ANIMAL HEALTH SURVEILLANCE

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PREFACE

The importance of surveillance for the prevention and control of emergency animal diseases cannot be overstated. Timely detection of disease events through targeted surveillance is critical for the control of any emergency disease incursion. Surveillance to demonstrate the absence of disease is also essential in underpinning Australia's export trade in agricultural produce.

In this issue of *Animal Health Surveillance Quarterly*, a significant emphasis is placed on the role of active surveillance programs in Australia's overall strategy to prevent and respond to incursions of emergency animal diseases. Activities range from the National Sentinel Hive Program for detection of parasites of honeybees, through enhanced surveillance efforts to detect avian influenza in wild birds by both the Australian Wildlife Health Network and the Northern Australia Quarantine Strategy, to a review of surveillance needs in the aquaculture industries. The planned changes to the management of the surveillance program for bovine tuberculosis are also reported. These reports on a range of Australia's active surveillance programs are timely because of their relevance to the National Animal Health Surveillance Strategy that is currently under development.

Other topics include 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. *Animal Health Surveillance Quarterly* is also available on the Animal Health Australia website (http://www.animalhealthaustralia.com.au/status/nahis.cfm).

Bob Biddle, Acting Australian Chief Veterinary Officer

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National Sentinel Hive Program — the varroa menace

The National Sentinel Hive Program (NSHP) was established in 2000 to enhance post-border monitoring at key locations around Australia for exotic pests of honeybees, notably varroa mite (*Varroa destructor*). The late Dr David Banks (Australian Government Department of Agriculture, Fisheries and Forestry; DAFF), in collaboration with Mr Trevor Weatherhead (former Quarantine Liaison Officer with the Australian Honeybee Industry Council), provided the inspiration for the establishment of the NSHP. The program was implemented nationally through the expertise of State apiary officers and cooperating beekeepers around the country. Its aim is to enable early detection, and hence successful eradication, of incursions by exotic honeybee pests of concern (varroa mite, tropilaelaps mite, tracheal mite and Asian honeybee).

Within a few months of establishment of the program, varroa mite was detected in New Zealand, in beehives located near the port of Auckland. This highlighted the ability of honeybee pests to 'hitch-hike' across international borders via movement of feral honeybees on cargo-laden transport ships. The impact of varroa mite on the beekeeping industry in New Zealand has been significant; however, a far greater impact has occurred on the pastoral industries through a reduction in the number of honeybees pollinating pasture plants, and the subsequent adverse effects on pasture productivity due to decreases in seed production and pasture-based nitrogen fixation in soils. Similar impacts would be expected in Australian pastoral industries and plant industry sectors in which productivity is highly dependent on effective pollination by honeybees.

The NSHP operates in seven Australian jurisdictions and at 27 seaports that annually receive a significant volume of imported cargo and/or regular berthing of vessels from international locations where exotic pests of honeybees are known to occur. Under the supervision of state apiary officers, sampling of sentinel hives occurs at least quarterly at each location. Sampling involves placing acaricidal strips in hives for 1–2 days, and placing adhesive entomological paper in the bottom of each hive to 'catch' any mites that are present. The entomological paper is removed after 48 hours, rolled and submitted to diagnostic laboratories, where it is examined for the presence of exotic bee mites. DAFF maintains minor use permits (issued by the Australian Pesticides and Veterinary Medicines Authority) for acaricidal products that are not yet registered for use in Australia. In addition to sampling for mites, in northern ports the NSHP deploys log traps that are baited with pheromones attractive to the Asian honeybee (*Apis cerana*). All monitoring results are collated and entered quarterly into the National Animal Health Information System (NAHIS; see Table 11).

In conjunction with surveillance activities conducted in commercial apiaries in each jurisdiction, NSHP monitoring continues to confirm Australia's freedom from varroa mite. In 2005, DAFF conducted a review of the NSHP and made a number of recommendations about the program's ongoing operation. With varroa mite now established throughout New Zealand, the potential for an incursion in Australia has increased. Representatives from all jurisdictions and relevant industry sectors will attend a workshop in Canberra on 24 November 2006, at which progress on implementation of the DAFF recommendations will be assessed. Further options will also be considered to improve the effectiveness of the NSHP as an early detection mechanism for exotic pests of honeybees, especially varroa mite.

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

Bovine tuberculosis surveillance

The Tuberculosis Freedom Assurance Program Part 2 (TFAP2, 2003–2006) will be successfully completed by the end of 2006. The last tuberculosis (TB) case (outbreak) was detected in January 2002 in a buffalo herd and was resolved that year.

A further four years of surveillance for disease freedom will take place before TB is considered for categorisation under the Emergency Animal Disease Response Agreement. Australia met the standard for a TB-free country set by the World Organisation for Animal Health (OIE, formerly Office International des Epizooties) in 1997.

Animal Health Australia will manage a project that reports on TB surveillance activities for the next four years. The central activity of this surveillance will be standard meat inspection at abattoirs, primarily for cattle over 2 years of age. Australian Quarantine and Inspection Service inspectors in export abattoirs will follow the principle of 'inspector discretion' to submit granulomatous lesions that are of uncertain etiology. The yardstick for submissions is one lesion per 5000 head slaughtered over 2 years of age. Since Australia slaughters about 8 million head per year and approximately half of these are over 2 years of age, this will result in about 800 lesions per year submitted to jurisdictions' laboratories. The results will be included in the National Animal Health Information System (NAHIS) database and will be reported in the standard Animal Health Australia reporting outputs generated through NAHIS.

Other aspects of TB surveillance will relate to domestic slaughter activities; slaughter of deer, buffalo and camels; TB testing of live exports; and testing of miscellaneous granulomas submitted after field post mortem examination for various reasons.

In the event of detection of a TB case, Animal Health Committee will endorse and monitor the response of the jurisdiction. Eradication activities will be guided by a TB Case Response Manual, which draws on past experience with TB eradication. A Property Program Group with cattle industry representation will assist with developing an Approved Property Program for eradication. Funding for reimbursement of livestock acquisition for disease control will be provided by the cattle industry, through the Cattle Disease Contingency Fund.

The Animal Health Australia website provides details of TFAP2[1] and a fact sheet on bovine tuberculosis.[2]

Contributed by: Kevin de Witte, TFAP2 Manager, Animal Health Australia

1. http://www.animalhealthaustralia.com.au/programs/adsp/tfap2/tfap2_home.cfm

2. http://www.animalhealthaustralia.com.au/programs/adsp/nahis/nahis_home.cfm

Management of Newcastle disease risk

Outbreaks of virulent Newcastle disease (ND) occurred in New South Wales in 1999–2002 and in Victoria in 2002. These outbreaks were due to an Australian virus that had undergone a change of virulence, rather than to a virus originating from overseas. The outbreaks in 2002 were managed under the framework of the Emergency Animal Disease Response Agreement. Following the incidents, the National Management Group asked Animal Health Australia to manage the development and implementation of a National ND Management Plan. The plan, which was endorsed by the Primary Industries Standing Committee and the National Management Group in 2003, is managed with the assistance of a steering committee that represents both industry and government.

The plan's goals are:

- to minimise the risk of ND outbreaks from virulent viruses of Australian origin
- to protect the status of non-infected flocks and regions

- to reduce the risk of negative social, economic and trade effects of ND at the farm, regional and national levels.

The components of the plan are:

- application of industry biosecurity plans, use of 'live' V4 and inactivated vaccines, and other measures to reduce the spread of precursor viruses
- nationally coordinated surveillance
- communication and awareness to promote adoption (especially early adoption) of agreed risk-management processes
- research and development
- management and evaluation of the plan's effectiveness and progress.

The plan aims (and needs for its success) to engage a broad range of stakeholders, including poultry farmers and processors, poultry organisations, governments, avian societies and ratite industries.

An independent review recently commissioned by the steering committee has found a high level of compliance with elements of the plan, as well as areas requiring enhancement or modification.

All jurisdictions now require vaccination of poultry according to agreed protocols. The level of compliance with this requirement appears to be high, although opinions differ about the best way to measure effectiveness of vaccination protocols. Despite the use of identical protocols, the review reported variable serological outcomes in different sectors of the industry. The reasons for this have not been identified and clearly will require investigation.

The review concluded that knowledge about the presence or absence of precursor viruses is currently lacking. The steering committee has recommended that the vaccination program should remain in place until surveillance demonstrates that the level of precursor virus present is too low to lead to an incident.

Contributed by: Ian Denney, Manager Veterinary Services, Animal Health Australia

Northern Australia Quarantine Strategy

The Northern Australia Quarantine Strategy (NAQS) is a national program within the Australian Quarantine and Inspection Service. Established in 1989 following an independent review of Australia's quarantine defence systems, it recognises the relatively high risk of new pests and diseases entering Australia via the northern coastline. Low population density, neighbouring countries with varying disease status, illegal vessel landings, monsoonal winds and feral animals all contribute to the risk. Factor in the operating environments in which NAQS activities are delivered — remote, inaccessible and potentially dangerous terrain, among communities reflecting a diverse range of language groups, cultures and nationalities — and the picture becomes even more complex.

The NAQS program combines all three tiers of the Australian Government's quarantine activities — pre-border, border and post-border — intended to reduce the risk of introduction of targeted exotic pests, weeds and diseases. NAQS achieves this through a combination of border activities within the Torres Strait, scientific surveys and monitoring to facilitate early detection of targeted animal and plant pests and diseases, and public awareness activities.

Monitoring activities include insect traps for exotic fruit flies, screw-worm fly and *Culicoides* species; and sentinel animal herds for bluetongue virus, Japanese encephalitis and surra. Exotic pest and disease surveillance activities include surveys of plants, domestic animals and feral animals; and monitoring for arboviruses under the National Arbovirus Monitoring Program. Animal surveillance and monitoring results are submitted to the National Animal Health Information System.

Additional funding has recently allowed increased surveillance for avian influenza. NAQS has increased its sampling activities of migratory shorebirds and waterbirds in the north of Australia. To date, more than 2700 samples have been collected for serological testing at the Australian Animal Health Laboratory (AAHL). It appears that migratory waders are infected at a low rate with low-pathogenic

avian influenza viruses, but no antibodies to highly pathogenic avian influenza (HPAI) have been detected. NAQS also submits virological samples for polymerase chain reaction (PCR) analysis. No influenza virus has been detected in either migratory shorebirds or waterbirds in Northern Australia. The importance of migratory waterbirds, such as magpie geese, has been examined in collaboration with AAHL; preliminary results indicate that these birds are susceptible to HPAI and provide a suitable host for the agent.

NAQS also collaborates regularly in animal and plant surveys and quarantine capacity-building projects with Australia's neighbours: Indonesia, East Timor and Papua New Guinea (PNG). Two externally funded projects have recently been established and are being progressed:

- *Enhanced Avian Influenza Surveillance and Reporting Project in PNG*. Because PNG is currently free from HPAI, the importance of early detection and reporting in the country is critical. This project involves working with PNG quarantine and health authorities to assist in early detection and reporting of emerging animal and human diseases via awareness training, use of rapid antigen kits and the strategic placement of communication systems at identified sites.
- *Indonesian Quarantine Strengthening Project*. This 2-year project is funded by AusAID and aims to strengthen the Indonesian quarantine system, particularly with regard to avian influenza.

Further information about the NAQS program can be obtained from the Manager, Ms Jane Parlett (telephone 02 6272 3494).

Contributed by: James Wallner, Northern Australia Quarantine Strategy, Australian Quarantine and Inspection Service

The Emergency Animal Disease Response Agreement — a remarkable document

The Emergency Animal Disease Response Agreement (EADRA) is an innovative agreement between all Australian governments and the major livestock industries. When it was signed in May 2002, the Deed of Agreement established a new partnership that committed signatories to a range of measures designed to better protect Australia's livestock industries and the community from the harmful effects of emergency animal diseases.

An emergency animal disease (EAD) is a disease that meets one or more of the following criteria:

- a known disease that does not occur in Australia
- a variant form of an endemic disease that, if established in Australia, would have a national impact
- a serious infectious disease of unknown cause, which might be an entirely new disease
- a known endemic disease, occurring in such a severe outbreak form that an emergency response is required.

The agreement combines several complementary approaches to combat emergency diseases:

- **Participation and cooperation**. This provides effective response action across State borders and gives each participating industry a real voice in the decision-making process.
- **Risk management**. All parties are required to take all reasonable steps to minimise the level of risk.
- **Detection and response**. Each party is committed to maintaining capability to ensure early detection and mount an effective response.
- **Cost sharing**. All signatories will contribute to funding the costs of an EAD response for a listed disease; any party that does not participate does not pay, and the maximum contributions will be capped.
- **Training**. Training is an essential part of EAD preparedness, and all parties are committed to training for response activities under the agreement.

In summary, the main focus of the agreement is preparedness of all signatories to prevent the incursion of EADs and ensure a rapid response should one occur. Detailed arrangements are set out in various schedules to the deed. Both the deed and the schedules can be viewed on the Animal Health Australia website.[3]

3. http://www.animalhealthaustralia.com.au/programs/eadp/eadra.cfm

The EADRA has been tested in a number of large-scale simulated EAD exercises and several actual EAD outbreaks. It is a 'dynamic' document that is subject to annual review, in which all signatories participate. Under the terms of the deed, a detailed and comprehensive review of the EADRA will be undertaken every 5 years; the first 5-year review is due to commence in early 2007.

Contributed by: Mike Bond, Director, Programs, Animal Health Australia

Botulism — cause for concern?

Significance

Botulism is recognised worldwide as a significant and often fatal neurological disease of cattle and other species. Sporadic cases have been seen in cattle and birds in Australia in recent times. An important question is whether the epidemiology of botulism is changing or whether the awareness of botulism by the animal health community is improving. Botulism can be difficult to confirm as the cause of affliction. This article discusses some features of the disease in Australia.

Cause

Clostridium botulinum, the bacterium that causes botulism, belongs to the genus that causes some other well-known livestock diseases, including tetanus, malignant oedema, enterotoxaemia, black leg and black disease. This bacterium is a spore-forming anaerobe that thrives in decaying plant or animal material where oxygen availability is low. It produces a toxin that causes loss of function and paralysis in animals; the most common route for poisoning is by ingestion of toxin in feed or water. Once absorbed into the animal's blood supply, the toxin acts by competitively binding to nerve endings and blocking the presynaptic release of the neurotransmitter acetylcholine.

Toxin

Seven strains of *C. botulinum* have been recognised on the basis of differences between their neurotoxin antigens (A, B, C, D, E, F and G). Between strains, the level of cross reactivity of antibody responses, and cross protection through vaccination, is generally low.

All warm-blooded species are susceptible to the toxin. Species susceptibility to toxin varies: cattle are relatively susceptible and birds are relatively resistant. Strains C and D are the most important for cattle, and strain C is the most important for birds in Australia. Type B intoxication of cattle and horses has also been recognised. However, horses are not commonly affected; the last major outbreak in horses was in 1994, associated with a yearling sale.

Specific conditions of temperature and moisture are required for bacterial and toxin production; the optimum temperature for types C and D is 23°C. The production of toxin requires the inclusion within the botulism bacterium of a bacteriophage. For unknown reasons, the bacteriophage is not always present. The toxin is degraded by temperatures that are possible in the environment; it is rapidly degraded at 37°C and above.

Clinical picture

Classical botulism is an ascending, flaccid, motor paralysis that is usually fatal. However, the occurrence of sublethal botulism in cattle has been confirmed during commercial trials of botulism vaccine efficacy, when cattle were closely observed following a measured toxin challenge. Sheep can also be affected by a sublethal syndrome.

Signs depend on the dose and the immune status of the animal. Often, a noticeable early sign is the inability to swallow food and water (dysphagia), and

there may be general loss of tongue, anal, tail and eyelid tone. Hind leg incoordination and general weakness can progress to full paralysis. Death can be due to paralysis of respiratory muscles or exposure and dehydration. This clinical picture can also be attributed to many other diseases.

The 'limberneck' stage of paralysis is indicative of botulism in birds.

Epidemiology

Due to their capacity to form resistant spores, botulism organisms are assumed to be widespread in the environment, particularly in soil and rotting plant material. The organism is also part of the normal bacterial fauna in the gut of healthy animals; for example, type C and D organisms can be cultured from the faeces of about 20% of cattle.

Specific event chains leading to botulism that have been recognised in Australia include:

- Northern Australian cattle (types C and D): Diets deficient in phosphorus or protein can lead to pica, resulting in nonimmune (unvaccinated) cattle consuming carcases in which toxin proliferation has occurred.
- Birds (type C): Birds feeding on flyblown carcases can consume maggots that have accumulated toxin from the carcase. Birds might also consume stagnant water with rotting vegetation.
- Feedlot and prepared feed industries (types B, C and D): Accidental inclusion of a small animal carcase in feed can lead to botulism. Australia has banned the inclusion of poultry litter in feed since 1991.
- Type B 'Shaker Foal' Syndrome, probably due to wound infection.
- Dead animal in water supply.

A 'toxico-infectious' form of botulism poisoning, involving toxin production from the gut of affected cattle and horses, has been suspected. This type of illness also occurs in human infants. Wound infection by *C. botulinum* can lead to toxin production and botulism in horses and humans.

Increased awareness of avian influenza has led to a greater rate of submission of sick and dead birds, many of which are affected by botulism type C.

South Australia has reported an increase in botulism cases in a rangeland area because of a declining phosphorus status of grazing land, leading to pica and toxin ingestion by unvaccinated cattle. A survey conducted by the Northern Territory in the early 1990s demonstrated that the distribution of strains C and D was widespread but mortalities apparently varied, despite poor to absent vaccination practices.

A recent outbreak of botulism type B in dairy cattle has been the first reported Australian case of type B in cattle. Two major mortality incidents occurred on the property over 3 years. After the first outbreak in 2004, all animals were vaccinated against types C and D. Vaccine efficacy was confirmed by high antibody levels on serological testing. Despite this, a second outbreak occurred in May 2006. Clinical symptoms, which were characteristic of botulism types C and D, included recumbency, anorexia, dullness and dehydration due to diarrhoea. The morbidity rate was 60% and the mortality rate 38%. Type B was confirmed using mouse inoculation tests. Type B differs from types C and D in that it is usually found in decaying vegetable matter (in this case, contamination of lucerne silage by irrigation from a channel containing rotting vegetation) rather than animal matter.

Diagnosis

Diagnosis of botulism is primarily clinical, with exclusion of other possible differential diagnoses.

In all species, a post mortem examination to exclude other causes of mortality is a useful first step. Evidence of digestive stasis and pica, including ingestion of maggot pupae, supports the diagnosis of botulism. There is no characteristic histopathology.

The definitive test is the mouse neutralisation test, in which naive and type-specific immunised mice are challenged with suspect sera from a case. This test is rarely useful in cattle because of the very low concentrations of toxin necessary to affect cattle. The test works better with avian cases.

The botulism antibody enzyme-linked immunosorbent assay (ELISA) is useful for assessing exposure or immune status at the herd level. The botulism C and D antigen ELISA can be performed on gut contents and sera from affected animals, as well as suspect feed samples. A positive result is confirmation of the presence of toxin. The test has good specificity but variable sensitivity,

because the amount of toxin present in feed or affected animals is often minute. Use in carcases more than 24 hours after death may give false positive results due to post mortem proliferation of toxin.

Prevention

Several effective cattle vaccines for types C and D are commonly used in Northern Australia. Natural exposure does not lead to effective immunity in cattle. Pica prevention strategies for range-grazing cattle are generally not effective. Exclusion of risky materials and pest animals from feed and water sources is effective for the feedlot industry.

Conclusion

C. botulinum is widespread worldwide, including in Australia, and the potential for disease exists wherever there are susceptible animals and other necessary factors. The epidemiology of botulism is only partly understood. The risk has probably declined as a result of the use of vaccines against types C and D in livestock and restrictions on the use of poultry litter in feed formulations. Further advances in diagnosis will facilitate recognition, particularly of the sublethal syndrome.

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Contributed by: Kevin de Witte, Veterinary Services, Animal Health Australia

Online *Veterinary Laboratory Manual*

New South Wales Department of Primary Industries (NSW DPI) has recently published a web-based version of its *Veterinary Laboratory Manual*. The manual originated as a printed book in 1945 and has since been published under various titles. The books were distributed to all veterinarians who submitted specimens to the NSW Veterinary Laboratories, and to Sydney University veterinary science students in their final year of study. The last printed edition (the eighth edition) was published in 1995 as the *Laboratory Specimen Submission Manual* after extensive editing by Graeme Eamens.

The web-based *Veterinary Laboratory Manual* is the result of a review of the eighth edition, but maintains a similar structure. It provides up-to-date information to submitters about selecting suitable specimens for many diseases seen in New South Wales, packing and transporting specimens, specimen submission forms, available tests, laboratory charges and NSW DPI disease surveillance programs. While the target audience for the manual is submitters to the NSW DPI Veterinary Laboratories, the manual will also be useful for veterinary students. The web-based version is available to the public, and a PDF version can be downloaded and printed for use away from the computer.

Updating the format for web delivery has provided a number of advantages:

- The use of hot links provides instant linkage to related sites (e.g. to external websites and information about diseases).
- It is much easier to keep the manual current.
- The format is easy to navigate.

A useful feature of the web-based manual is the search box. Full text indexing of the pages in the

manual means that a search for ‘anthrax’, for example, will yield links not just to the section on that disease in the ‘Diseases of Livestock’ section but also to occurrences in the ‘Bacteriology’ and ‘Specimen Packaging’ sections. These pages are easily accessed from the search results with a single mouse click.

The manual can be viewed at the NSW DPI website at http://www.dpi.nsw.gov.au/agriculture/vetmanual or simply by searching for ‘vet lab manual’ in Google. It is intended that a CD version will ultimately be available. The manual is no longer available as a hardcopy book.

NSW DPI has already received very favourable feedback from users regarding the concept and the usability of the manual. Additional feedback may be emailed to graeme.fraser@dpi.nsw.gov.au.

Contributed by: Graeme Fraser, Regional Veterinary Laboratory — Wollongbar, NSW Department of Primary Industries

Eleventh International Symposium of Veterinary Epidemiology and Economics

From 7 to 11 August 2006, Australia hosted the Eleventh International Symposium of Veterinary Epidemiology and Economics at the Cairns Convention Centre. The theme was ‘Innovation: Reshaping Veterinary Epidemiology’. Acclaimed by many of the 700 delegates from more than 50 countries as one of the best international veterinary conferences ever held, the symposium included 500 oral presentations and more than 300 posters, on topics including aquatic epidemiology, food safety and emerging diseases. The symposium was opened by Dr Gardner Murray, the former Australian Chief Veterinary Officer. Several social functions allowed the delegates to relax and to network with other delegates throughout the week. A number of 3-day pre- and post-conference workshops provided training in new developments in epidemiology.

The symposium, held once every 3 years, brings together internationally renowned epidemiologists, public health officials, veterinarians, university students and many others to discuss significant global issues affecting animals, aquatic species and humans. This year’s symposium was broken into seven streams. Some of the highlights of the well-organised scientific program were the topics of avian influenza, foot-and-mouth disease, advances in epidemiological tools, and surveillance of known and emerging zoonotic diseases.

The Department of Agriculture, Fisheries and Forestry and Biosecurity Australia were joint principal sponsors, and the Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease (AB-CRC) was a major sponsor. The Department of Education, Science and Training supported the symposium with a generous grant, and AusAid and AusVet Animal Health Services sponsored the attendance of a number of experts from developing countries. Several other government departments and universities in Australia and New Zealand also provided sponsorship.

Professor John Edwards, Dean of the School of Veterinary and Biomedical Sciences at Murdoch University, who filled the position of chair of the organising committee after the death of the previous chair (Dr Chris Baldock), was elected as the new Chair of the International Society of Veterinary Epidemiology and Economics. The next symposium will be held in Durban, South Africa, in August 2009.

Contributed by: George Perry, Biosecurity Australia, Australian Government 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 causes of death in wildlife in Australia. The network is interested in receiving such reports. For copies of the network newsletter or digests, contact Rupert Woods at rwoods@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.

Avian influenza surveillance

The Australian Government Department of Agriculture, Fisheries and Forestry continues to promote the surveillance of Australia's wild birds for avian influenza viruses. Since 2004, cloacal swabs and faecal samples have been collected from more than 8200 wild birds. The majority of samples were collected from shorebirds; approximately 40% were from ducks and magpie geese (*Anseranas semipalmata*); and a smaller number were from shearwaters and other species. Sampling has occurred 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*) in New South Wales, H11N9 from sharp-tailed sandpipers (*C. acuminata*) in New South Wales, H3N8 and H4N6 from ducks (*Anas* sp.) in Tasmania, and H13N6 from a 3–4-week-old silver gull (*Larus novaehollandiae*) chick from Tasmania. Avian influenza virus has also been excluded as a cause of the six major wild bird mortalities reported around Australia during the first 9 months of 2006.

The overall objective of the surveillance program is an understanding of influenza viruses in wild birds in Australia, to ensure that Australia's immediate and long-term national and international commitments are met. Short-term objectives of surveillance include:

- continuing surveillance for H5 and H7 subtypes (both high and low pathogenic strains)
- detecting and reporting on virulent avian influenza viruses by investigating significant, unexplained mortality events in wild birds (focusing on H5 and H7 subtypes)
- obtaining data on the occurrence and frequency of avian influenza viruses in sampled wild birds in Australia.

The longer-term, ecological objective is to investigate the genotypes of avian influenza viruses circulating in wild birds in Australia. This will improve understanding of the ecology of influenza viruses in the Australian context, so that better management decisions can be made.

As part of the ongoing management of the program, a meeting was held in Adelaide on 6–7 September 2006 between the Australian Avian Influenza Wild Bird Surveillance Steering Committee (Zoo-based Ancillary Program Group), members of the Australian Government Department of Health and Ageing and the Department of the Environment and Heritage, and selected nongovernment organisations. The purpose of the meeting was to keep people informed about Australia's wild bird avian influenza surveillance program, assist them with planning and discuss the coordination of results. The meeting was hosted by the Department of Primary Industries and Resources, South Australia.

Recommendations from the meeting included:

- development of stronger communications within and between government and nongovernment agencies and organisations
- encouragement of research to address transport issues
- pursuing genotyping of all subtypes as a significant part of understanding the ecology of influenza viruses
- timely transmission of information and its entry into the national database (eWHIS).

Major surveillance activities in wild birds are continuing.

Other key investigations are listed below.

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

Mortalities and morbidities of unknown cause

Over a 2-week period in September 2006, a small cluster of bird deaths (approximately 45) was reported in central Canberra. The birds were mainly Australian ravens (*Corvus coronoides*), feral pigeons (*Columba livia*), and some other species. Infectious diseases, including avian influenza, West Nile virus and Newcastle disease, have been ruled out. Malicious poisoning is suspected, and samples have been submitted for routine pesticide screening.

In late September 2006, 30 black swans (*Cygnus atratus*) were found weak or dead in the Bowen district of Queensland. Tests for infectious diseases, including avian influenza and Newcastle disease, and for botulism (by enzyme-linked immunosorbent assay), were negative. Laboratory investigations of two birds demonstrated renal coccidiosis and heavy intestinal burdens of cestodes.

Human health

In late August 2006, a sick little red flying fox (*Pteropus scapulatus*) from Rockhampton that was undergoing rehabilitation by a wildlife carer tested positive for Australian bat lyssavirus by fluorescent antibody test (Queensland Health Scientific Services Bat Stats).

Seven cases of toxoplasmosis have been reported from wildlife in Tasmania for the quarter. Affected animals included three rufous-bellied pademelons (*Thylogale billardierii*) from Collinsvale, Kingston and Hastings; a brushtail possum (*Trichosurus vulpecula*) from New Norfolk; two common wombats (*Vombatus ursinus*) from Blessington and Franklin; and a Bennett's wallaby (*Macropus rufogriseus*) from Deddington. Diagnosis was based on histology and serology.

Biodiversity/other

Trials are underway in Tasmania to examine the transmission of devil facial tumour disease. Preliminary results support the growing scientific acceptance that the infective agent is a rogue cell line passed between Tasmanian devils (*Sarcophilus harrisi*) by allograft. This has implications for control and suppression of the disease.

In mid-June 2006, there were reports of an unusual number of sick and dying hatchling crocodiles (*Crocodylus porosus*) on four crocodile farms near Darwin (see the Northern Territory report under 'State and Territory reports').

Contributed by: Rupert Woods, Manager, Australian Wildlife Health Network. The network would like to thank all those who submitted information for this report.

Aquatic animal health

'Strengthening aquatic animal health capacity and biosecurity in ASEAN'

During the past year, the Office of the Chief Veterinary Officer (OCVO) within the Australian Government Department of Agriculture, Fisheries and Forestry has been working with the Network of Aquaculture Centres in the Asia Pacific (NACA), AusVet Animal Health Services and the Aquatic Animal Health Research Institute (Department of Fisheries, Thailand) to help deliver a project on aquatic animal health. The project, 'Strengthening aquatic animal health capacity and biosecurity in ASEAN', falls under the Regional Partnership Scheme of AusAid's ASEAN–Australia Development Cooperation Program. It aims to develop harmonised approaches to aquatic animal health management and biosecurity in the countries of ASEAN, and improve the capacity of countries to implement ASEAN strategies for harmonised national aquatic animal health and biosecurity.

The project consists of a series of policy and technical workshops, and technical missions to four ASEAN member countries. In April 2006, representatives from all ten ASEAN countries participated in the first policy workshop, which aimed to:

- analyse the status of aquatic animal health management plans, capacities and institutional arrangements in ASEAN member countries
- identify gaps

- prepare an overall workplan and detailed outputs for the project.

This policy workshop was followed in May 2006 by the first technical workshop, where participants received training in the fundamentals of epidemiology and investigation of disease outbreaks, and an introduction to risk analysis. OCVO provided a resource expert for the technical workshop, and, in July and September 2006, an OCVO representative visited Cambodia, Laos and Burma as part of a small team to conduct the technical missions.

The aim of the technical missions was to support the development and implementation of country-specific activities. Some key outcomes were:

- identification of key national issues in aquatic animal health in each country
- development of a draft national list of diseases
- raised awareness among the participants of how countries can access and use the NACA regional network of laboratories and experts
- development of a draft framework for passive surveillance and reporting, and the development of a project proposal — for submission to local aid agencies in each country — to pilot the passive surveillance framework
- development of a draft framework for contingency planning.

The fourth and final technical mission will be conducted in Vietnam in December 2006. The second technical and policy workshops will be held in early 2007.

AQUAPLAN August 2006 surveillance workshop

AQUAPLAN is Australia's National Strategic Plan for Aquatic Animal Health 2005–2010. It is a broad, comprehensive strategy to build and enhance capacity for managing aquatic animal health in Australia.

Incorporation of surveillance into AQUAPLAN recognises the importance to stakeholders of surveillance for aquatic animal health. AQUAPLAN strategy 1, 'Enhanced integration and scope of aquatic animal health surveillance in Australia', aims to support cost-effective surveillance activities that meet national, state and industry needs.

An aquatic animal health surveillance workshop was held on 11 August 2006 as part of progress toward the objectives of AQUAPLAN strategy 1. The workshop aimed to:

- identify gaps in current aquatic animal health surveillance with regard to needs (present and future)
- reach agreement on national priorities for aquatic animal health surveillance for five key sectors (prawns, edible oysters, pearl oysters, salmon and tuna).

Participants at the workshop included representatives from the Australian Government Department of Agriculture, Fisheries and Forestry; Biosecurity Australia; the Australian Animal Health Laboratory; State and Territory governments; aquaculture and fisheries industry sectors; and the Australian Wildlife Health Network.

The deliberations of workshop participants were assisted by a recent report on aquatic animal health surveillance needs and activities across Australia. The report outlines the current capacity and activities in each jurisdiction and summarises the current and predicted surveillance needs for the five key industry sectors.

A report on the workshop is in preparation.

Contributed by: Sonia Gorgula, Office of the Chief Veterinary Officer, Australian Government Department of Agriculture, Fisheries and Forestry.

State and Territory reports

New South Wales

Contributed by: Rory Arthur, Department of Primary Industries

Foot-and-mouth disease exclusion

A northern beef producer voluntarily imposed quarantine and called his private veterinary practitioner when he suspected foot-and-mouth disease. Three days after oral drenching, most of the herd of 51 beef cattle developed ulcers on their muzzles, and the cows developed similar ulceration on their teats and udders. The owner also developed blister-like lesions around his mouth. Samples tested at the Australian Animal Health Laboratory (AAHL) were negative for the exotic foot-and-mouth disease virus and vesicular stomatitis virus. Pseudocowpox was suspected as the cause.

Epizootic ulcerative syndrome

When the aeration system failed in three aquaculture ponds on the mid-north coast and killed about 4000 fingerlings, blotchy red skin lesions were noticed on many of the fish carcases. Samples were submitted for laboratory examination after a continuing low-level mortality in the population of nearly 50 000 cod and perch. An ulcerative dermatitis consistent with *Aphanomyces invadans* infection was diagnosed in some of the samples. This fungal disease may have been precipitated by high acid levels within the ponds.

Suspect *Ehrlichia canis*

Ehrlichia canis is considered exotic to Australia. A dog recently released from quarantine and resident in the Sydney metropolitan area became ill and returned a positive rapid test to *E. canis* at a Queensland laboratory. On 13 September 2006, AAHL confirmed *E. canis* serology in the dog, but preliminary polymerase chain reaction tests failed to detect any antigen. The dog responded to treatment with antibiotics. It was resident in an area that is free from the brown dog tick, *Rhipicephalus sanguineus*, and so transmission of *Ehrlichia* to other dogs was impossible.

Acute equine respiratory disease

Two weanlings died and nine others were affected with acute respiratory disease on a large horse stud in New South Wales. The two weanlings, which had been housed at different times in a common stall, developed an acute, severe respiratory disease. Clinical signs included purulent nasal discharge and respiratory distress. Within weeks, a further nine weanlings developed a similar respiratory disease, with varying degrees of fever, purulent nasal discharge, coughing and increased respiratory effort. All nine eventually recovered.

Samples were forwarded to AAHL for exclusion of Hendra virus and equine influenza. A profuse growth of *Streptococcus equi* subspecies *zooepidemicus* was cultured from the pleural fluid. Equine rhinovirus was isolated from a nasal swab of one of four samples. The rhinovirus may be the primary cause of infection, with the *Streptococcus* causing a secondary pleuropneumonia.

Anthrax

A single steer in the Forbes district died suddenly, leading the owner to think that it had been shot. On examination, the steer was in sternal recumbency, with its head turned into its flank, as though it were sleeping. Blood appeared to have passed out of the anus. Although the property had no history of anthrax, samples were taken for anthrax exclusion; the possibility of poisoning by toxic plants was also investigated. When the laboratory confirmed anthrax, the property was placed under movement restrictions for 42 days, and the remaining in-contact cattle were vaccinated. Trace-forward and trace-back investigations confirmed no stock movements off the property during the specified incubation period for the disease. The carcase was disposed of by burning.

Listeriosis in goats

Four stud Angora goats died and a further three animals became sick (unable to chew, excessive salivation) after eating silage harvested from pasture that had been treated with sewerage water in the Sydney basin. Older goats, which consumed more of the presented feed, were more affected than younger ones. Meningoencephalitis caused by *Listeria monocytogenes* was diagnosed by culture and histopathology.

In July, 15 out of 350 silage-fed Angora goats on a property in the Braidwood district died with nervous signs. Signs included circling, twitching of the legs, muscle fasciculations, difficulties in swallowing and lateral recumbency. Autopsy of two animals revealed meningitis, with fibrinous tags between the cerebellum and the cerebral hemispheres. Histological examination showed severe diffuse leukoencephalitis typical of listeriosis. Silage feeding ceased, and no further cases were reported.

Salmonellosis in sheep

In October 2006, salmonellosis killed 153 4-year-old merino ewes and 17 5-year-old ewes run as one mob, of 600, in the Merriwa area.

The mob was yarded and drafted according to age. The two groups remained separate for 2 weeks, then were yarded in their respective age groups, held overnight with access to water, and trucked for about an hour to a purchaser. Ten days later, many carcases in varied states of decomposition were noted. When mustered, 50% of the 4-year-olds and 10% of the 5-year-olds were missing, presumed dead, and many sheep showed lethargy, diarrhoea, and slight dehydration. Significant autopsy findings included caecal and colonic serosal and mucosal congestion, with mucosa ulcerated with fibrin tags. One ewe had an enlarged gall bladder; the bile contained flocculent material and the mucosa was ulcerated, with fibrin attached. Significant histologic findings included colitis, typhlitis and cholecystitis. *Salmonella* Typhimurium phage type 12a was isolated from multiple sites of many ewes.

It is likely that water in the yard of the 4-year-old ewes was contaminated, either from a ewe excreting *S.* Typhimurium in its faeces or from some other source. This case emphasises the importance of biosecurity procedures following purchase. If discovered earlier, the morbidity and mortality might have been reduced by appropriate treatment.

Botulism in a dairy herd

Botulism was diagnosed as the cause of mortalities in a 500-cow pasture-based dairy herd on the north coast of New South Wales. The first mortality occurred on 25 August 2006. Within 4 days, more than 31 adult milking cows had died.

Affected animals were initially stiff-gaited, progressing to sternal recumbency with bilateral hind leg abduction. Initial deaths due to respiratory failure occurred 24–48 hours after the onset of clinical signs. The clinical course was prolonged in later cases.

After the outbreak, all cattle on the farm were vaccinated against botulism, and carcases were buried in plastic-lined pits on farm.

Northern Territory

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

Chlamydophila infection in juvenile farmed crocodiles

Outbreaks of disease causing high mortality in farmed saltwater crocodiles occurred on two properties in the Darwin region between June and August 2006. More than 3000 juveniles in the 2–5-month age group died. The animals consistently had fibrinous pharyngitis and conjunctivitis. Specimens tested positive for family Chlamydiaceae by polymerase chain reaction tests. The infection spread rapidly after it was first noticed; a shared water body and regrouping animals probably contributed to the high infection rate. The animals responded poorly to antibiotic treatment. Sporadic cases of a chronic nature were also seen in 1–3-year-old animals on all four of the major crocodile farms in the region.

Outbreaks of *Chlamydophila* infection have been reported before in southern Africa and Papua New Guinea, but the clinical presentation was different. The literature describes an acute hepatitis or a chronic conjunctivitis, but no throat lesions. The affected animals in those outbreaks responded well to antibiotics.

Factors that appear to account for the high mortality in the juveniles are the anatomical features of the pharynx and larynx in crocodiles and their inability to cough. These factors make the animals highly susceptible to laryngeal obstruction by exudate. The build-up of exudate, associated with mucosal damage, partly accounts for the poor clinical response to antibiotic treatment. These animals had to be force-fed, which put them under further stress. Juvenile crocodiles, in general, poorly tolerate parenteral administration of antibiotics.

Reference laboratories are undertaking DNA sequence analysis for species and strain typing of the *Chlamydophila*. Preliminary results have shown that the strain of *Chlamydophila* from the crocodiles is different from *Chlamydophila* detected in birds on the same farms, but does not fully match sequences of known existing strains.

It is not clear why the disease appeared suddenly in outbreak form on the two farms this year. Possible factors include the unusually cold dry season and the opportunity for transmission of infection from older animals to juveniles. The Berrimah Laboratory has applied for funding to further investigate the epidemiology of the disease.

Fowl pox

A small, free-range poultry farm in the Darwin rural area presented young chickens with severe pustular lesions around the cheeks and eyes. Five out of 30 young chickens had died, and another ten showed clinical lesions. Older birds were not affected. A diagnosis of fowl pox was confirmed at the laboratory. Fowl pox is caused by a pox virus and is spread by mosquitoes. The infection leads to the formation of wart-like nodules on the head and legs, and occasionally lesions occur in the mouth and throat. This is then known as canker and causes difficulties in eating and breathing. A vaccine is available to protect young stock.

Abortions in goats

An abortion storm occurred in a goat herd in the Darwin rural area. Seven of 30 animals aborted, and two of the nannies died. A post mortem examination of the nannies and foetuses did not indicate an infectious cause. The heavily pregnant goats were rejects from an export shipment. The remaining goats have kidded normally.

Queensland

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

Cattle

Salt poisoning

Salt poisoning was responsible for the deaths of three cattle out of 50 at risk on a property in Biggenden Shire in July 2006. Cattle had just been shifted from drought-affected country as an emergency measure. A combination of a high salt intake from a salt lick and rations, and insufficient water on arrival at the property, precipitated the condition. Clinically, the cattle had nervous signs, with a high-stepping gait, stillbirth and fever. On histopathology, there was widespread perineuronal oedema in the cerebral cortex of one animal. Another animal that was autopsied had scattered vacuolation throughout the white matter of the cerebral cortex. Serum sodium was normal (139.00 mmol/L), but sodium in the cerebrospinal fluid was marginally elevated (145.00 mmol/L).

Plant poisoning

Cardiac glycoside poisoning due to jute seeds (*Corchorus olitorius*) was diagnosed in a milking herd of 240 Holstein Friesian cows in the Beaudesert Shire in July 2006. Twenty cows in the herd developed depression, reduced milk production and bloody diarrhoea after a new batch of sorghum grain was introduced into the bails. A sample of the hammer-milled grain contained approximately 20 000 jute seeds per kilogram (approximately 2.5% by weight). Agricultural Standards Regulations mandate fewer than 10 jute seeds per kilogram of grain offered for sale as stockfeed. Steers in a small feedlot on the same farm refused the contaminated grain when it was offered, but avidly ate uncontaminated grain. Affected cows recovered when the contaminated grain was replaced.

Botulism

More than 40 out of 5000 yearling Brahman-cross cattle died on a property near Normanton. Recumbency was usually followed by death within 24–48 hours. Flaccid paralysis was a consistent clinical finding. The sera from one recumbent animal tested positive to *Clostridium botulinum* toxin type C or D on an enzyme-linked immunosorbent assay. Property owners will be vaccinating all cattle at weaning in future.

A Cook Shire property had 50 out of 850 2-year-old Brahman heifers die. One heifer examined had flaccid paralysis, but no gross pathology was found on autopsy. A check of the station records showed that this particular group of heifers had mistakenly not been vaccinated for botulism, and mustering had been delayed for several months as a result of the protracted wet season earlier in the year. Losses ceased after botulism vaccination.

Sheep

Pregnancy toxaemia

Cases of pregnancy toxaemia occurred on grazing properties in western Queensland. On one property, 12 heavily pregnant ewes due to lamb within 2 weeks died after being mustered for crutching to reduce flystrike problems. Autopsy of four animals showed that the animals had good levels of body fat, fatty infiltration of liver cells, and carried either twins or triplets near full-term development. Blood samples showed that affected ewes had beta-hydroxybutyrate levels 5 to 10 times the normal level. All reported incidents had some disease risk factors involved, such as water deprivation for a period, long travelling times, mustering stress, and late pregnancy (but good body condition).

There were ten deaths and two sick ewes out of 200 heavily pregnant ewes in Warwick Shire. The stress on the ewes had recently been increased by a dog attack. Liver sections had marked diffuse fatty change on histological examination.

Horses

Equine herpesvirus infection

In July 2006, in Pittsworth Shire, a 20-year-old standardbred mare that had given birth to a live foal the previous year aborted at 34 weeks gestation. An autopsy of the foetus revealed a malformation of the nose and mandible, and a moderate amount of fluid containing blood in the thoracic cavity. Histological examination revealed multifocal necrosis of the liver. Polymerase chain reaction (PCR) testing and viral culture were positive for equine herpesvirus 1.

A 1-day-old thoroughbred filly on the Darling Downs presented with acute respiratory distress and then died. On autopsy, pneumonia and atelectasis were observed. On histological examination, the lung was found to be congested and showed hyperplastic changes in the epithelium of the bronchi and bronchioles. Inclusion bodies consistent with herpesvirus infection were seen within some of the epithelial cells. The liver was congested, while the spleen, thymus, and kidney showed no pathology. PCR and virus isolation were positive for equine herpesvirus 1.

Poultry

Fowl cholera

In Rosalie Shire, 350 free-range layers aged 12 months died out a flock of 2000. Birds had varying degrees of suppurative peritoneal effusion. Livers were enlarged, with miliary pale foci throughout the parenchyma and a mild to moderate perihepatic gelatinofibrinous effusion. Some lungs were consolidated and spleens were enlarged. Most birds were in good to fat body condition and in lay.

Liver sections had a mild to moderate multifocal necrosuppurative hepatitis, with numerous intralesional bacteria. Lung sections had a marked diffuse fibrinopurulent bronchopneumonia, with large numbers of bacteria throughout the sections. Spleens had fibrinoid necrosis of periarteriolar sheaths, with low numbers of bacteria throughout. *Pasteurella multocida* was isolated from the lungs, livers and spleens of autopsied fowl.

PCR tests were negative for both avian influenza virus and Newcastle disease virus.

Pigs

Bronchopneumonia

The death of four pigs and illness in 20 others out of 250 pigs, aged 3–4 weeks, prompted investigation at a Milmerran Shire property. Of the four pigs that were autopsied, one had a severe polyserositis involving the lungs, heart, liver and intestines and severe suppurative meningitis, and the other three

pigs had suppurative bronchopneumonia. *Actinobacillus pleuropneumoniae* was isolated from lung tissue and joint fluid from two of the four pigs autopsied.

Salmonellosis

In early September 2006, a *Salmonella* infection, resulting in interstitial pneumonia and suppurative meningitis, caused the sudden deaths of four 4-week-old pigs out of 300 at risk in a piggery in Kilkivan Shire. There were signs of septicaemia, peritonitis, arthritis, and pleurisy. *Salmonella* Heidelberg was cultured from a joint and the brain in a mixed culture.

South Australia

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

Toxic renal failure in a bull in the lower north (foot-and-mouth disease ruleout)

A 4-year-old Murray Grey bull was noticed to have tarry faeces, red-tinged urine and loss of condition 4 weeks after escaping from his paddock. On veterinary examination, ulcers were found to be present on the tongue, gums and palate. A provisional diagnosis of bovine virus diarrhoea (pestivirus) was made, but samples were tested to exclude foot-and-mouth disease.

Pestivirus serology, as well as all foot-and-mouth disease testing on mucosal samples, was negative. Biochemistry results indicated severe azotaemia and mild hepatocellular damage. Severe lymphopaenia and haemolysis were present in the haematology specimen.

The animal was euthanised for post mortem examination. Histopathology showed a severe nephrosis, consisting of irregular crystalline deposits (reminiscent of oxalate crystals) within the renal tubules, primarily in the cortex and extending into the medulla, accompanied by a moderate to marked multifocal tubular epithelial necrosis. The liver showed moderate to marked, severe, diffuse, acute periacinar necrosis, not accompanied by any inflammatory element. It was considered likely that the liver lesion, while severe enough in its own right to cause death, was probably a secondary lesion to the renal failure. The main cause of crystalline renal failure in South Australia is consumption of oxalate-containing plants, usually soursob (*Oxalis pes-caprae*).

Annual ryegrass toxicity in cattle in the Adelaide Plains

A landowner in the Adelaide Plains region lost 11 of his 30 cattle over a period of 1 week in mid-October 2006. Clinical signs noticed in some animals included ataxia and collapse. Post mortem examination was unremarkable, and serum biochemistry and histopathology showed no significant changes. Annual ryegrass toxicity (ARGT) was diagnosed on the basis of the characteristic symptoms seen, as well as a history of the owner's neighbour being affected in the previous year. A paddock inspection also revealed affected ryegrass heads, and pasture tests were strongly positive for the annual ryegrass toxin. The animals were too young to be included in the transmissible spongiform encephalopathy testing program. The animals were removed from the affected paddock, and deaths ceased 5 days later.

Each year, usually in November and December, sporadic cases of ARGT occur in many areas of the state. The unusually early occurrence of the disease in this case was probably due to unusual weather, which caused pastures to dry off early. ARGT may cause dramatic livestock losses on affected properties. The nematode *Anguina funesta* carries a bacterium, *Rathayibacter toxicus*, into the ryegrass. This bacterium produces toxins, which, when ingested in sufficient amounts, cause toxicosis in livestock.

Pyrrolizidine alkaloid-induced hepatic encephalopathy

During August 2006, a sheep property in the Mallee region suffered a spate of sheep deaths. Three sheep from a mob of approximately 250 died, and another 15 showed clinical abnormalities. The predominant clinical signs were star-gazing and mild ataxia, and the affected animals were unthrifty and lethargic. The owner observed that the breed of all affected

sheep was Wiltshire Poll. Merino sheep in the flock did not exhibit any clinical signs.

On autopsy of two animals, the most notable gross feature was the presence in each animal of shrunken, markedly fibrotic livers. Laboratory analysis of samples concluded that the hepatic lesions were characteristic of pyrrolizidine alkaloid poisoning. Histopathology showed the presence of severe, diffuse biliary hyperplasia, accompanied by hepatocytes exhibiting marked cellular enlargement and enlarged nuclei. Such cellular changes markedly alter the functional ability of the liver. Hepatic encephalopathy occurs after the animal's liver function is severely compromised as a result of chronic exposure to a variety of toxic agents — usually plant toxins. The pathological changes in the brain result from the toxic effects of metabolites that are normally detoxified by the liver. These metabolites attack and degrade the myelin sheath of the cells in the white matter of the brain.

It is hypothesised that the hepatic encephalopathy was induced by access to significant quantities of plants containing pyrrolizidine alkaloids in the preceding summer-autumn period. Significant amounts of the plant *Heliotropium europaeum* occur on the property, and the sheep had been grazing these plants during the autumn. The delayed expression of hepatic encephalopathy in the sheep can be explained by the current significant reduction in pasture availability. The property owner estimated that the available pasture was 50% below normal. This clinical picture has not previously been seen on the property (despite the presence of *Heliotropium europaeum* plants), and the sheep will be monitored closely over the next few years.

Listeria causing abortion in maiden crossbred ewes

In mid-June 2006, a producer in the southeast purchased 700 late-pregnant maiden ewes, and split them into two separate groups in adjoining paddocks. Thirty animals in one of the groups began aborting about 4 weeks after arrival, but no abortions were observed in the other group. Aborted foetuses were fully formed, appeared normal, and were about 2–3 weeks premature. Before the abortions, the ewes had been scanned ultrasonically, and the lambing expectancy was 140%.

A freshly aborted foetus was submitted to the laboratory for analysis. Histopathology revealed severe necrotising and suppurative hepatitis in the liver, with intralesional bacteria. The brain also had mild multifocal suppurative meningoencephalitis. Lesions were diagnostic for bacterial abortion, and consistent with listerial abortion. A heavy growth of *Listeria ivanovii* was cultured from both foetal stomach contents and liver.

Listerial abortion can occur in outbreak form in sheep and goats, with an abortion rate that may approach 15% in some cases. The point of entry of the *Listeria* is usually a bacteraemia within the ewe. The source of *Listeria* may be difficult to establish; suspects include silage, water or food contamination and possibly carrier animals. Neither the source nor the reason for only one group being affected in this outbreak was established. The affected group of ewes was moved into another paddock, and each animal was given an injection of a long-acting tetracycline. All abortions ceased within 24 hours.

Tasmania

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

Laboratory accessions

Source	Number of accessions
Aquaculture	76
Companion	123
Livestock	705
Other	14
Wildlife	174

Notifiable diseases

Disease	Investigations	
	Positive	Total
Abalone gangioneuritis	0	1
American foulbrood	3	4
Avian influenza (highly pathogenic)	0	2
Avian psittacosis	0	5
Bacterial kidney disease *(Renibacterium salmoninarum)*	0	6
Bluetongue virus	0	2
Brucella ovis	0	10
Brucella abortus	0	6
Chalkbrood	0	4
Contagious agalactia	0	2
Devil facial tumour disease	5	33
Enzootic bovine leucosis	0	1
European foulbrood	0	4
Goldfish ulcer disease	0	1
Hydatid disease	1	3
Johne's disease	3	30
Leptospira hardjo	8	30
Leptospira pomona	4	30
Listeria	1	6
Negative finfish bacteriology*	0	39
Newcastle disease (virulent)	0	1
Ovine macrocyclic lactone resistance	0	3
Clinical salmonellosis	28	152
Pullorum disease (*Salmonella* Pullorum)	0	3
Rickettsia-like organism of salmonids	0	1
Salmonella Abortusequi	0	5
Salmonella Abortusovis	0	11
Salmonella Enteritidis	0	4
Transmissible spongiform encephalopathy	0	4
Vesicular exanthema	0	1
Viral encephalopathy and retinopathy	0	1

* *Aeromonas salmonicida* ssp *salmonicida*, goldfish ulcer disease, streptococcosis of salmonid

Equine abortion syndrome

Over the past 11 years, high (50%) abortion rates have repeatedly been recorded on several horse properties in northern Tasmania. Cases are typically late term and associated with an apparently nonascending placentitis. Aborting mares often have low glutathione peroxidase levels. There has been no evidence of the common infectious abortifacients, such as equine herpesvirus 1 or equine arteritis virus, or of other causes suggested in recent investigations of equine abortion overseas, such as vesivirus infection (Kurth et al 2006).

The abortions are strongly associated with individual properties; mares removed from the properties in early pregnancy carry to term, but they abort in the next season if returned. A survey of equine breeding establishments completed last quarter indicates that equine abortion is not a widespread problem on other Tasmanian properties.

Reference: Kurth A, Skilling DE and Smith AW (2006). Serological evidence of vesivirus-specific antibodies associated with abortion in horses. *American Journal of Veterinary Research* 67:1033–1039.

Campylobacter abortion in goats

A commercial dairy goat herd recorded a 10% abortion rate this kidding season. The herd was in the north of Tasmania and had been newly established from several sources. *Campylobacter fetus* ssp *fetus* was isolated from placenta, foetal tissues (lung and abomasal fluid) and dam water. Faeces from sheep and native hens (*Gallinula mortierii*) were negative for *Campylobacter*. The common abortifacients *Leptospira* and *Toxoplasma* spp were not found.

Campylobacter abortion is rarely confirmed in goats (especially in Australia), although it is regularly diagnosed in sheep. In this case, the owner was advised of the zoonotic risks and various management strategies to reduce recurrence.

Unusual pestivirus case in beef calves

A case of congenital ataxia and whole body tremors in three beef calves was investigated because of unusual autopsy findings in the affected calves. The calves could vocalise, but could not stand without assistance. The tremors dissipated, apart from slight head tremors when the calves were recumbent. A cerebellar abnormality was suspected. On autopsy, the cerebellum was of normal size; however, the folia on one side were thinner than normal, indicating a hypomyelination disorder. The classical pestivirus-induced cerebellar aplasia was not present. No histological abnormalities were observed in two calves, although examination using myelin stains is still in progress. In the third calf, the cerebral

hemispheres were smaller than normal, and there were histopathological changes in the white matter of the cerebellum.

The dams of the affected calves and the bull were positive for pestivirus antibody, whereas the calves were negative. The calves were positive for pestivirus antigen. These results are consistent with pestivirus infection in naive dams at 125–175 days of gestation. Summers et al (1995) reported a syndrome in which in-utero pestivirus infection did not result in cerebellar aplasia.

Reference: Summers BA, Cummings JF and de LaHunta A (1995). *Veterinary Neuropathology*, Mosby, St Louis, p 84.

Listeriosis

Several cases of listeriosis have been diagnosed in cattle and sheep this winter. Heavy losses occurred in a flock of 350 maiden ewes, in which 70% mortality in neonatal lambs was recorded. Lambs were underweight and weak. Swollen heads were not a common feature. *Listeria ivanovii* was isolated from lamb tissues, but the source of the infection has not been found. Three bovine cases of acute neurological disease due to *L. monocytogenes* were associated with ingestion of mouldy silage.

Victoria

Contributed by: Roger Paskin, Department of Primary Industries

Uterine prolapse in ewes

Twelve out of 400 maiden merino/Border Leicester-cross ewes suffered uterine prolapse 12–24 hours after lambing during a 1-week period in July 2006 on a property near Wodonga. The ewes, which were in condition score 3.5, primarily gave birth to single lambs. They were grazing a clover-rich pasture on undulating country onto which they had been moved 2 weeks previously, and had lambed in an area not previously used for lambing. This area had an abundance of superseded subterranean clover varieties, including Yarloop. Yarloop clover is known to cause uterine prolapses due to its oestrogenic effects, which relax the suspensory ligaments of the reproductive tract. The cost of the outbreak to the producer was estimated to be $1200.

Grain engorgement in adult merino wethers

Thirty adult merino wethers in a mob of 800 died from acidosis (grain engorgement) on a Hamilton district property in September 2006. On one weekend, the wethers had accidental access to locked-up sheep yards full of capeweed and a grain silo. The sheep were found dead around the yards the following Monday. One wether was noticed to be depressed and lethargic. Nitrate poisoning was suspected. Several autopsies revealed the rumen to be full of whole grain (triticale). Rumen pH on a dipstick was 6, more than 36 hours after death. (Rumen pH rises after death.) This management incident cost the producer more than $1500.

Salmonellosis in cattle

In September 2006, septicaemia caused by *Salmonella* Typhimurium caused the death of eight cows and halved production in a herd of 150 Friesian and Friesian/Jersey cows, on a property near Inverloch in South Gippsland. The outbreak occurred over a 20-day period; one weekend saw 25 new cases. *S.* Typhimurium was isolated from faecal samples and the liver of an autopsied cow. Only adult dairy cows in the milking herd were affected. Compounded feed fed before and during the initial stages of the outbreak was totally consumed, so that none was available for testing. The entire farm water supply was town reticulated. One farm boundary abuts residential and industrial land that drains across part of the property; however, sampling of the drains failed to isolate any significant bacteria. There were no human cases.

Treatment consisted variously of oxytetracycline, trimethoprim/sulfa combination, ceftiofur and flunixin. On day 13 of the outbreak, all adults were vaccinated with a specific *S.* Typhimurium vaccine. Nine cows became ill the day after vaccination, but responded to treatment, and the outbreak finished 3 days later. The cost to the producer was estimated to be at least $20 000.

Salmonellosis in sheep

One hundred and twenty late-pregnant ewes died and many more aborted in an outbreak of salmonellosis on a property west of Ballarat in August 2006. Fifty out of 1200 merino ewes were found dead one morning, 5 days after a 24-hour yarding for crutching. On-farm treatment with propylene glycol and vaccination with 5-in-1 were instigated. The next day, 100 ewes were reported dead or dying, with an abortion storm. Autopsies performed on euthanised clinical cases revealed emphysematous foetuses, rapidly autolysing carcases and inflamed intestines with putrid contents. Oxytetracycline was administered to the unaffected portion of the mob, which was drafted into clean paddocks. *Salmonella* Typhimurium was isolated from multiple organs submitted for testing from ewes and foetuses. This mob of 1200 was the last of 8000 sheep put through the yards in cold, damp conditions, which provided an ideal environment for the amplification and survival of *Salmonella* bacteria. A neighbouring property had experienced an outbreak of *Salmonella* a year earlier. The suspected contaminated water source has since been fenced off. The cost to the producer was $10 000.

Salmonellosis in poultry

Seven cases of human food poisoning with the rare serovar *Salmonella* Livingstone were traced back to a poultry farm in West Gippsland. The people had become ill after eating Japanese-style mayonnaise, containing raw egg, served with sushi. The Department of Human Services expects, on average, one case per year involving this serovar. The usual source is meat meal.

This outbreak of food poisoning occurred from February 2006. Five of the cases had eaten food at commercial premises that were supplied by one egg farm. Inspection of the farm revealed excellent egg grading and cleaning facilities. Manure drag swabs taken at the time of the visit were positive on culture for *S.* Livingstone. Other drag swabs taken recently as part of a *S.* Enteritidis accreditation program were also positive for *S.* Livingstone. Sampled feed was negative for *S.* Livingstone, and results for water samples are pending. At this stage, the source of this unusual serovar is unknown.

Mycoplasma hyopneumoniae in pigs

During August 2006, gilts on two pig farms in central Victoria were diagnosed with pneumonia caused by *Mycoplasma hyopneumoniae*. The first was a 400-sow farm with an associated grow-out facility located 20 kilometres away. Nearby, there was a 200-sow farrow-to-finish farm, which had been known to have *M. hyopneumoniae* and *Actinobacillus pleuropneumoniae*. The first farm, which has no provision for quarantine, purchased gilts and boars from the same source every 2 months. In August 2006, coughing was noticed in the introduced gilts and some of the sows. Autopsy on a euthanised gilt showed ventral consolidation in all lung lobes and pericarditis. Histology revealed a suppurative, plasmocytic bronchopneumonia. Testing using PCR was positive for *M. hyopneumoniae*.

The second farm was a 1200-sow herd established from high-health stock. Gilts were purchased every 4 months from a single source (not the same source as Farm 1) and kept in quarantine for 8 weeks after arrival. The quarantine shed was on the farm, about 300 metres from the main buildings. Coughing was noticed in the gilts, and autopsy on three showed extensive consolidation in the lungs. Histology was suggestive of *M. hyopneumoniae*, which was confirmed by PCR.

For both farms, the fatal flaw was a lack of effective quarantine facilities. The disease was most likely introduced by replacement gilts. The rule of thumb is that introduced breeders should be held in a quarantine facility that is at least 3 kilometres from the home farm.

Suspect erysipelas in market-age pigs

During abattoir inspection in August 2006, 11 of 60 pigs from a farm in central Victoria were rejected due to polyarthritis. Six trimmed hock joints were examined and found to have an excessive amount of serosanguinous synovial fluid, with hyperaemia and proliferation of the synovial membrane. The samples were cultured but did not yield any growth. Histology of the synovial membrane revealed severe fibrinous suppurative synovitis and arthritis, with bacteria present. A farm visit revealed that there had been an ongoing problem with erysipelas infection in pigs around 16 weeks of age. The pigs at the abattoir had been infected some 6 weeks earlier and were suffering from chronic arthritis. Attention to shed hygiene and a vaccination program were recommended. This cost the producer $2200.

Western Australia

Contributed by: Fiona Sunderman, Department of Agriculture and Food

During the quarter, 289 investigations of animal disease led to laboratory testing. There were four exotic disease alerts and one notifiable disease report (bovine Johne's disease).

All four 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.

The case of bovine Johne's disease was diagnosed on beef cattle property in the Albany area. The case was referred to the Department of Agriculture and Food after the owner reported a recurring problem with a small number of cows suffering weight loss and diarrhoea. Clinical signs and results from blood and tissue tests were all consistent with bovine Johne's disease, and DNA testing confirmed the diagnosis. The herd has been quarantined and the department is tracing cattle movements to and from the herd over the past 12 years.

Cattle

Congenital epidermolysis bullosa was diagnosed in a 2-week-old Angus calf at Tenterden. Within 2 hours of its birth, redness was noted at the coronary band of the hind hooves. Post mortem examination revealed that the hind limb claws had sloughed, leaving coronary band erosion, granulation tissue and adherent necrotic debris and crusts. The base of each accessory digit was reddened and slightly underrun. Each digit was easily degloved. Although the aetiology was not determined, literature reports suggest that some forms of the disease are inherited.

Osteodysplasia/spondylodysplasia was diagnosed in a neonatal Dexter-cross calf at Waroona. Unable to stand from birth, it also exhibited rotational torticollis and bilateral strabismus. Autopsy and dissection revealed rotation of the anterior thoracic and entire cervical vertebrae, deformities of the left scapula and medial rotation of the forelimbs. A major histopathological lesion was found in the lumbar intumescence of the spinal cord, where there was a distinct thinning of the dorsal aspects of the ependymal lining of the spinal canal and, in one location, a complete absence of ependyma. Several large cavities involving the dorsal grey matter and dorsal funiculi of the white matter were associated with the lesion. Although the deformity was clearly congenital, its aetiology is unknown.

Lupinosis was considered to be the cause of mortalities in mixed-age, pregnant Wagyu cattle on poor country at Eneabba. At the time of investigation, 25 of 500 cows had died, and at least another 20 were clinically ill. The available feed was of poor quantity and quality, but did include some ryegrass and blue lupins. Autopsy of affected cattle revealed jaundice and swollen, yellow livers.

Ingestion of **cape tulip** was suspected to have caused the death of 18 heifers purchased from saleyards and trucked to the Chidlow area. Four days after their arrival, three animals were found dead; seven more died the following day. Other cattle exhibited ataxia, rapid respiration, tachycardia, salivation and diarrhoea. Autopsy revealed pulmonary, endocardial, intestinal and renal ecchymoses. Cape tulips were growing among the other pasture species.

In another case at Beverley, a Murray Grey calf died soon after admission to a paddock containing an almost pure stand of cape tulip. Epidemiological evidence, and histological lesions of cardiac myofibre necrosis and focally extensive full-depth mucosal necrosis, were considered to be sufficient evidence of cape tulip poisoning.

Sheep and goats

The poor season is probably responsible for the appearance of disease in very young animals. **Parasitism**, including coccidiosis, has been diagnosed in 4–8-week-old lambs at Badgingarra and Dowerin. Ten of 1000 lambs, aged 3–4 weeks, died from **salmonellosis** at Dalwallinu. With feed in such short supply, it is likely that the youngsters were being forced to fend for themselves or were being hand-fed in contaminated areas. There has also been an increase in reported cases of **mastitis** in ewes; at Toodyay, approximately 20 ewes died from bacterial mastitis. It is thought that the ewes' milk supplies are

faltering due to shortage of feed. This may be leading to increased predisposition to mastitis because of increased bunting and attempts to suckle by hungry lambs.

Dermatosparaxis was diagnosed in nine of 200 Dorper-cross lambs at Narrogin. The lambs had excessive skin fragility and swollen joints. Their sires were from a property with a history of dermatosparaxis, an autosomal recessive disorder of connective tissue characterised by extreme skin fragility and tearing. It is caused by deficiency of procollagen I N-terminal peptidase, one of the enzymes responsible for conversion of procollagen to collagen. The disease has been reported elsewhere in merino, Dorper and Border Leicester-Southdown sheep. Similar conditions occur in cattle, cats and humans (Ehlers-Danlos syndrome type VII).

Pneumonia was diagnosed on several occasions during the quarter. An unspecified number of lambs at Merredin that had been drenched a week earlier died from aspiration pneumonia. Bacterial pneumonia (*Mannheimia haemolytica*) killed six lambs in a flock of 325 Merino ewes with 6–8-week-old lambs at foot at Kondinin.

Lupinosis contributed to the deaths of a number of pregnant ewes at Pingelly. Liver lesions were consistent with lupinosis, but not severe enough to be lethal. Pregnancy toxaemia was probably involved, as subclinical lupinosis will cause inappetence. Ill-thrift and deaths of 20 out of 700 sheep in a mixed-sex and mixed-breed flock at Three Springs was also attributed to lupinosis.

Photosensitisation and mortalities in rams at Quairading were attributed to grazing French millet (*Panicum miliaceum*). Worldwide, *Panicum* spp are the main cause of toxicosis due to steroidal saponins. Steroidal saponins may also cause a crystal-associated cholangiohepatopathy, which results in secondary photosensitisation.

Copper deficiency contributed to more than 40 mortalities in neonatal goats at Borden. Many dying kids were unable to suckle and exhibited hind limb paresis. Histological examination identified lesions consistent with copper deficiency in the spinal cords of two kids. The liver copper concentration of one kid was a low 9.00 mg/kg, but that of the other two kids was within the normal range.

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 September 2006

State	Free
ACT	2
NSW	835
NT	0
QLD	60
SA	497
TAS	96
VIC	548
WA	170
AUS	2208

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 or the Northern Territory, and active measures are taken to stamp out any incursions. One infected herd has been identified in Western Australia. The herd is being depopulated, and tracing and surveillance are being undertaken. 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 September 2006

	Cattle	Goat	Deer	Sheep	Total
NSW	114	8	1	1286	1409
NT	0	0	0	0	0
QLD	0	1	0	0	1
SA	65	1	1	74[a]	141
TAS	16	3	0	58	77
VIC	976	7	7	453	1443
WA	1	0	0	17	18
AUS	1172	20	9	1888	3089

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

New approaches based on risk assessment and management have been developed to control Johne's disease. Market Assurance Programs are in operation for cattle, sheep, 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 September 2006

	Alpaca	Cattle	Goat	Sheep	Total
NSW	108	588	34	348	1078
NT[a]	0	0	0	0	0
QLD[a]	0	0	0	0	0
SA	46	262	18	190	516
TAS	1	108	3	31	143
VIC	26	317	2	92	437
WA[a]	0	0	0	0	0
AUS	181	1275	57	661	2174

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: http://www.animalhealthaustralia.com.au/programs/jd/maps.cfm

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

Enzootic bovine leucosis

Enzootic bovine leucosis accreditation programs have been operating in the dairy industries in Queensland and New South Wales for several years. Victoria, South Australia, 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 from enzootic bovine leucosis at the end of the quarter.

Table 4 Dairy herds tested free from enzootic bovine leucosis at 30 September 2006

State	Infected	Non-assessed	BMT[a] negative	Provisionally clear	Monitored free	Total
NSW	0	35	16	0	971	1022
NT	-	-	-	-	-	-
QLD	2	0	0	2	880	884
SA	0	0	0	0	380	380
TAS	0	486	0	0	0	486
VIC	43	31	2015	31	3196	5316
WA	0	0	0	0	241	241
AUS	45	552	2031	33	5668	8329

a Bulk milk test

Laboratory testing

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

Table 5 Serological testing from routine submissions to State laboratories

	Akabane		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
Jul–Sep 2005	1936	476	1298	257	3452	343	2330	2	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	1970	460	1398	290	2492	297	1341	3	740	1	281	6
Jul–Sep 2006												
NSW	329	125	210	23	3890	54	90	0	560	0	307	0
NT	418	169	386	51	393	140	0	0	0	0	0	0
QLD	348	82	330	58	293	68	156	0	170	1	2	0
SA	86	0	0	0	86	0	394	0	0	0	0	0
TAS	21	0	10	0	20	0	1	0	0	0	5	0
VIC	69	0	55	0	50	0	81	0	213	0	202	4
WA	1453	16	311	20	1938	56	1	0	32	0	26	0
AUS	2724	392	1302	152	6670	318	723	0	975	1	542	4

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 (BSE) 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 http://www.animalhealthaustralia.com.au/aahc/programs/adsp/tsefap/ntsesp.cfm). In addition to the samples collected as part of the NTSESP, other species (e.g. deer, buffalo and goat) are tested for BSE and scrapie when found showing clinical signs consistent with a TSE. The results of these investigations appear in the table of exotic or emergency disease investigations (see Table 12).

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

Table 6 TSE surveillance

	Jul–Sep 2005		Oct–Dec 2005		Jan–Mar 2006		Apr–Jun 2006		Jul–Sep 2006	
State	Ovine	Bovine	Ovine	Bovine	Ovine	Bovine	Ovine	Bovine	Ovine	Bovine
NSW	36	33	27	25	19	18	16	16	25	31
NT	0	6	0	5	0	0	0	10	0	10
QLD	6	54	1	37	1	34	7	48	11	69
SA	10	4	7	4	4	3	4	5	10	9
TAS	1	3	0	0	1	2	1	2	0	6
VIC	58	40	52	78	12	20	43	25	33	37
WA	9	9	67	11	14	11	23	7	17	14
AUS	120	149	154	160	51	88	94	113	96	176

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 120 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
Jul–Sep 2005	343	0	1430	0
Oct–Dec 2005	201	0	1038	0
Jan–Mar 2006	274	0	2215	0
Apr–Jun 2006	204	0	1702	0
Jul–Sep 2006				
NSW	35	0	184	0
NT	0	0	2992	0
QLD	4	0	431	0
SA	0	0	0	0
TAS	7	0	7	0
VIC	2	0	127	0
WA	72	0	715	0
AUS	120	0	4456	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 July to 30 September 2006

	Avian	Bovine	Canine	Caprine	Equine	Feline	Ovine	Porcine	Other	Total
S. Bovismorbificans	0	52	3	0	0	1	0	0	0	56
S. Dublin	0	37	1	0	0	0	0	0	0	38
S. Infantis	0	3	2	0	0	0	0	0	0	5
S. Typhimurium	15	132	2	0	5	3	8	2	1	168
Other	8	64	14	3	4	3	5	6	25	133
Total	23	288	22	3	9	7	13	8	26	400

Northern Australia Quarantine Strategy

In recognition of the special quarantine risks associated with Australia's sparsely populated northern coastline, the Australian Quarantine and Inspection Service conducts an animal disease surveillance program as an integral component of the Northern Australia Quarantine Strategy (NAQS). The NAQS surveillance program provides early warning of disease threats to livestock industries and, in some cases, to human health. NAQS surveillance activities include both offshore and onshore components. Table 9 summarises NAQS activity in Australia over the past five quarters.

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

Table 9 Summary of recent NAQS activity in Australia

	Jul–Sep 2005		Oct–Dec 2005		Jan–Mar 2006		Apr–Jun 2006		Jul–Sep 2006	
Category	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve	Tested	+ve
Aujeszky's disease	65	0	13	0	19	0	16	0	147	0
Avian influenza — highly pathogenic	58	0	710	0	15	0	0	0	413	0
Classical swine fever	65	0	13	0	19	0	16	0	147	0
Japanese encephalitis[a]	0	0	89	0	79	1	193	0	51	0
Surra — *Trypanosoma evansi*	79	0	84	0	10	0	334	0	124	0

a The positive result noted in the table for Japanese encephalitis (JE) occurred in a pig bled on one of the northern islands in the Torres Strait. These islands experience seasonal incursions of JE. JE remains exotic to the Australian mainland.

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 10 summarises results from the program.

Table 10 Results of the National Granuloma Submission Program

	Jul–Sep 2005	Oct–Dec 2005	Jan–Mar 2006	Apr–Jun 2006	Jul–Sep 2006
Submitted	540	488	362	371	374
TB +ve	0	0	0	0	0

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, Australian Government Department of Agriculture, Fisheries and Forestry

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

		Jul–Sep 2005	Oct–Dec 2005	Jan–Mar 2006	Apr–Jun 2006	Jul–Sep 2006
Ports	Asian bees	14	12	7	7	6
	Varroa mites	21	22	28	34	17
	Asian mites	21	22	28	34	17
	Tracheal mites	19	22	22	33	18
	Culicoides sp	27	28	27	30	27
	Screw-worm fly	29	24	22	24	23
NAQS	Screw-worm fly	45	45	45	45	45

Suspect exotic or emergency disease investigations

There were 42 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 July to 30 September 2006

Disease	Species	State	Month	Response	Finding
Avian influenza — highly pathogenic	Avian	ACT	Sep	3	negative
	Avian	NSW	Aug	2	*Pasteurella multocida*
	Avian	NSW	Sep	2	negative (2 unrelated investigations)
	Avian	QLD	Jul	2	negative (3 unrelated investigations)
	Avian	QLD	Jul	2	organophosphate poisoning
	Avian	QLD	Jul	2	aspergillosis
	Avian	QLD	Aug	2	infectious laryngotracheitis
	Avian	QLD	Aug	2	negative
	Avian	QLD	Aug	2	trauma
	Avian	QLD	Aug	2	lipidosis
	Avian	QLD	Sep	2	fenthion poisoning (3 unrelated investigations)
	Avian	QLD	Sep	2	negative
	Avian	QLD	Sep	2	cardiomyopathy
	Avian	QLD	Sep	2	cardiomyopathy
	Avian	TAS	Jul	3	negative
	Avian	VIC	Sep	2	infectious laryngotracheitis
	Avian	WA	Aug	2	negative (2 unrelated investigations)
	Avian	WA	Sep	2	negative
Bovine brucellosis (*Brucella abortus*)	Bovine	WA	Jul	3	negative
Equine herpesvirus 1 — abortigenic and neurological strains	Equine	QLD	Sep	2	equine herpesvirus
Equine influenza	Equine	NSW	Jul	2	negative
Foot-and-mouth disease	Bovine	NSW	Jul	3	negative
	Bovine	NSW	Sep	3	negative
	Bovine	SA	Jul	3	negative
	Bovine	VIC	Aug	2	bovine malignant catarrh
Hendra virus	Equine	QLD	Jul	2	carcinoma
	Equine	QLD	Aug	3	negative
	Equine	QLD	Sep	3	negative (2 unrelated investigations)
Newcastle disease — virulent	Avian	ACT	Sep	3	negative
	Avian	NSW	Jul	2	*Pasteurella multocida*
	Avian	NSW	Aug	2	negative
	Avian	TAS	Jul	3	negative
Scrapie	Caprine	SA	Sep	2	negative for scrapie and BSE
Tuberculosis in any mammal	Camel	NT	Sep	2	chronic hepatic abscessation
West Nile virus infection — clinical	Avian	ACT	Sep	3	negative

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

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 (http://www.health.gov.au/cda/Source/CDA-index.cfm)

Table 13 Notifications of zoonotic disease in humans

	Q3 2005	Q4 2005	Q1 2006	Q2 2006	Q3 2006	Current quarter (July–September 2006)							
	AUS					ACT	NSW	NT	QLD	SA	TAS	VIC	WA	AUS
Brucellosis	7	18	14	5	14	0	3	0	10	0	0	0	1	14
Chlamydophilosis	41	31	43	49	33	0	16	0	0	0	1	16	0	33
Leptospirosis	24	28	51	59	20	0	1	0	13	1	0	3	2	20
Listeriosis	11	18	25	7	14	0	7	0	1	2	0	3	1	14
Q fever	81	85	101	89	100	0	43	1	42	7	0	7	0	100

National Residue Survey

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

There were 2917 samples collected and analysed in the National Residue Survey Random Monitoring Program for the quarter (see Table 14). Three samples were found with residues above the relevant standard in the Australian Food Standards Code. In each case, a traceback investigation has been initiated.

One sample of fat from a cow was found with a residue of chlorpyrifos-methyl at 0.06 mg/kg, which is above the Australian maximum residue limit (MRL) of 0.05 mg/kg. The residue was believed to result from feeding of treated grain.

One sample from a bobby calf was found with a ceftiofur residue of 11.0 mg/kg, which is in excess of the MRL (2.0 mg/kg). Such residues often result from failure to observe the withholding period for treatment for calf scours.

One sample of liver from a sheep had lead residues of 1.67 mg/kg. This is above the Australian maximum level of 0.5 mg/kg. Lead residues in livestock are often the result of exposure of animals to old lead batteries or other lead sources dumped inappropriately on a property.

Table 14 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	46	0	0	0	115	0	11	0	5	0	40	0	16	0	233
	other	0	1	0	0	0	0	0	1	0	0	0	5	0	0	0	7
	pigs	0	19	0	0	0	12	0	6	0	0	0	15	0	5	0	57
	sheep	0	49	0	0	0	7	0	22	0	0	0	23	0	31	0	132
	Total	0	115	0	0	0	134	0	40	0	5	0	83	0	52	0	429
Anti-microbials	cattle	0	83	0	5	0	149	0	16	0	12	1	120	0	18	1	403
	other	0	1	0	0	0	2	0	2	0	0	0	5	0	0	0	10
	pigs	0	44	0	0	0	31	0	23	0	2	0	50	0	25	0	175
	sheep	0	46	0	0	0	17	0	18	0	2	0	34	0	38	0	155
	Total	0	174	0	5	0	199	0	59	0	16	1	209	0	81	1	743
Growth promotants	cattle	0	78	0	3	0	147	0	9	0	3	0	37	0	18	0	295
	other	0	3	0	0	0	1	0	0	0	0	0	6	0	0	0	10
	pigs	0	33	0	0	0	23	0	16	0	1	0	29	0	15	0	117
	sheep	0	70	0	0	0	17	0	24	0	2	0	31	0	29	0	173
	Total	0	184	0	3	0	188	0	49	0	6	0	103	0	62	0	595
Insecticides	cattle	0	95	0	9	1	195	0	8	0	12	0	68	0	23	1	410
	other	0	4	0	0	0	8	0	4	0	0	0	3	0	0	0	19
	pigs	0	15	0	0	0	11	0	7	0	0	0	17	0	5	0	55
	sheep	0	88	0	0	0	16	0	33	0	3	0	40	0	44	0	224
	Total	0	202	0	9	1	230	0	52	0	15	0	128	0	72	1	708
Metals	cattle	0	21	0	0	0	42	0	3	0	2	0	21	0	6	0	95
	other	0	2	0	0	0	4	0	2	0	0	0	5	0	0	0	13
	pigs	0	17	0	1	0	15	0	6	0	0	0	9	0	7	0	55
	sheep	0	24	0	0	0	0	0	10	1	1	0	14	0	13	1	62
	Total	0	64	0	1	0	61	0	21	1	3	0	49	0	26	1	225
Miscell-aneous	cattle	0	27	0	2	0	47	0	5	0	0	0	11	0	2	0	94
	other	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	3
	pigs	0	19	0	0	0	12	0	8	0	0	0	13	0	5	0	57
	sheep	0	21	0	0	0	6	0	10	0	0	0	13	0	13	0	63
	Total	0	68	0	2	0	65	0	23	0	0	0	39	0	20	0	217
Total		0	807	0	20	1	877	0	244	1	45	1	611	0	313	3	2917

NAHIS CONTACTS

The National Animal Health Information System (NAHIS) collects summaries of animal health information from many sources. NAHIS is on the internet (http://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.

Name	Role	Phone	Fax	email
Chris Bunn	Emergency Disease Preparedness, DAFF	02 6272 5540	02 6272 3372	chris.bunn@daff.gov.au
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Kristy Venten	Australian Milk Residue Analysis Survey	03 9810 5919	03 9819 4299	kventen@dairysafe.vic.gov.au
Jenny Hutchison	National Surveillance Coordinator	02 6287 4483	02 6287 4468	jenny@ausvet.com.au
David Kennedy	Johne's Disease Coordinator	02 6365 6016	02 6365 6088	david@ausvet.com.au
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Diane Lightfoot	National Enteric Pathogen Surveillance Scheme	03 8344 5701	03 8344 7833	dligh@unimelb.edu.au
Jim Derrick	National Residue Survey	02 6272 4019	02 6272 4023	jim.derrick@daff.gov.au
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Neville Spencer	National Granuloma Submission Program	02 6271 6650	02 6272 5442	neville.spencer@aqis.gov.au
John Walker	National Notifiable Diseases Surveillance System	02 6289 1555	02 6289 7791	www.health.gov.au
Rupert Woods	Australian Wildlife Health Network	02 9978 4749	02 9978 4516	rwoods@zoo.nsw.gov.au
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Fiona Sunderman	WA State Coordinator	08 9368 3805	08 9474 2479	fsunderman@agric.wa.gov.au

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.

ANIMAL HEALTH SURVEILLANCE

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