* titres up to 3200, and *L. pomona* titres to 400. Although *L. hardjo* has not been proven to be associated with abortions in Australia, anecdotal reports suggest that it can be. Investigations in this herd were negative for neosporosis and vibriosis, and showed past exposure to pestivirus. This evidence suggests that the abortions were associated with *L. hardjo*.

In addition, there seems to be an increase in the number of very high titres to *L. hardjo* in western areas of New South Wales during the past couple of years; previously, nearly all titres were for *L. pomona.* It may be that *L. hardjo* has only recently been introduced to western areas, and higher titres are indicative of first exposure, whereas previous high titres to *L. pomona* were associated with higher numbers of feral pigs in the past.

Chlamydophilosis in pigeons

Chlamydophila psittaci and *Salmonella typhimurium* were identified in samples submitted from a commercial pigeon squab flock of 700 pairs from the Hume district. Higher than normal death rates in juvenile birds, preceded by neurological signs (opisthotonos), were observed by the owner. Specific testing for avian influenza was not undertaken because the histology showed meningitis of bacterial origin.

Disease management and monitoring included occupational health and safety measures (masks, gloves and eye protection) aimed at reducing the risk of transmission of disease to people.



Northern Territory

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

Subcutaneous oedema and emphysema in cattle

Two cows from separate paddocks on a cattle station in the Katherine region were reported to have swollen heads, necks and briskets. One animal died and the other was euthanised following a period of recumbency. A post mortem examination showed extensive subcutaneous emphysema over oedematous regions, with no evidence of trauma to the trachea, oesophagus or lungs. The cattle were bright and alert and did not show signs of respiratory distress. A PCR test for bovine ephemeral fever (BEF) was negative. No significant changes were seen on the red or white blood cell parameters, and no bacteria of significance were cultured from the lesions. The cause of the lesions is uncertain; a histopathology examination is pending.

Pyrrolizidine alkaloid toxicity

A 20-year-old horse in emaciated condition on a Katherine property was euthanised following a period of weight loss. A post mortem examination revealed an extremely jaundiced carcase. Serum liver enzymes were elevated, and histopathology results were consistent with chronic hepatopathy caused by pyrrolizidine alkaloid toxins. The property has previously had cases of pyrrolizidine alkaloid toxicity. *Crotolaria* species, known as rattlepods, are quite common in certain areas of the Northern Territory and continue to be a threat to grazing animals, particularly horses. Avoidance is the only effective precautionary measure, but this is difficult to achieve under extensive grazing conditions.

Marek's disease

In the Darwin rural area, deaths in point-of-lay pullets were investigated. Average losses of seven birds per day over a 2-week period culminated in losses of more than 40 birds per day for 3 days. Clinically sick birds were weak and emaciated and

had varying degrees of lameness. Death occurred within 2 days of onset of illness. Avian influenza and Newcastle disease were excluded. A post mortem examination and subsequent histopathology examination revealed lesions of lymphoid neoplasia, and Marek's disease was confirmed. A breakdown in vaccination procedures had occurred at the hatchery of the supplier.

Die-off in young bats

Parks and Wildlife rangers reported weakness and death in hundreds of juvenile flying foxes in the Katherine region following the Katherine flood in April 2006. Adult flying foxes were making no contact with the juveniles. The affected animals were found weak and lethargic, hanging in trees and lying on the ground. Five were submitted for post mortem examination. They were emaciated, but apart from liver swelling and hepatocyte vacuolation, no specific lesions were detected. Internal parasites that were present were most likely the ascaridoid nematode, *Toxocara pteropodis*. These worms are commonly found in flying foxes, especially suckling animals, and are expelled after about 5 months. Australian bat lyssavirus and Hendra virus infection were excluded. It is thought that the animals were dying of starvation after they were abandoned by the adults. The reason for this behaviour is not clear.

Queensland

Contributed by: John Cronin, Department of Primary Industries and Fisheries

Cattle

Akabane infection

A recently aborted bovine foetus was one of three abortions from a herd of 450 in Jondaryan shire. On necropsy, the calf was found to be undersized and emaciated, with mild arthrogryposis and severe hydranencephaly. Serology of the foetal blood was positive for Akabane virus. Histological examination of the fetal lung revealed large amounts of meconium and squames in the airways. A diagnosis of Akabane disease was made on the basis of positive serology and necropsy findings.

Suspected botulism

Botulism was suspected to have caused the deaths of 13 cattle out of 45 at risk, from January to late May 2006 on a property near Childers. Clinical signs of recumbency during the 24 hours before death were observed. The animals were vaccinated in March 2006 with botulinum vaccine and clostridial 5-in-1 vaccine, but deaths continued. Livers tested positive to *C. botulinum* toxin on ELISA.

Salmonellosis

Salmonella group D was considered to be responsible for the sudden deaths of seven calves and sickness of another 20 calves out of 70 at risk in Widgee shire in early April 2006. Clinical signs of diarrhoea, respiratory distress and sudden death were observed, and *Salmonella* group D was isolated from faeces.

Salmonella group D, isolated from blood and faecal samples, was also considered to be responsible for the sudden deaths of four 4–5-week-old dairy calves, and sickness in another two calves, out of 55 at risk on a property near Beaudesert in early May 2006. Clinical signs of acute illness and sudden death were observed.

Pompe's disease

A 7-month-old heifer in Jericho shire was observed to be walking in an unusual manner when mustered, and became recumbent after being yarded for 3 days. On clinical examination, some areas of the skin — especially the neck — seemed over-reactive to touch. The heifer was autopsied, and histological examination revealed a severe vacuolar change affecting the larger neurones in nuclei in the brain and spinal cord. Purkinje fibres of the heart were similarly affected, displaying vacuolar myopathy and cardiomyopathy. A fine diffuse vacuolation of hepatocytes was also seen. The diagnosis of Pompe's disease was confirmed at the Elizabeth Macarthur Agricultural Institute through DNA testing. Transmissible spongiform encephalopathy was excluded.

Pompe's disease is a fatal glycogen storage disease of cattle in which excess glycogen builds up in muscle tissue. The disease occurs because calves lack activity of the essential enzyme, acidic alpha-glucosidase (AAG). Affected animals become lethargic, display poor growth and are most affected during the stress of weaning, poor nutrition and crowding. Death occurs within the first year of life.

Lantana *poisoning*

A 2-year-old Santa Gertrudis cow in Cambooya shire presented with nasal crusting, jaundice, inappetance and constipation. Haematology revealed decreased haemoglobin (4.9 g/dL), packed cell volume (15%) and erythrocyte count (2.59×10^{12}/L), indicating a moderate anaemia. Biochemistry results were consistent with liver damage. An enlarged, orange liver was noted at gross necropsy. Histopathological examination showed a severe, diffuse cytoplasmic vacuolation of hepatocytes and a degree of heptocellular enlargement and distortion, with occasional necrosis of individual hepatocytes. Bile accumulation was also observed within both hepatocytes and Kupffer cells. A diagnosis of *Lantana camara* poisoning was made on the basis of the histopathological changes and history.

Trema tomemtosa *poisoning*

Ingestion of poison peach, *Trema tomemtosa*, was diagnosed as the cause of seven deaths of 6-month-old crossbred heifers out of a group of 30 near Mareeba. Sudden death was the predominant clinical sign, preceded by salivation and nasal discharge. Histological examination of one section of liver revealed a severe, acute, extensive haemorrhagic necrosis. Poison peach was growing in the paddock and had been browsed by livestock. It was also suspected as the cause of previous goat deaths on the property.

Horses

Hendra virus in a horse

A 17-year-old thoroughbred gelding died near Peachester after a short illness. The horse was at first noticed to be restless, but eating and drinking. On the next day, the horse presented with slightly swollen and purple lips and a significant fever (40.5°C); it had normal gut movements on auscultation. On the third day, marked swelling of the lips and increased heart and respiratory rates were reported, but a lower temperature (38.5°C) was recorded. The horse died suddenly on that day.

A decision was made to exclude Hendra virus as a cause, and the limited samples that were available (blood and urine) were tested. Initially, an equivocal result was obtained from the rapid PCR test on urine (the blood sample was negative). After 5 days of incubation, some mild cytopathogenic effect was noticed in cell culture, and a positive PCR result for Hendra virus was obtained when the fluid portion of the cell culture was tested. Paramyxovirus-like particles were apparent under electron microscopy. A positive diagnosis was made, based on sequencing the virus.

A companion horse and two horses on an adjoining property were monitored for Hendra virus infection and shown to be unaffected.

Hendra virus is known to occur within the four species of macrochiropteran bats (flying foxes or fruit bats, *Pteropus* spp.) in Australia. The virus has occurred in an aberrant form in horses on rare occasions (six occurrences since 1994), and four humans are known to have been infected by very close contact with infected horses. The virus does not establish in horse populations.

Sheep

Salmonellosis

Thirty merino sheep from a group of 6000 introduced to a feedlot in Rosalie shire died, and a further 30 showed scouring and lethargy. The animals were being fed pellets and hay at the time of the incident. Fresh and fixed tissues from one animal were submitted to the laboratory for examination. *Salmonella* sp. was isolated on primary selective media from swabs of the small intestine, colon and liver. Histopathological examination revealed a mild to diffuse catarrhal colitis, with multifocal mucosal haemorrhage and some crypt necrosis.

Pigs

Swine dysentery

Swine dysentery due to *Brachyspira hyodysenteriae* caused sickness in 25 pigs, aged 14 weeks, out of 500 at risk on a piggery in Wondai shire in early April 2006. Clinical signs of diarrhoea and cachexia were observed. Necropsy revealed colitis, and histopathological examination revealed sections of mild diffuse catarrhal and erosive colitis, with clusters of type 1 spirochaetes in some crypts. *Brachyspira hyodysenteriae* was cultured from the faeces.

Sarcocystis *infection*

A porcine carcase originating from Wondai shire was condemned because of diffuse, abnormal appearance of the muscles. Histopathological examination revealed degenerate, mineralised parasitic granulomas with only an occasional viable sarcocyst. *Sarcocystis* infection is a fairly rare finding in intensively raised pigs.

Goats

Melioidosis

Melioidosis was diagnosed by a complement fixation test of blood from one goat of five at a school in Bowen. A week before the goat died, it aborted and became recumbent and febrile, exhibiting a purulent nasal discharge and disorientation. It was nonresponsive to treatment by a local veterinarian. Melioidosis is caused by the bacterium *Burkholderia pseudomallei*, mainly in tropical climates. It is a sporadic disease of domestic mammals, in which morbidity and mortality can be high, and can spread to susceptible humans through direct contact with contaminated water and soil. Because of the potential zoonotic nature of the disease, the Tropical Public Health Unit was notified, and serology was performed on the rest of the herd to check for exposure. The school was advised to limit contact with the rest of the herd and the area, and the handler was advised to practise routine workplace health and safety precautions.

Poultry

Aspergillosis

Aspergillosis due to *Aspergillus flavus*, cultured from lung tissue, caused the deaths of 50 34-day-old broilers out of 30 000 at risk on a farm in south-east Queensland in early May 2006. Clinical signs of recumbency, lateral and ventral torticollis and toe-curling were observed. Histology revealed a severe subacute multifocal to confluent necrotising encephalitis, with numerous lesion-associated fungal hyphae eliciting a florid granulomatous inflammatory response. Severe chronic multifocal to confluent fungal pneumonia was also seen.

South Australia

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

Suspected acute bovine liver disease

Several cases of periportal or massive hepatic necrosis, consistent with acute bovine liver disease (ABLD), were diagnosed in cattle on pasture over a month. The outbreak occurred during a period of heavy rainfall in May 2006 and involved Hereford cattle from the Mount Gambier region. Three adult cows that had calved 2–3 weeks previously died suddenly after developing acute nervous signs. One of these cows also developed icterus, but histological examination was prevented by post mortem autolysis of the liver. In the livers of the remaining two cows, severe periportal coagulative/lytic necrosis and haemorrhage were seen. No significant lesions were seen in the kidney, heart or brain sections, thus excluding bovine spongiform encephalopathy (BSE).

ABLD is an acute hepatotoxicity of cattle, the cause of which has not been determined. The condition has been reported mainly in dairy cattle (less commonly in beef cattle) grazing cultivated pastures in south-eastern South Australia and southern Victoria. It is characterised by sudden mortality or a drop in milk production, followed by development of photosensitivity in animals that survive. The severity of photosensitivity is related to the level of sun exposure and access to green feed. The disease is most common in animals 'strip grazing' improved clover/ryegrass pastures, particularly lush pastures that have abundant decaying litter from previous growth. Most outbreaks occur in late autumn and early winter (between April and June), during weather conditions that favour rapid pasture growth.

Suspected botulism outbreak

More than 3 years ago, a suspected botulism (*Clostridium botulinum*) outbreak in dairy cattle occurred on a property close to the Murray River, near Murray Bridge. It was suspected that wrapped silage produced on irrigated highland on the property

was responsible for the outbreak. The herd has since been regularly vaccinated against botulism (types C and D).

Another outbreak has recently occurred on the same property. It again appears to be related to feeding wrapped lucerne silage. In response to the outbreak, the feed was changed to silage from another source and the cattle were re-vaccinated against botulism. Mortalities then ceased and cattle recovered. A month later, the cattle were again fed the original silage, and deaths began again, with more than 70 mortalities (out of a herd of 200) recorded over 3 weeks. Environmental and post mortem samples were sent interstate for testing. Initial results of mouse inoculation tests have identified *C. botulinum* type B as a likely cause of the outbreak. All cattle tested showed protective titres to *C. botulinum* types C and D. More testing is taking place and results are awaited.

Salmonellosis in dairy cattle

About 40 animals out of a herd of 400 dairy cattle in the south-east were affected with salmonellosis. Six of the affected animals died. The clinical signs, observed over 2 weeks, included bloody, mucoid diarrhoea, decreased milk production and inappetence. Faecal samples from six cows all cultured positive for *Salmonella typhimurium* phage type 68.

Investigation of the property revealed that dairy effluent was being pumped directly onto a paddock near the milking shed, forming pools that were accessible to cattle in that paddock. Environmental and feed samples were collected, and samples from the ponds cultured positive for *S. typhimurium* phage type 68. Effluent management advice has since been provided to the producer.

Polioencephalomalacia in pet sheep

A small group of pet sheep in South Australia's mid-north experienced one sudden death and two cases of neurological disease during a period of less than a week. The owner also became unwell during this period, prompting an investigation to rule out zoonoses. Histopathology of the dead sheep indicated that polioencephalomalacia due to vitamin B1 deficiency was the likely cause of the signs and deaths. Copper accumulation in the liver (probably due to ground reserves in the region) was an incidental finding; there were no indications of a hepatic encephalopathy. No zoonotic cause of disease was found in either the sheep or their owner.

Urinary conditions in sheep

Several cases of urinary tract problems, including oxalate nephrosis and urolithiasis, were reported in sheep during the quarter. One case occurred in a Barbary sheep wether at a zoological park. The animal was found moribund and was euthanised. Gross pathology revealed cachexia and overgrown hooves, and other signs consistent with renal failure. Histopathology confirmed a severe subacute nephrosis, with numerous unstained needle-like to rectangular crystals consistent with oxalate crystals. Oxalate nephrosis occurs sporadically (most commonly in the late autumn or early winter) in association with ingestion of weeds that contain oxalate. These include soursob (*Oxalis pes-caprae*), pigweed (*Portulaca* spp.) and some grass species.

Mortality and blindness in young layer chicks

An unusually high mortality rate was reported in 4-week-old pullets in a poultry flock just north of Adelaide. Examination of the flock revealed the presence of a number of lame and blind birds. Post mortem examination showed hypopyon in one or both eyes of the blind birds, and a purulent arthritis in knee or hock joints of the lame birds. Some birds had a multifocal necrosis in the liver, and many had caseated, swollen yolk sacs. Culture from most organ sites grew *Salmonella hessarek*. Affected birds were culled from the flock.

Paresis in growing turkeys

Three out of seven turkey farms belonging to one organisation had a sudden onset of paresis, followed by mortality, in turkey flocks of 10–11 weeks of age. A few birds were initially noticed to be having difficulty walking and then falling down; unless removed, they would be trodden on and traumatised by the other birds. The following day, the syndrome became much more rapid and birds died within hours of the onset of paresis and diarrhoea. Mortality reached 10% in some affected sheds. Feed was withdrawn because ionophore toxicity was suspected, and the symptoms immediately resolved. However, ionophores were not detected upon analysis of the feed.

Blood biochemistry revealed a possible potassium imbalance, and feed analysis showed that potassium levels were lower than expected. Potassium carbonate was added to the drinking water of an affected flock, resulting in an immediate recovery. The problem has not recurred since the feed was reformulated to a higher potassium level. When the reason for only three of the seven farms being affected was investigated, it was found that the unaffected farms routinely withdrew feed overnight, resulting in slightly lower growth rates.

Erysipelothrix in growing turkeys

An increase in tom mortalities in a flock of 12-week-old turkeys south-east of Adelaide was investigated. No clinical signs were noted before death, but post mortem examination of recently dead birds revealed a generalised septicaemia, with mottled spleens. Bacterial culture of organs grew *Erysipelothrix rhusiopathiae*. Mortalities ceased when the flock was treated with an approved antibiotic.

Tasmania

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

Laboratory accessions

Source	Number of accessions
Aquaculture	67
Companion	84
Livestock	572
Other	19
Wildlife	128

Notifiable diseases

	Investigations	
Disease	Positive	Total
American foul brood	6	7
Avian influenza (highly pathogenic)	0	9
Chlamydophilosis	0	3
Brucella ovis	0	11
Brucella abortus	0	7
Chalkbrood	0	9
Enzootic bovine leucosis	0	3
European foul brood	0	9
Hydatid disease	4	11
Johne's disease	1	30
Leptospira hardjo	4	10
Leptospira pomona	5	9
Listeria	3	6
Macrocyclic lactone resistance	0	4
Marine aeromonad disease	0	7
Negative finfish bacteriology*	0	9
Newcastle disease (virulent)	0	3
Q fever	0	1
Clinical salmonellosis	9	50
Piscirickettsiosis	0	4
Pullorum disease (*Salmonella pullorum*)	0	1
Rickettsia-like organism of salmonids	2	6
Salmonella abortus ovis	0	7
Salmonella enteritidis	0	1
Viral encephalopathy and retinopathy	0	1

* *Aeromonas salmonicida* ssp. *salmonicida*, Goldfish ulcer disease, streptococcosis of salmonids

Avian respiratory disease investigation

A mixed-aged show poultry flock managed under partially free-range conditions was affected with an upper respiratory disease over a 6-week period from mid-April 2006. Ducks on the same property were not affected. While up to five birds were affected at any one time, most recovered in several days; only five deaths occurred. Clinical signs included swollen eyes and a serous ocular discharge. The investigation was undertaken as part of a general biosecurity awareness campaign among poultry fanciers. Although highly pathogenic avian influenza (HPAI)

was highly unlikely, an avian influenza ruleout was included. Gross pathology indicated a chronic bacterial sinusitis. *Haemophilus* spp. were cultured from sinus swabs of one of two birds presented for examination. There was evidence of viral involvement on histology of sinuses but not the trachea. A presumptive diagnosis was made of a low pathogenic strain of infectious laryngotracheitis (ILT), producing sinusitis and conjunctivitis. The most plausible explanation for the disease outbreak was the introduction of low pathogenic ILT, subsequently complicated with a secondary bacterial infection.

Gunpowder toxicity in ducks

In another example of Tasmanian ducks succumbing as a result of their ingestive curiosity, three of a group of four ducks died the day after the local fireworks night. Necropsy revealed smoking (subliming at room temperature) black granular material in the proventriculus of all three ducks. Histological findings of multifocal perivascular hepatitis, multifocal myodegeneration of the heart, villous necrosis of the duodenum and moderate brain congestion were consistent with a history of toxin ingestion — namely, gunpowder from spent or misfired fireworks.

Victoria

Contributed by: Tristan Jubb, Department of Primary Industries

Haemolytic anaemia in dairy cows

In April 2006, severe haemolytic anaemia caused the deaths of 25 recently calved cows on a dairy farm near Benalla in north-east Victoria. Another 75 cows out of the mob of 700 were diagnosed with haemolytic anaemia by clinical examination and haematology. Packed red blood cell volumes in affected cows were less than 20% (normal 23–44%), with some as low as 8%. Blood smears showed a severe regenerative anaemia. Blood biochemistry — including zinc, copper, cobalt, phosphorus, calcium, magnesium and glutathione peroxidase — were all within the normal range. Histological changes in the liver and spleen were consistent with severe anaemia.

The cause of the anaemia has not been elucidated, but two possibilities are under investigation. One possibility is a fungal toxin associated with mouldy byproducts of tomato, grape and orange processing, which were major components of the diet; no further cases have been recorded since changing the feed source. The other possibility is *Theileria buffeli*. Red blood cells in smears taken from a small number of cows were found to be parasitised, and it is possible that recent introductions to the herd from New South Wales carried *Theileria* subclinically, with spread via contaminated needles used to inject anthelminthics. Losses exceeded $30 000.

Acute bovine liver disease in cattle

Acute bovine liver disease (ABLD) was diagnosed as the cause of sudden death of one animal, and photosensitisation of another six, in a group of 25 mature, heavily pregnant Hereford and Angus cows. The outbreak occurred in mid-May 2006 on an agistment property north of Bairnsdale in east Gippsland.

Negative pasture spore counts meant that facial eczema was unlikely, and absence of scum made blue-green algae poisoning unlikely. Serum biochemical indices indicated severe hepatocellular injury and icterus.

Necropsy of the dead cow showed severe, widely distributed petechial and ecchymotic haemorrhages, including of the neck and jaw muscles, heart, gastrointestinal tract and especially the gall bladder. The gall bladder wall was grossly thickened to about 1 cm, and the gall bladder contained thin, black bile. Grossly, the liver was reddened but otherwise normal; however, histologically there was diffuse periportal and mid-lobular necrosis typical of ABLD.

ABLD was suspected in another outbreak of photosensitisation in May 2006 on a property in the Kiewa Valley in north-east Victoria. The land has previously been associated with outbreaks of ABLD. Ten of 35 10-month-old Friesian heifers were affected, displaying acute abdominal pain and lethargy followed by severe photosensitisation. All recovered.

In both outbreaks, the cattle had been given access to fresh, hilly paddocks with an abundance of rough dog's tail grass (*Cynosurus echinatus*), which has consistently been present in previous outbreaks.

Scouring yearling calves and pestiviraemia

Six 1-year-old Friesian heifer calves were investigated for scouring in the Cobram district in north-east Victoria in May 2006. The calves presented initially with fever before scouring. Investigations were negative for intestinal worms, coccidiosis, *Salmonella* and *Yersinia*. All six calves were negative for pestiviral antibodies in the agar gel immunodiffusion test (AGID), but positive in the pestiviral antigen capture ELISA test (PACE). The calves have since been reported to be slowly recovering. Most of these animals can be expected to develop mucosal disease and die, usually by 18 months of age.

This case illustrates the significant economic wastage that can occur in herds with concentrated mating periods if pestivirus is spread at that time.

Bovine malignant catarrhal fever

Five cattle deaths in a small herd of 50 in the Talbot area of central Victoria were attributed to malignant catarrhal fever (MCF) caused by ovine herpes virus 2. Cattle that had been grazing with sheep sporadically demonstrated signs of blindness, staggers, hyperthermia (temperatures above 42°C) and sudden death. Histological findings of lymphocytic necrotising vasculitis of multiple organs, consistent with MCF, supported the clinical diagnosis. Necropsy of one of the affected cattle (a 5-month-old calf) revealed evidence of systemic inflammation, including nodular heart valves, capsule adhesion on the kidneys — with a triangular defect in the left kidney, ecchymotic haemorrhages on the rumen wall and generalised synovitis. Deaths have continued, despite the removal of the sheep from the paddocks, and most cases have been unresponsive to supportive therapies. A neighbouring property had a single death diagnosed as MCF.

Blindness in merino ewes

Chronic conjunctivitis and keratitis were diagnosed as the cause of blindness in approximately 50 aged, late-pregnant ewes in a mob of 500 during May 2006 in the Seymour district of north-east Victoria. The producer noticed that the ewes were walking into fences, wandering and circling, and that their eyes were bright blue and opaque. All the ewes were bred on the property, and younger ewes in neighbouring paddocks appeared unaffected. Affected sheep had bilateral corneal oedema (manifesting as blue eyes), hyperaemia of scleral vessels, excessive tear production, and breath smelling like acetone. Trace ketones were detectable by urine dipstick.

Chronic conjunctivitis and keratitis were diagnosed from histology of the eyeball. No causative agent was cultured; however, involvement of a chlamydia or mycoplasma — both of which are hard to detect in chronic cases — was suspected. The ketosis was considered to be secondary to the blindness and the inability to forage. The cost to the farmer was estimated to be more than $2500, resulting from lost ewes, mismothering and poor production.

Urinary tract infection in wethers

Three 10-week-old wethers in a mob of 800 feedlot lambs in Dingee in central Victoria were diagnosed with urinary tract infections during mid-June 2006. The animals had swollen pizzles and oedematous ventral midlines. Because of the early detection of the disease, there were no deaths, except for two animals that were sacrificed for necropsy. Histological findings of a subacute to chronic, active necrotising urethritis, cystitis and pyelonephritis supported the gross pathological findings. The animals had been fed a commercial ration in which the composition had been slightly changed (an increase in protein) when the company changed ownership, and it is suspected that this change in diet contributed to the disease.

Swine dysentery in finisher pigs

During abattoir inspection in April 2006, 13 of 60 pigs from a farm in central Victoria had slight roughening of the serosal surface of the spiral colon. Samples taken for polymerase chain reaction (PCR) and histological examination were positive for swine dysentery (caused by *Brachyspira hyodysenteriae*). The farm had depopulated its pigs 3 years earlier to control swine dysentery and a number of other diseases and had since had a high health status. Investigations, including abattoir monitoring, were able to rule out farms supplying replacement pigs and breeders as the source. This caused the investigators to focus on the possibility of rodents or

birds transmitting the disease from a contract grower unit located 1 km away. An incursion of swine dystentery was highly unexpected; respiratory disease was more feared from this source than enteric disease.

This case highlights the importance of continual disease monitoring and biosecurity in pig herds. The potential cost to the producer, had the disease not been detected at an early stage, would have been approximately $40 per pig sold, which is about the current profit margin.

Zinc deficiency in pigs

In June 2006, a 60-kg pig from a commercial grower herd north-east of Melbourne was sacrificed for laboratory investigation of skin lesions that were affecting the herd; these had resulted in down-grading of carcases at the abattoir. The pigs were grown under intensive conditions and fed a farm-mixed ration without mineral and vitamin premixes. Examination of the skin showed a brownish, greasy exudate on the extremities and snout, with patches on the ears and body that were bilaterally symmetrical but not mirror images. The ear canals were not involved, and examination for mites proved negative. Scraping the greasy exudate off the surface revealed a crusty dandruff-like surface of the epidermis. Histological examination of skin sections showed a buildup of layers of keratin beneath an exudate of keratin, fibrin, and inflammatory cells, interspersed with colonies of staphylococcal-like bacteria. The normal disappearance of nuclei from the superficial epidermis occurred in most parts of the keratinised layers, except in the areas where there was evidence of inflammation. Here, there was a tendency for the nuclei to be retained, indicating only partial parakeratosis. Parakeratosis is a hallmark of zinc deficiency.

The zinc level in a lithium heparin blood sample was found to be 5.4 mol/L, compared with a normal range of 8–15 mol/L. The bacteria seen in histological sections were identified as *Staphylococcus hyicus*, which is implicated in greasy pig skin disease in younger pigs. Zinc deficiency was the diagnosis, despite the atypical histological picture, and this diagnosis was supported by the rapid recovery of the pigs after addition of zinc to the diet. The *Staphylococcus* infection probably played a part in the development of the lesions. This was only the third case of zinc deficiency skin disease in pigs seen in the veterinary consultant's 30 years of experience.

Infectious laryngotracheitis in chickens

Infectious laryngotracheitis caused the death of 17 chickens in a backyard flock near Ballarat in south-west Victoria in April 2006. Coughing progressing to respiratory distress was seen one week after the introduction of birds purchased from a dealer. The owner started treatment with oxytetracycline in drinking water, but deaths continued. Affected chickens were ill for 3–4 days before developing severe conjunctivitis, blindness and anorexia, and then dying. Caseous plugs partially blocking the laryngeal openings were noted at necropsy. Histological examination found characteristic intranuclear inclusion bodies in tracheal epithelium. The owner vaccinated a small number of unaffected breeding stock that had been caged separately and culled the others. The cost of the outbreak to the farmer was approximately $500.

Viral ganglioneuritis in abalone

A herpes-like virus was diagnosed as the cause of high mortality rates in abalone in two land-based and two sea-based abalone farms and in wild stocks in coastal Victoria in January 2006. The source of infection was thought to be wild-caught abalone. Blacklip abalone (*Haliotis rubra*), greenlip abalone (*Haliotis lavigate*) and hybrid abalone of all ages were affected, with young stock suffering the highest mortalities.

Clinically, there was anorexia, a curled footpad (paresis) and a swollen/prolapsed mouth with a protruding radula. Histological changes were restricted to the nervous system, where there was distinctive infiltration of ganglia and nerves with moderate to high numbers of haemocytes, producing a necrotising ganglioneuritis. A herpes-like virus was observed by electron microscopy, and transmission studies have confirmed its infectivity. These findings were consistent with those in a report of herpes-like virus infection of cultured abalone in Taiwan in 2003.

The affected Victorian farms have voluntarily depopulated, cleaned and disinfected. They plan to restock, using a high level of biosecurity. The mortalities and disruption to production have been extremely costly to the affected farms.

A legislated control area was established along a 10-km stretch of affected coastline, and restrictions were placed on the taking of abalone and other shellfish. Preliminary surveillance from survey and commercial diving, and monitoring of processing facilities in Victoria, have not detected the disease elsewhere in wild stocks.

Western Australia

Contributed by: Fiona Sunderman, Department of Agriculture and Food

During the quarter, 284 investigations of animal disease led to laboratory testing. There were five exotic disease alerts and no notifiable disease reports.

All five exotic disease investigations were category 1 alerts (low index of suspicion). They involved routine exclusion of avian influenza and Newcastle disease in poultry and other avian species. A diagnosis of an endemic disease was made in all cases.

Cattle

Bovine respiratory disease complex was reported to be a problem in several feedlots in the Manjimup District. Investigation of one such case revealed severe and chronic pleuropneumonia. Pure growths of *Mannheimia haemolytica* were obtained from bacterial culture.

Rotavirus and cryptosporidiosis were diagnosed as the cause of death of 15 of 25 Murray Grey calves, aged 1–2 weeks, from a mob of 150 at Boyanup. The calves had diarrhoea and died over a short interval. Sections of the terminal ileum showed abundant cryptosporidia adhering to the villus epithelium.

Bovine polioencephalomalacia caused neurological signs and deaths in three out of 100 shorthorn-cross heifers in a feedlot at Dowerin.

Pestivirus infection and suspect pyrrolizidine alkaloid poisoning were diagnosed in calves at Gingin. In April 2005, 2500 calves weighing 60–120 kg were moved from the Pilbara to Gingin. Fifty of these animals died over a period of 6–9 months from July 2005, and a further 20 showed emaciation, despite drenching and mineral supplementation. The diagnosis was based on antigen-capture ELISA for bovine pestivirus and histopathology typical of pyrrolizidine alkaloid poisoning.

Bovine ketosis occurred following transport of pregnant cows from saleyards at Esperance to Cranbrook. Four deaths occurred out of 160 late-pregnant, 3-year-old shorthorn cattle. Clinical chemistry on two of the dead animals demonstrated marked ketosis in one animal, marked azotemia in both and marked elevations in creatine kinase in both.

Sheep

Rumenitis was the cause of death of 25 out of 1000 lambs, of mixed age and sex, at Badgingarra. The lambs were on a sprayed-out failed crop of oats, supplemented with lupin and oaten hay, and died within a 2-week period. At Cuballing, mortalities occurred in feedlot lambs on a ration of 50% cereal grain and lupins and 50% hay.

Blue-green algal poisoning killed at least 30 of 600 2-year-old South African merino mutton (SAMM)-cross ewes at Esperance. Histological lesions highly characteristic of a toxic insult with blue-green algae were seen. *Nodularia spumigena*, a well-recognised toxic blue-green alga, was found in the dam.

Salmonellosis was the cause of severe weight loss in feedlot weaner sheep near Albany. *Salmonella typhimurium* was grown in heavy pure growth from abomasum, small intestine and liver. Salmonellosis was also responsible for diarrhoea and deaths in ten of 430 merino ewe lambs, aged 8 months, at Tambellup, and the death of 13 of 376 crossbred lambs at a Quairading feedlot.

Pneumonia was diagnosed as the cause of death of 30 of 700 merino/white Suffolk weaners at Wilga. Necropsy of two sheep with advanced respiratory distress revealed fibrinous pleural adhesions and pleural effusion. Bacterial culture yielded *Pasteurella multocida.*

Severe fibrinous pneumonia was responsible for the deaths of seven of 180 Poll Dorset lambs, aged 9 months, at Kendenup. Post mortem examination of three lambs revealed that 75% of the lungs were pneumonic and contained multiple abscesses.

Bacterial culture yielded not only light to moderate growths of *Mannheimia haemolytica* and *P. multocida*, but also *Mycoplasma* sp.

Mycoplasma pneumonia killed 20 of 1500 crossbred weaners at Mt Barker over a 3-week period. The sheep had been in a feedlot for just over 3 weeks. Post mortem examination of two of these animals revealed severe pleurisy and pneumonia. Bacterial culture yielded *P. multocida*, *M. haemolytica* and *Mycoplasma* sp.

Enterotoxaemia, pneumonia and enteritis killed 30 of 400 12-month-old mixed-sex merinos at Beacon over an 8-week period. Necropsy and histopathological examination revealed pneumonia and haemorrhagic enteritis.

Polioencephalomalacia was held to be responsible for the deaths of 12 of 1200 point-of-lambing ewes at Esperance. Several other animals exhibited recumbency and 'sky gazing'. On another Esperance property, five of 1300 wethers on lupin/oat supplementary feed died.

Listeriosis was suspected to be the cause of neurological signs, with head tilt, in two of 150 Wiltshire ewes at Witchcliffe.

Caltrop poisoning was the cause of jaundice and swollen heads in a small group of ewes, unweaned 4–5-month-old lambs and rams at Bencubbin. The animals originated from the pastoral area and had been on the property for approximately 6 weeks. The paddock of stubble they occupied also contained 50% caltrop (*Tribulus terrestris*).

Lupinosis caused the death of nine of 1200 mixed-age pregnant ewes at Dandaragan. The ewes were grazing wheat stubble 4 weeks before being put onto lupin stubble.

Lesser loosestrife poisoning was diagnosed in merino ewe lambs at Mt Barker. The lambs were grazing on oat stubble, and lesser loosestrife (*Lythrum hyssopifolia*) was also present at various stages of growth. Clinical pathology test results on serum from the sheep indicated liver and renal disease.

An unusual case of **oxalate toxicosis** was diagnosed in 30 of 800 merino ewes grazing millet in the Stirling Range area. The sheep died 3–14 days after being moved to a new paddock that had been sown in late December 2005 with millet (*Pennisetum* variety) and superdan 2 (a cross between sudan grass and sorghum, hybrid variety).

Pigs

Hyperostosis, an uncommon condition, was diagnosed in a 3-day-old piglet with stilted gait and obvious thickening of both forelimbs. Histologically, on cross section, the thickening was seen to be due to a markedly thickened periosteum and excessive radial deposition of periosteal intramembranous bone formation, with myxoedematous tissue present between the spicules of new bone. This is in contrast to the normal concentric laminar architecture of cortical bone. The pathogenesis of the disease is not well understood but it is thought to be a lethal homozygous recessive inherited disease.

Pleuropneumonia was the cause of respiratory disease that resulted in the deaths of 18 of 206 male pigs, aged 16 weeks, at an eco-shelter at Cranbrook. *Pasteurella multocida* was recovered from multiple cultures of lung and pleural fluid from three pigs.

Goats

An ongoing investigation of neurological clinical signs or diarrhoea in a herd of 1100 goats in the Darkan area attributed the problem to **enterotoxaemia and parasitism (ostertagiosis)**. Necropsies were performed on several animals over an extended period. In every case, the enterotoxaemia ELISA was positive.

Avian

Chlamydophilosis (psittacosis) was diagnosed in a flock of 24 red-capped parrots that died in the Albany township. The parrots were regular visitors to a suburban garden feeding station. Over a period of several days, the entire flock died, and several of the parrots were found sick or dead in the garden. The resident noted that there was also a lack of small birds visiting her garden. Immunofluorescence tests on splenic smears from two parrots were positive for *Chlamydia psittaci*. Avian influenza was excluded by virological testing at the Animal Health Laboratories of the Western Australian Department of Agriculture and Food, and at the Australian Animal Health Laboratory.

Mycotic keratitis and endophthalmitis were diagnosed as the cause of unilateral ocular lesions in approximately 250 layer chicks, aged 3 weeks, in a commercial flock of 25 000 in the Perth metropolitan area. The lesions were in the right or left eyes, rarely in both.

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 30 June 2006

State	Free
ACT	2
NSW	835
NT	0
QLD	62
SA	495
TAS	96
VIC	608
WA	162
AUS	2260

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/flocks infected with Johne's disease at 30 June 2006

	Cattle	Goat	Deer	Sheep	Total
NSW	115	8	1	1286	1410
NT	0	0	0	0	0
QLD	0	1	0	0	1
SA	55	1	1	71	128
TAS	16	3	0	57	76
VIC	961	7	8	432	1408
WA	0	0	0	18	18
AUS	1147	20	10	1864	3041

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, goats and alpacas; the numbers of herds or flocks that have reached a status of Monitored Negative 1 or higher are shown in Table 3.

Table 3 Herds/flocks with a Market Assurance Program status of at least Monitored Negative 1 at 30 June 2006

	Alpaca	Cattle	Deer	Sheep	Total
NSW	110	616	36	371	1133
NT[a]	0	0	0	0	0
QLD[a]	0	0	0	0	0
SA	44	261	18	187	510
TAS	1	107	2	31	141
VIC	26	322	3	94	445
WA[a]	0	0	0	0	0
AUS	181	1306	59	683	2229

a Herds/flocks in free or protected zones have a status of 'Monitored Negative 1' or better because of the zone status

Lists of beef, dairy and alpaca herds and sheep flocks assessed in the Market Assurance Programs are available at 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, Western Australia and Tasmania are undertaking a program of bulk milk testing of all dairy herds. Table 4 shows the number of dairy herds tested free of enzootic bovine leucosis at the end of the quarter.

Table 4 Dairy herds tested free of enzootic bovine leucosis at 30 June 2006

State	Free	Herds
NSW	987	1022
NT	0	0
QLD	889	889
SA	380	380
TAS	525	525
VIC	5621	5684
WA	234	234
AUS	8636	8734

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		Bovine ephemeral fever		Bluetongue		Enzootic bovine leucosis		Equine infectious anaemia		Equine viral arteritis	
	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve	Tests	+ve
Apr–Jun 2005	2984	583	1458	356	4279	288	2874	0	570	3	251	8
Jul–Sep 2005	1936	476	1298	257	3399	343	2330	3	577	21	188	13
Oct–Dec 2005	4926	383	1586	252	8429	272	1526	3	719	14	343	6
Jan–Mar 2006	1667	394	1321	291	5669	254	1889	0	462	0	273	9
Apr–Jun 2006												
NSW	283	81	293	18	628	9	67	3	304	0	199	5
NT	400	195	401	145	396	187	465	0	3	0	-	-
QLD	399	150	415	114	625	87	131	0	179	1	14	0
SA	340	0	31	0	391	0	554	0	2	0	2	0
TAS	0	0	0	0	0	0	3	0	0	0	0	0
VIC	181	0	159	0	80	0	120	0	213	0	24	1
WA[a]	367	34	99	13	372	14	1	0	39	0	42	0
AUS	1970	460	1398	290	2492	297	1341	3	740	1	281	6

a Western Australia mistakenly reported five positive tests for equine infectious anaemia in the January to March 2005 *Animal Health Surveillance Quarterly* Report. The 90 tests completed were all negative.

Surveillance activities

National TSE 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 TSEs. Information about the NTSESP is available on the internet (at www.animalhealthaustralia.com.au/aahc/programs/adsp/tsefap/ntsesp.cfm).

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

Table 6 TSE surveillance

	Apr–Jun 2005		Jul–Sep 2005		Oct–Dec 2005		Jan–Mar 2006		Apr–Jun 2006	
State	Ovine	Bovine	Ovine	Bovine	Ovine	Bovine	Ovine	Bovine	Ovine	Bovine
NSW	30	26	36	33	27	25	19	18	14	12
NT	0	15	0	6	0	5	0	0	0	10
QLD	7	34	6	54	1	37	1	33	7	44
SA	18	6	10	4	7	4	4	3	4	5
TAS	0	3	1	3	0	0	1	2	1	2
VIC	35	31	58	40	52	78	12	20	37	24
WA	17	8	9	9	67	11	14	11	23	6
AUS	107	123	120	149	154	160	51	87	86	103

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, a total of 204 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
Apr–Jun 2005	253	0	1748	0
Jul–Sep 2005	343	0	1430	0
Oct–Dec 2005	201	0	1038	0
Jan–Mar 2006	274	0	2215	0
Apr–Jun 2006				
NSW	12	0	160	0
NT	0	0	465	0
QLD	82	0	455	0
SA	9	0	3	0
TAS	16	0	2	0
VIC	2	0	196	0
WA	83	0	421	0
AUS	204	0	1702	0

Salmonella surveillance

The National Enteric Pathogen Surveillance Scheme (NEPSS) is operated and maintained on behalf of the Commonwealth and States/Territories by the Microbiological Diagnostic Unit at the University of Melbourne. Data on isolates of salmonellae 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 8 summarises *Salmonella* isolations from animals notified to NEPSS for the quarter.

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

Table 8 *Salmonella* notifications, 1 April to 30 June 2006

	Avian	Bovine	Canine	Caprine	Equine	Feline	Ovine	Porcine	Other	Total
S. Bovismorbificans	0	21	0	0	1	0	1	0	0	23
S. Dublin	0	31	0	1	0	0	0	0	0	32
S. Infantis	1	2	2	0	0	0	0	0	0	5
S. Typhimurium	14	106	6	0	3	3	8	1	1	142
Other	5	59	6	0	1	0	2	16	11	100
Total	20	219	14	1	5	3	11	17	12	302

Tuberculosis

Australia was declared free from bovine tuberculosis (TB) on 31 December 1997, exceeding the 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. Table 9 summarises results from the program.

Table 9 Results of the National Granuloma Submission Program

	Apr–Jun 2005	Jul–Sep 2005	Oct–Dec 2005	Jan–Mar 2006	Apr–Jun 2006
Submitted	760	540	488	362	371
TB +ve	0	0	0	0	0

Northern Australian 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. Table 10 summarises NAQS activity in Australia over the past five quarters.

Contact: Jane Parlett, Australian Quarantine and Inspection Service, DAFF

Table 10 Summary of recent NAQS activity in Australia

	Apr–Jun 2005		Jul–Sep 2005		Oct–Dec 2005		Jan–Mar 2006		Apr–Jun 2006	
Category	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve
Aujeszky's disease	72	0	65	0	13	0	19	0	16	0
Avian influenza — highly pathogenic	186	0	58	0	0	0	15	0	0	0
Classical swine fever	72	0	65	0	13	0	19	0	16	0
Japanese encephalitis[a]	54	0	0	0	89	0	79	1	193	0
Surra — *Trypanosoma evansi*	77	0	79	0	84	0	10	0	138	0

a The positive result for Japanese encephalitis in Jan–Mar 2006 occurred on a Torres Strait island. In 1995–97, animals at sentinel sites on islands in the Torres Strait, but not the Australian mainland, seroconverted to Japanese encephalitis (JE) during the latter part of the wet season (March–April). In March 1998, seroconversions occurred at a number of sites on islands in the Torres Strait, and for the first time on the mainland at the tip of Cape York Peninsula. Since 1999, sentinel pigs at Badu Island have seroconverted each wet season, and seroconversions have been detected on other central Torres Strait islands in surveys. In early 2004, sentinel pigs in the northern peninsula area on the mainland seroconverted, and JE virus was isolated. This was the first detection of JE on the mainland since 1998. Subsequently, feral pigs from south of Mapoon showed a pattern of serology consistent with exposure to JE virus, but the time of exposure is undetermined. The sentinel pigs in the northern peninsula area did not seroconvert in early 2005, and there has been no evidence of transmission of JE virus on the mainland in 2005. It remains unclear whether JE is established in central Torres Strait islands or is reintroduced from the island of New Guinea in monsoonal weather.

Ports Surveillance Program

Biosecurity Australia conducts the Ports Surveillance Program for *Culicoides*, screw-worm fly, exotic bees and bee mites. 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 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 11 shows the number of times that insect trap sites were inspected for the Ports Surveillance Program; no exotic insects or mites were detected.

Contact: Leigh Nind and Howe Heng, Biosecurity Australia, DAFF

Table 11 Ports Surveillance Program: number of inspections of insect traps

		Apr–Jun 2005	Jul–Sep 2005	Oct–Dec 2005	Jan–Mar 2006	Apr–Jun 2006
Ports	Asian bees	21	14	12	7	7
	Varroa mites	30	21	22	28	34
	Asian mites	30	21	22	28	34
	Tracheal mites	28	19	22	22	33
	Culicoides sp.	29	27	28	27	30
	Screw-worm fly	29	29	24	22	24
NAQS	Screw-worm fly	90	45	45	45	45

Suspect exotic or emergency disease investigations

There were 43 investigations of diseases suspected to be either exotic or a possible emergency reported during the quarter, as shown in Table 12. More details about some of these investigations can be found in the State and Territory reports.

Table 12 Exotic or emergency disease investigations reported, 1 April to 30 June 2006

Disease	Species	State	Month	Response	Finding
Australian bat lyssavirus	Bat	TAS	Apr	3	negative
Avian influenza – highly pathogenic	Avian	NSW	Apr	2	supected poisoning
	Avian	NSW	Apr	2	suspected botulism
	Avian	NSW	Apr	2	fowl cholera, chlamydophilosis
	Avian	NSW	Apr	2	negative (2 unrelated investigations)
	Avian	NSW	May	3	vitamin A deficiency
	Avian	NSW	May	3	respiratory disease complex
	Avian	NSW	Jun	2	negative
	Avian	NT	Jun	2	Marek's disease
	Avian	NT	Jun	2	necrotising pharyngitis
	Avian	NT	Jun	3	negative
	Avian	QLD	Apr	2	diazinon poisoning
	Avian	QLD	Apr	2	suspected botulism
	Avian	QLD	Apr	2	yolk sac peritonitis
	Avian	QLD	Apr	3	negative
	Avian	QLD	Apr	3	fowl cholera
	Avian	SA	Apr	3	negative
	Avian	TAS	Apr	2	negative
	Avian	TAS	Apr	3	negative (3 unrelated investigations)
	Avian	TAS	May	2	negative (3 unrelated investigations)
	Avian	TAS	May	3	negative (2 unrelated investigations)
	Avian	VIC	Jun	2	negative
	Avian	WA	May	3	negative (2 unrelated investigations)
	Avian	WA	Jun	3	negative (2 unrelated investigations)
Bovine brucellosis (*B. abortus*)	Bovine	TAS	May	2	negative
	Bovine	TAS	Jun	2	negative (2 unrelated investigations)
Classical swine fever	Porcine	NSW	May	2	trauma
Foot-and-mouth disease	Bovine	VIC	May	2	bovine malignant catarrh
Hendra virus	Bat	NT	Apr	3	negative
	Bat	WA	Jun	3	positive
	Equine	QLD	Jun	3	Hendra virus
Newcastle disease - virulent	Avian	TAS	Apr	3	negative (3 unrelated investigations)

Key to response codes
2: Investigation by State or Territory government veterinary laboratory
3: Specimens sent to the Australian Animal Health Laboratory (or CSIRO Division of Entomology)

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 each quarter (see Table 13).

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

Table 13 Notifications of zoonotic disease in humans

	Q2 2005	Q3 2005	Q4 2005	Q1 2006	Q2 2006	Current quarter (April–June 2006)							
	AUS					ACT	NSW	NT	QLD	SA	TAS	VIC	WA	AUS
Brucellosis	2	7	14	8	6	0	0	0	5	0	0	1	0	6
Chlamydophilosis	53	41	39	24	38	1	20	0	1	0	0	15	1	38
Leptospirosis	39	24	30	24	66	0	8	1	57	0	0	0	0	66
Listeriosis	12	11	17	12	8	0	5	0	0	0	0	2	1	8
Q fever	124	81	79	57	86	1	38	3	35	5	0	4	0	86

Australian Milk Residue Analysis Survey

The Australian Milk Residue Analysis (AMRA) Survey provides a national, independent monitoring system for residues of agricultural and veterinary chemicals and environmental contaminants in raw cow's milk. The survey underpins the export requirements of the Australian Quarantine and Inspection Service for dairy products, and facilitates access to major export markets through demonstrating compliance with both European Union and other importing countries' requirements. It is coordinated by Dairy Food Safety Victoria on behalf of the Australian New Zealand Dairy Authorities' Committee for the Australian dairy industry. The AMRA Survey is risk based, designed to identify, monitor and manage potential chemical inputs into Australian dairy production that may affect dairy food safety. The survey makes an overall assessment of the effectiveness of the range of controls in place to deliver food safety outcomes with respect to chemicals used in dairy production, as well as focusing on particular chemicals that may pose a higher risk of residues in milk. The risk profile of potential contaminants is reviewed annually. Table 14 is a summary of the results for the 2005–2006 year. Over this period, 960 milk samples were collected and 13 080 analyses were conducted. Only one residue was detected at a level above the maximum residue limit (MRL) specified in the Food Standards Australia New Zealand Food Standards Code. The residue detected was cloxacillin, which is an antimicrobial. A thorough trace-back investigation was unable to determine the source of this residue.

Table 14 Australian milk residue analysis (each pair of figures gives the number of samples above the maximum residue limit and the number of samples tested)

	NSW		NT		QLD		SA		TAS		VIC		WA		Total	
Aflatoxin M1	0	5	0	0	0	19	0	0	0	0	0	5	0	0	0	29
Antimicrobials	0	38	0	0	0	21	0	21	0	18	1	190	0	12	1	300
Arsenic	0	4	0	0	0	2	0	2	0	2	0	19	0	1	0	30
Benzimidazoles	0	10	0	0	0	6	0	6	0	5	0	40	0	3	0	70
Cadmium	0	4	0	0	0	2	0	2	0	2	0	19	0	1	0	30
Lead	0	4	0	0	0	2	0	2	0	2	0	19	0	1	0	30
Levamisole	0	2	0	0	0	2	0	2	0	1	0	13	0	0	0	20
Macrocyclic lactones	0	27	0	0	0	15	0	15	0	13	0	132	0	8	0	210
Mercury	0	4	0	0	0	2	0	2	0	2	0	19	0	1	0	30
Organochlorines	0	4	0	0	0	2	0	2	0	2	0	19	0	1	0	30
Organophosphates	0	29	0	0	0	15	0	14	0	14	0	140	0	8	0	220
Synthetic pyrethroids	0	29	0	0	0	15	0	14	0	14	0	140	0	8	0	220
Triclabendazole	0	0	0	0	0	0	0	0	0	10	0	40	0	0	0	50

National Residue Survey

There were 2812 samples collected and analysed in the National Residue Survey Random Monitoring Program for the quarter (Table 15). One sample was found with residues above the relevant standard in the Australian Food Standards Code. This sample of sheep liver had a cadmium level above the Australian maximum level (ML) and above the residue action level; a traceback investigation was requested. Cadmium residues above the ML are a common finding in older sheep across southern Australia.

Table 15 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	68	0	0	0	86	0	13	0	4	0	21	0	8	0	200
	other	0	17	0	0	0	25	0	13	0	0	0	7	0	5	0	67
	pigs	0	12	0	0	0	10	0	7	0	1	0	9	0	5	0	44
	sheep	0	50	0	0	0	2	0	16	0	2	0	23	0	19	0	112
	Total	0	147	0	0	0	123	0	49	0	7	0	60	0	37	0	423
Antimicrobials	cattle	0	81	0	2	0	105	0	12	0	7	0	40	0	10	0	257
	other	0	14	0	0	0	14	0	6	0	0	0	7	0	2	0	43
	pigs	0	54	0	0	0	28	0	17	0	3	0	39	0	16	0	157
	poultry	0	62	0	0	0	24	0	16	0	8	0	40	0	14	0	164
	sheep	0	79	0	0	0	13	0	18	0	2	0	42	0	33	0	187
	Total	0	290	0	2	0	184	0	69	0	20	0	168	0	75	0	808
Growth promotants	cattle	0	68	0	2	0	83	0	15	0	11	0	19	0	12	0	210
	other	0	7	0	0	0	11	0	4	0	0	0	4	0	0	0	26
	pigs	0	20	0	0	0	15	0	18	0	0	0	20	0	8	0	81
	poultry	0	3	0	0	0	2	0	2	0	1	0	2	0	1	0	11
	sheep	0	50	0	0	0	11	0	20	0	0	0	18	0	24	0	123
	Total	0	148	0	2	0	122	0	59	0	12	0	63	0	45	0	451
Insecticides	cattle	0	86	0	1	0	130	0	18	0	5	0	52	0	12	0	304
	other	0	47	0	0	0	57	0	17	0	0	0	11	0	5	0	137
	pigs	0	11	0	0	0	8	0	8	0	0	0	10	0	9	0	46
	sheep	0	73	0	0	0	14	0	22	0	3	0	25	0	25	0	162
	Total	0	217	0	1	0	209	0	65	0	8	0	98	0	51	0	649
Metals	cattle	0	13	0	1	0	32	0	2	0	2	0	8	0	5	0	63
	other	0	18	0	0	0	28	0	8	0	0	0	5	0	5	0	64
	pigs	0	8	0	0	0	5	0	5	0	0	0	9	0	1	0	28
	sheep	0	17	0	0	0	1	0	9	0	0	0	15	1	6	1	48
	Total	0	56	0	1	0	66	0	24	0	2	0	37	1	17	1	203
Miscellaneous	cattle	0	50	0	0	0	59	0	8	0	7	0	16	0	6	0	146
	other	0	1	0	0	0	2	0	2	0	0	0	1	0	0	0	6
	pigs	0	17	0	0	0	14	0	10	0	1	0	13	0	6	0	61
	sheep	0	24	0	0	0	3	0	6	0	0	0	20	0	12	0	65
	Total	0	92	0	0	0	78	0	26	0	8	0	50	0	24	0	278
Total		0	950	0	6	0	782	0	292	0	57	0	476	1	249	1	2812

NAHIS CONTACTS

The National Animal Health Information System (NAHIS) collects summaries of animal health information from many sources. NAHIS is on the internet (at www.animalhealthaustralia.com.au/status/nahis.cfm). Because NAHIS does not duplicate the data in the other systems, the relevant person below should be contacted if further details are required.

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DISEASE WATCH HOTLINE — 1800 675 888

The 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 Disease Watch Hotline, contact Scott Porteous, Animal Health Australia

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