ANIMAL HEALTH IN AUSTRALIA

2011
Acknowledgments

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Feedback

Comments and suggestions regarding the Animal Health in Australia 2011 report are welcomed. Please forward all correspondence to the Manager, Corporate Communications, Animal Health Australia, via email at aha@animalhealthaustralia.com.au.
FOREWORD

This fifteenth volume in the Animal Health in Australia series of annual reports presents a comprehensive summary of Australia’s animal health status and system in 2011. It includes reports from ongoing programs, status reports on nationally significant terrestrial and aquatic animal diseases, and descriptions of new initiatives during the year.

The year 2011 was an eventful one. Dr Andy Carroll stepped down as Australian Chief Veterinary Officer (ACVO) in July 2011, pending retirement, and I thank Dr Carroll for his leadership as ACVO. I also take this opportunity to introduce myself as the new ACVO. My experience has included on-farm and abattoir veterinary work, as well as the role of Agriculture Counsellor in China and the Republic of Korea. More recently, I have been a senior executive in the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF). I look forward to continuing to provide national leadership, collaboration and engagement with stakeholders in managing Australia’s animal health.

The Australian Government suspended livestock exports to Indonesia for one month following concerns that some animals were not being slaughtered according to international standards. An independent review led by Mr Bill Farmer, AO, was commissioned, which examined all Australia’s live exports (from paddock to the point of slaughter) for all markets. Separately, the Minister for Agriculture, Fisheries and Forestry requested that I coordinate an independent scientific assessment of the appropriateness of the Mark I and Mark IV cattle restraint boxes. Based on the outcomes of these reports and recommendations from industry–government working groups established by the minister, a new regulatory framework was developed. The new animal welfare safeguards that have been implemented will require exporters to show that livestock from Australia will be treated in accordance with international animal welfare standards, right through to the point of slaughter.

Also in 2011, DAFF commissioned a consultancy — undertaken by Mr Ken Matthews, AO — to provide independent advice on Australia’s current level of preparedness and capacity to effectively manage the threat of foot-and-mouth disease (FMD). The report of the consultancy, A Review of Australia’s Preparedness for the Threat of Foot-and-Mouth Disease, was released on the DAFF website in November 2011. The report acknowledges the many strengths in the Australian system, and recommends enhancements in 11 key areas. A National FMD Action Plan has been developed to address issues in the report. In addition, a major review of the AUSVETPLAN disease strategy manual for FMD is continuing and will take into account the issues identified in the report.

The year saw some Australian jurisdictions dealing with emergency animal disease incidents. Heavy rainfall and unusual weather events in northern and eastern Australia in the summer and autumn led to widespread activity of the three major Australian mosquito-borne viruses — Murray Valley encephalitis virus, Kunjin virus and Ross River virus. Reports of two clinical syndromes (neurological signs and muscular signs) in horses emerged, predominantly across south-eastern Australia. These viruses have rarely caused disease in horses in previous years. Since the viruses are endemic to Australia, with wild bird and mosquito reservoirs, they could potentially cause further disease outbreaks in horses in future, and veterinary vigilance will be necessary.

Another major emergency animal disease focus was that relating to Hendra virus infection of horses. In 2011, there was a marked increase in Hendra virus incidents compared with the previous 16 years. The year’s incidents included the southernmost incident, the incident furthest inland, and the first natural infection of a dog. Fortunately, human cases were absent during these incidents. In July 2011, the Australian, Queensland and New South Wales governments announced contributions totalling $12 million for Hendra virus research over a three-year period. An Intergovernmental Hendra Virus Taskforce was established in July to pursue a collaborative, ‘One Health’ approach to minimising adverse impacts of Hendra virus on human and equine health, and to identify and prioritise research to be funded. I recommend that all veterinarians visit the Australian Government’s outbreak website to maintain their awareness of the latest information on appropriate biosecurity precautions for this and other disease incidents.

4 www.outbreak.gov.au
In the second half of 2011, a strain of avian paramyxovirus 1 that had not previously been reported in Australia was identified in hobby and racing pigeons, and subsequently in feral pigeons, in Victoria. Industry and governments worked closely together to manage the incident. This detection highlights the need for good biosecurity practices in all Australian livestock enterprises. Australia remains free from Newcastle disease in poultry as defined by the World Organisation for Animal Health.

The year 2011 was the 250th World Veterinary Year. Australia celebrated the anniversary by convening the 1st International One Health Congress in Melbourne, Victoria, and publishing *A Veterinary Awakening: The History of Government Veterinarians in Australia*.

The year was a significant one for animal health in Australia. I commend this report to you.

Mark Schipp
Australian Chief Veterinary Officer
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Australia’s animal health system — comprising all the organisations, government agencies, livestock industries, research institutions, laboratories and individuals that are involved in the livestock production chain — maintains a high standard of animal health in Australia.

This report describes Australia’s animal health system and current status of animal health. Significant events in 2011 are also described, and these are summarised below.

Organisation of the animal health system
Chapter 1 describes the roles of government and nongovernment participants in the national animal health system, as well as the consultative mechanisms that link them. Animal Health Australia is a major coordinating body of national animal health programs in Australia, and the Australian Wildlife Health Network provides a link between livestock health and the health of wild and feral animals.

During 2011, the Australian Government began reforming Australia’s biosecurity system to emphasise management of biosecurity across the continuum from offshore (pre-border) to border to onshore (post-border). These reforms, which will be implemented over a number of years, are consistent with the themes outlined in the 2008 (Beale) independent review of Australia’s quarantine and biosecurity arrangements. One change has been the bringing together into a single division of the quarantine and biosecurity functions of the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), to provide a national approach to biosecurity, simplify domestic and international communications, and improve responsiveness. DAFF Biosecurity includes the following entities: Biosecurity Australia, Office of the Chief Veterinary Officer, Animal Health Policy Branch and the Australian Quarantine and Inspection Service.

Improvements to the National Livestock Identification System (NLIS) for livestock identification and traceability continued during 2011. The NLIS for cattle now enables animals to be identified with regard to residue and disease status, and the NLIS for sheep and goats has been reviewed by an independent consultant.

Quality assurance programs in the livestock industries are central to on-farm biosecurity and food-safety practices. A new version of the National Feedlot Accreditation Scheme, with updated rules and standards, was released in early 2011, following an extensive review. Rollout of the new Australian Pork Industry Quality Assurance Program (APIQA®), owned and administered by Australian Pork Limited, continued during 2011 and will be complete by March 2012. The Australian Egg Corporation Limited’s quality assurance program, EggCorp Assured, has been converted to a standard, which will be launched to both the egg industry and customers in 2012.

Terrestrial animal health
Chapter 2 describes Australia’s status for nationally significant diseases of terrestrial animals — these include diseases that are notifiable to the World Organisation for Animal Health, as well as other diseases of national significance. Details are given of the distribution and occurrence of endemic diseases of national significance in Australia during 2011, and the control programs that are in place for these diseases. This chapter also describes the operation of the national reporting system for animal diseases in Australia, the National Animal Health Information System.

In 2011:
- no cases of anthrax were detected in New South Wales or Victoria; for New South Wales, this is the longest period on record with no reports of cases
- a new immunochromatographic test — which has been approved by the Sub-Committee on Animal Health Laboratory Standards and is manufactured by the Victorian Department of Primary Industries — was used for rapid screening for anthrax in the field
Terrestrial animal disease and surveillance monitoring

Disease surveillance and monitoring programs, an important component of the animal health system, are described in Chapter 3. They include programs managed by Animal Health Australia, the Australian Wildlife Health Network, and the Australian, state and territory governments.

During 2011, the Animal Health Committee made significant progress in developing a framework for a risk-based National General Surveillance Program. General surveillance is the background level of passive reporting by animal health professionals, paraprofessionals, animal owners, producers, processors and others across the Australian livestock industries. The Animal Health Committee formed a General Surveillance Epidemiology Working Group, which completed several assessments that will contribute to Australia’s general surveillance system.

The Zoo Animal Health Reference Group, which includes representatives from Australia’s major zoos, conducted a zoo-based wildlife disease surveillance pilot project in 2011. During the project, zoo veterinarians from six major Australian zoos reported disease events in free-ranging wildlife and wildlife in rehabilitation centres directly into the National Wildlife Health Information System. The project is being extended for a further six months while the results are evaluated.

Surveillance in wild birds and investigation of wild bird mortalities did not detect any highly pathogenic avian influenza in Australia.

Surveillance processes for exotic pests of honey bees will change following the transfer of the National Sentinel Hive Program from Animal Health Australia to Plant Health Australia in 2011. As well, Asian honey bee, which was first detected in Cairns in 2007, will be managed in future, rather than being the subject of an eradication campaign, following a national decision that this pest bee is not eradicable from the Cairns region.

Managing animal health emergencies

Chapter 4 describes arrangements that are in place for Australia to prepare for and respond to emergency animal diseases, including planning, training and communication. The chapter also describes emergency animal disease responses during 2011.

The Australian Veterinary Emergency Plan (AUSVETPLAN) sets out the policies, roles and responsibilities to be followed in an emergency animal disease response. In 2011, AUSVETPLAN disease strategies for equine influenza, rabies and avian influenza, and the wild animal response strategy were updated and published, and revisions were made to a number of other manuals. A new enterprise manual for the pig industry was also issued. The initial stages of a consultancy to develop a new approach to AUSVETPLAN manuals were completed in 2011. The system being developed will allow manuals to be revised more efficiently, and will also allow those involved in outbreaks to download or print documents that are tailored to their particular operational needs.

During 2011, significant progress was made on the review of Australia’s response policy to an outbreak of foot-and-mouth disease. Animal Health Australia convened a high-level roundtable consultation meeting between government and industry peak bodies to recommend policy framework options for revision of the AUSVETPLAN disease strategy for foot-and-mouth disease. A draft revision of the disease strategy is being undertaken, which includes the outcomes of the review and the meeting.

DAFF commissioned a consultancy — undertaken by Mr Ken Matthews, AO — to provide independent advice on Australia’s current level of preparedness and capacity to effectively manage the threat of foot-and-mouth disease. The report of the consultancy, A Review of Australia’s Preparedness for the Threat of Foot-and-Mouth Disease, was released on the DAFF website in November 2011.

Several changes were made in 2011 to the Emergency Animal Disease Response Agreement, a legally binding agreement between the Australian Government, the state and territory governments, livestock industries and Animal Health Australia. As well, guidance documents, Guidelines for Determining Whether an Unlisted Disease is an EAD, and a Guide to Developing an Emergency Animal Disease Response Plan were endorsed by parties to the agreement.

In 2011, work continued on ensuring that Australia is well prepared for any incursion of avian influenza:

- Australia delivered capacity-building programs in neighbouring countries to help these countries prevent, detect and respond to disease in animals.
• DAFF convened the National Avian Influenza Vaccination Expert Advisory Group, which developed national operating policy and procedures for the use of vaccination in avian influenza outbreaks.

• The fifth Government – Poultry Industry Biosecurity Forum was held, with a focus on national vaccine policy in the event of a disease outbreak in poultry.

• DAFF and Exhibition Stud Poultry Australia developed national biosecurity guidelines for the exhibition sector, which were published in a manual titled *Biosecurity Guidelines for Exhibition Poultry*.

Other activities in 2011 included:

• market research commissioned by the Australian Government to explore awareness of, and attitudes towards, biosecurity on the farm

• publication by the Australian Veterinary Association of *Guidelines for Veterinary Personal Biosecurity*

• publication by Australia’s zoo industry, the Australian Wildlife Health Network and DAFF of Australia’s *National Zoo Biosecurity Manual*.

Several emergency animal disease incidents required a response in 2011:

• An unprecedented number of Hendra virus incidents occurred in horses in Queensland and New South Wales. In response, an Intergovernmental Hendra Virus Taskforce was established, and the Australian, Queensland and New South Wales governments announced contributions totalling $12 million for Hendra virus research over a three-year period.

• The summer and autumn of 2011 saw widespread activity of the three major Australian mosquito-borne viruses (Murray Valley encephalitis virus, Kunjin virus and Ross River virus), associated with an unusual number of horses with neurological signs. The Australian, state and territory governments, in conjunction with relevant stakeholders, established an Equine Arboviral Working Group to coordinate investigations, and monitor and report on the outbreak in horses.

• A strain of avian paramyxovirus type 1 not previously detected in Australia led to the death of owned and feral pigeons in Melbourne and the area surrounding Shepparton, in Victoria. In response, the Victorian Department of Primary Industries imposed a temporary ban on pigeon events.

### Aquatic animal health

Chapter 5 provides details of the status in Australia of aquatic animal diseases of national significance, and the system for responding to aquatic animal disease events and preparing for such events.

The review of AQUAPLAN 2005–2010, Australia’s national strategic plan for aquatic animal health, is nearing completion. A number of training activities were funded in 2011 under the Aquatic Animal Health Training Scheme, which aims to improve the knowledge and skills of aquatic animal health professionals. An initiative to raise industry awareness of current aquatic emergency animal disease response arrangements also began in 2011.

Diseases reported in 2011 were:

• infection with *Edwardsiella ictaluri* — this was confirmed during routine testing of native Australian Berney’s catfish (*Neocutis berneyi*), black catfish (*Neosilurus ather*) and toothless catfish (*Anodontiglanis dahli*) in an aquarium facility

• abalone viral ganglioneuritis (infection with abalone herpes-like virus) — this was confirmed in three abalone processing facilities in Tasmania; no extension was reported in the range of this disease in wild abalone populations in Victoria since 2010

• Pacific oyster mortality syndrome, caused by Ostreid herpesvirus 1 microvariant (OsHV-1 µvar) — this was detected in wild Pacific oysters in an estuary in New South Wales adjacent to an estuary in which the disease was reported in farmed oysters in late 2010.

### Imports and exports

DAFF helps maintain Australia’s animal health status by managing pest and disease threats from imports. The department also provides technical input for the export of agricultural produce. Chapter 6 describes these activities.

In 2011, the department finalised the import risk analysis of biosecurity risks associated with gourami iridovirus and related viruses in freshwater ornamental finfish.

Animal Biosecurity branch released four reviews of biosecurity policy to stakeholders:

• a review of published tests to detect pathogens in veterinary vaccines

• revised health certification requirements for goldfish (*Carassius auratus*) for ornamental purposes

• a policy review of the bluetongue risks associated with cattle, sheep, goat and deer semen and embryos from the European Union, and cattle semen and embryos from Switzerland and Norway
• draft guidelines for managing the risk of transmitting transmissible spongiform encephalopathies via veterinary vaccines and other in vivo veterinary products.

A review of the import risk analysis of horses from approved countries was announced on 31 October 2011, as foreshadowed in the Australian Government’s response to a recommendation of the inquiry into the outbreak of equine influenza in 2007.

A new Australian Export Meat Inspection System was announced and implemented in 2011. The Australian Government also implemented a new regulatory framework for Australian livestock exports to Indonesia (see below, under ‘Animal welfare’).

**Consumer protection**

Activities to ensure that locally produced foods are safe for consumers are described in Chapter 7. Protective measures involve surveillance for communicable diseases and foodborne disease; monitoring for residues of agricultural and veterinary chemicals, and other contaminants; and inspection of meat. DAFF also inspects and certifies meat, dairy products, seafood and eggs for export.

Australia continued to play a strong leadership role in the development of international science-based food standards through the Codex Alimentarius Commission (Codex) and its subsidiary bodies. Australia chaired the Codex Committee on Food Import and Export Inspection and Certification Systems, which made significant progress on the draft *Principles and Guidelines for National Food Control Systems*. Australia also chairs the working groups for the Establishment of Priorities in both the Codex Committee on Pesticide Residues and the Codex Committee on Residues of Veterinary Drugs in Foods.

In 2011, Food Standards Australia New Zealand finalised a Primary Production and Processing Standard for Poultry Meat, which is scheduled to come into effect from May 2012. Standards are in development for raw meat, seed sprouts, and raw milk and raw milk products. Food Standards Australia New Zealand is currently assessing a proposal to extend mandatory country-of-origin labelling to all unpackaged beef, sheep and chicken meat.

**Animal welfare**

The Australian Animal Welfare Strategy (AAWS) — developed jointly by the Australian Government, state and territory governments, industry bodies and community organisations — provides a national framework to improve animal welfare outcomes. Chapter 8 reports on Australia’s animal welfare activities, including those under the AAWS.

In 2011:

- the Primary Industries Ministerial Council endorsed the revised AAWS and National Implementation Plan 2010–14
- the Minister for Agriculture, Fisheries and Forestry appointed a new Australian Animal Welfare Advisory Committee in October 2011 to assist DAFF in implementing the new AAWS goals and objectives
- a dedicated AAWS website was launched, which will be a reference point for Australia’s actions on animal welfare
- welfare codes of practice were finalised for the commercial wild-capture fishing industries
- development continued on Australian animal welfare standards and guidelines for cattle and sheep, dogs and cats, and exhibited animals (zoo animals)
- industry partners of the bobby calf supply chain agreed to implement a voluntary standard for the maximum allowable time off feed for bobby calves.

In response to evidence of serious mistreatment of cattle in Indonesian abattoirs, the Australian Government appointed Mr Bill Farmer, AO, to independently investigate the complete supply chain for all live exports that leave Australia, up to and including the point of slaughter. The government has now introduced a strict new framework for livestock exports to Indonesia to ensure that animals will be treated in a way that meets or exceeds international animal welfare standards, and has announced that this framework will be extended to all other markets for Australian feeder and slaughter livestock.

Chapter 8 also reviews Australia’s contribution to international animal welfare initiatives. In 2011, DAFF, in conjunction with the World Organisation for Animal Health, hosted the first meeting of the Coordination Group for the Regional Animal Welfare Strategy for Asia, the Far East and Oceania (RAWS) in Bangkok; the second meeting of the group was also held in 2011, in Tokyo. The Australian Government has made funding available to exporters of livestock to Middle Eastern trading partners, and to countries that import Australian livestock, to improve animal welfare outcomes.

**Regional animal health initiatives**

Australia assists countries in the Asia–Pacific region and Africa with improving the health of their livestock through aid (through AusAID — the Australian Agency for International Development) and research (through ACIAR — the Australian Centre for International Agricultural Research). Chapter 9 describes Australia’s main areas of activity in terrestrial animal health in these regions.
The Australian Government’s international development assistance to help combat pandemics and emerging infectious diseases in the Asia–Pacific region is guided by the Pandemics and Emerging Infectious Diseases Framework 2010–2015. It includes funding to the World Health Organization (WHO) under the WHO Asia Pacific Strategy for Emerging Diseases, and to the OIE under the Stop Transboundary Animal Diseases and Zoonoses (STANDZ) initiative in Southeast Asia. STANDZ aims to reduce the impact of emerging infectious diseases on food security, public health and livelihoods in Southeast Asia by strengthening the capacity of animal health sectors to prevent, control and eradicate priority transboundary animal diseases and zoonoses. AusAID also funds the Australia Indonesia Partnership for Emerging Infectious Diseases, Animal Health, 2010–14, which focuses on strengthening Indonesian animal health systems to meet the challenges presented by diseases such as avian influenza.

The ACIAR Animal Health program supports research organisations in Australia and partner countries — focusing on Indonesia, Cambodia, Laos and Papua New Guinea — to use a multidisciplinary approach to solve problems in animal production and health.

Research and development
Chapter 10 summarises Australian research in livestock health during 2011, and Appendix 4 lists some of the research projects. Research relating to livestock health is conducted by the Commonwealth Scientific and Industrial Research Organisation, cooperative research centres, university veterinary science faculties or schools, and industry-based research and development corporations.
CHAPTER 1

ORGANISATION OF THE ANIMAL HEALTH SYSTEM

Effective national surveillance and control of animal diseases in Australia requires cooperative partnerships among the government agencies, organisations, commercial companies and individuals who are involved in the animal industries.

This introductory chapter describes the organisation of Australia’s animal health system, including the roles of government and nongovernment organisations.

The Australian Government advises on and coordinates national animal health policy, and is responsible for international animal health matters, including quarantine, export certification, trade and disease reporting to the World Organisation for Animal Health (OIE). Under the Australian constitution, the individual states and territories are responsible for animal health matters within their boundaries. These include disease control, chemical residues in animal products, livestock identification and traceability, and animal welfare.
The traditional role of governments in managing animal health in Australia is complemented by a close association between governments and the livestock industries, which consult with each other to determine national animal health priorities. The livestock industries participate in policy development, support targeted activities and contribute to emergency responses. Australia’s livestock industries are described in Appendix 1.

Australia’s animal health system includes all organisations, government agencies, commercial companies, universities and individuals who are involved in the livestock production chain. The Australian Wildlife Health Network (AWHN) provides a link between livestock health and the health of wild and feral animals.

Table 1.1 shows the numbers and categories of veterinarians and other animal health personnel in Australia.

Animal Health Australia (AHA) is a not-for-profit public company that was established by the Australian Government, state and territory governments, and major national livestock industry organisations. AHA manages more than 50 national programs on behalf of its members: the Australian Government, state and territory governments, the peak national councils of Australia’s livestock industries and service providers (see Table 1.2). These programs improve animal and human health, biosecurity, market access, livestock welfare, productivity, and food safety and quality.

1.1 Governance

1.1.1 Australian Government committees

Consultative committees ensure that all components of the animal health system (described below and in Figure 1.1) work together to serve the interests of Australia. AHA provides linkages between these components through its members.

Primary industries committees

The Standing Council on Primary Industries (SCoPI) is the peak forum to pursue and monitor priority issues of national significance affecting Australia’s primary production sectors that require a sustained and collaborative effort across jurisdictions, and to address key areas of shared responsibility between the Australian Government and state and territory governments, and funding for Australia’s primary production sectors.

SCoPI comprises the Australian national, state and territory, and New Zealand ministers who are responsible for primary industries matters. The council develops and implements policies and strategies for agreed national approaches to biosecurity, productivity and sustainability of primary industries (including the fisheries and forestry industries), and food security. It encourages greater collaboration and promotes continuous improvement in the investment of Australia’s research and development resources.

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Table 1.1 Veterinarians and other animal health personnel, 2011

<table>
<thead>
<tr>
<th>Veterinarians</th>
<th>Auxiliary personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>Stock inspectors, meat inspectors, etc.</td>
</tr>
<tr>
<td>657</td>
<td>1 083</td>
</tr>
<tr>
<td>Laboratories, universities, etc.</td>
<td></td>
</tr>
<tr>
<td>766</td>
<td></td>
</tr>
<tr>
<td>Private practitioners</td>
<td></td>
</tr>
<tr>
<td>8 949</td>
<td></td>
</tr>
<tr>
<td>Other veterinarians</td>
<td></td>
</tr>
<tr>
<td>484</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>10 856</td>
<td>1 083</td>
</tr>
</tbody>
</table>

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5 Animals include terrestrial and aquatic animals.

6 www.mincos.gov.au
SCoPI is supported by a permanent committee, the Primary Industries Standing Committee (PISC). This committee comprises the heads of the Australian national, state and territory, and New Zealand agencies that are responsible for policy and technical issues that fall within the ambit of SCoPI.

The National Biosecurity Committee (NBC)\(^7\) is the advisory committee to PISC on all animal, plant, marine and environmental biosecurity issues. The NBC provides strategic leadership, across jurisdictions and sectors, for the development of national approaches and policies for emerging and ongoing biosecurity issues.

The Animal Welfare Committee provides advice to PISC on animal welfare matters through the Animal Welfare and Product Integrity Taskforce. Some aquatic animal health issues that have environmental implications are managed through the natural resource management committee structure.

Animal Health Committee

The Animal Health Committee (AHC) provides the Australian Government with strategic scientific and policy advice on animal biosecurity matters through the NBC, PISC and SCoPI. The AHC prioritises and coordinates activities in national animal health, domestic quarantine and veterinary public health by driving the development and implementation of the government’s policy, programs, operational strategies and standards.

AHC membership comprises the national, state and territory chief veterinary officers, and representatives from the Australian Animal Health Laboratory of the Commonwealth Scientific and Industrial Research Organisation (CSIRO-AAHL); DAFF Biosecurity (formerly the Australian Quarantine and Inspection Service, Biosecurity Australia, Office of the Chief Veterinary Officer and Animal Health Policy Branch) in the Australian Government Department of Agriculture, Fisheries and Forestry; AHA; the Australian Government Department of Sustainability, Environment, Water, Population and Communities; and New Zealand.

The AHC is advised by three subcommittees: the Sub-Committee on Aquatic Animal Health (SCAAH); the Sub-Committee on Animal Health Laboratory Standards (SCAHLS) and the Sub-Committee on Emergency Animal Diseases (SCEAD). When required, specialist ad hoc working groups advise the AHC on technical or policy issues.

The AHC consults with the animal industries through newsletters, membership of AHA and industry participation in some sessions of AHC meetings. Aquatic industries are consulted through the National Aquatic Animal Health Industry Reference Group and the Australian Fisheries Managers Forum. Those with an interest in zoo, wild or feral animals are consulted through the AWHN.

Sub-Committee on Aquatic Animal Health

SCAAH provides high-level scientific and technical advice to the AHC to support development of policy and programs on national aquatic animal health affecting the capture and recreational fishing industries, the aquaculture industries and the ornamental fish industry. SCAAH comprises representatives from the Australian, state and Northern Territory governments; the New Zealand Government; CSIRO-AAHL; and Australian universities. Other aquatic animal health experts from both government and nongovernment agencies — including specialists from academia, industry and the private sector — may also be invited to participate.

Sub-Committee on Animal Health Laboratory Standards

SCAHLS is the national network for animal and public health laboratories in Australia and New Zealand that are managed by governments, the private sector, universities and industry. SCAHLS establishes, implements and monitors professional and technical standards by dealing with quality assurance, skills, and the development and validation of new tests within these laboratories. This includes the production of Australian and New Zealand Standard Diagnostic Procedures. The subcommittee also monitors and facilitates preparedness for exotic and other emergency diseases through the Laboratories for Emergency Animal Disease Diagnosis and Response network, which ensures a nationally coordinated approach.

Sub-Committee on Emergency Animal Diseases

SCEAD maintains communications between agencies that manage responses to emergency animal diseases (EADs). The subcommittee is responsible for addressing operational aspects of EAD prevention and preparedness and identifying gaps in existing legislative EAD frameworks.

Consultative Committee on Emergency Animal Diseases

When an EAD outbreak occurs, the Consultative Committee on Emergency Animal Diseases (CCEAD) is convened. CCEAD membership is similar to that of the AHC, but also includes technical representatives from relevant industries. Further information about the CCEAD’s membership and role is in Chapter 4.

Aquatic Consultative Committee on Emergency Animal Diseases

Chapter 5 provides information on the Aquatic CCEAD.

1.1.2 Animal Health Australia — ‘Working together for animal health’

AHA is the coordinating body for national animal health programs in Australia. With a national focus on animal health and welfare issues, the company facilitates sustainable partnerships between members and provides leadership in securing outcomes that support Australia’s position as a world leader in animal health and animal health services.

9 www.scahls.org.au/procedures
Since its establishment in 1996, AHA has achieved a strong track record in delivering significant outcomes for its members. The company has grown in size and stature and is now recognised as an important contributor to the improvement of animal health in Australia.

AHA’s 31 members comprise the Australian Government, the state and territory governments, livestock industry organisations and service providers; some other organisations are associate members. The current membership is shown in Table 1.2, and contact details for these organisations are provided in Appendix 2.

The company’s roles are:

- to facilitate improvements in Australia’s animal health policy and practice by building capacity for EAD preparedness
- to ensure that Australia’s livestock health systems support productivity, competitive advantages and preferred market access
- to ensure that animal health programs help to protect human health, the environment and recreational activities
- to manage nationally agreed animal health programs.

One of the company’s strengths is its comprehensive consultative approach — which is based on consensus — to identifying priorities and resolving issues. AHA has established a number of formal and informal consultative mechanisms involving all members or groups of members, depending on the scope of the particular issues to be addressed. The Industry Forum provides a unique opportunity for AHA industry members to discuss industry-related concerns. An industry consensus can then be brought to the Members’ Forum for broader consideration by all members of the company.

Specific national projects and programs are also strongly based on a collaborative approach, leading to consensus and successful outcomes. Consultations can involve a specific company or be more broadly focused. Stakeholders other than members are also extensively involved in various projects. By working across a complex network of stakeholders, AHA delivers results that are of benefit to the national animal health system as a whole.

For more information about AHA, visit the website.11

11 www.animalhealthaustralia.com.au

<table>
<thead>
<tr>
<th>Government</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Australian Government</strong></td>
<td><strong>Industry</strong></td>
</tr>
<tr>
<td>Department of Agriculture, Fisheries and Forestry</td>
<td>Australian Alpaca Association Ltd</td>
</tr>
<tr>
<td><strong>State and territory governments</strong></td>
<td><strong>Australian Chicken Meat Federation Inc</strong></td>
</tr>
<tr>
<td>Australian Capital Territory</td>
<td>Australian Dairy Farmers Ltd</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>Australian Duck Meat Association Inc</td>
</tr>
<tr>
<td>State of New South Wales</td>
<td>Australian Egg Corporation Ltd</td>
</tr>
<tr>
<td>State of Queensland</td>
<td>Australian Honey Bee Industry Council</td>
</tr>
<tr>
<td>State of South Australia</td>
<td>Australian Horse Industry Council</td>
</tr>
<tr>
<td>State of Tasmania</td>
<td>Australian Lot Feeders’ Association Inc</td>
</tr>
<tr>
<td>State of Victoria</td>
<td>Australian Pork Ltd</td>
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<tr>
<td>State of Western Australia</td>
<td>Australian Racing Board</td>
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<tr>
<td></td>
<td>Cattle Council of Australia Inc</td>
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<tr>
<td></td>
<td>Equestrian Australia Ltd</td>
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<td></td>
<td>Goat Industry Council of Australia Inc</td>
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<tr>
<td></td>
<td>Harness Racing Australia</td>
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<tr>
<td></td>
<td>Sheepmeat Council of Australia Inc</td>
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<td></td>
<td>WoolProducers Australia</td>
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<table>
<thead>
<tr>
<th><strong>Service providers</strong></th>
<th><strong>Associate members</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Commonwealth Scientific and Industrial Research Organisation — Australian Animal Health Laboratory (CSIRO-AAHL)</td>
<td>Council of Veterinary Deans of Australia and New Zealand</td>
</tr>
<tr>
<td></td>
<td>Dairy Australia Ltd</td>
</tr>
<tr>
<td></td>
<td>National Aquaculture Council Inc</td>
</tr>
<tr>
<td></td>
<td>Zoo and Aquarium Association</td>
</tr>
</tbody>
</table>

Commonwealth Veterinary Association Ltd Australian Livestock Export Corporation Ltd (LiveCorp)
National Animal Health Performance Standards

The National Animal Health Performance Standards allow the member organisations of AHA to assess Australia’s animal health capacity, to ensure that obligations and expectations relating to EAD preparedness and response capability are addressed. Such assessments can show whether Australia’s baseline capacity is being met, identify gaps and indicate appropriate corrective strategies, and assist the effective distribution of scarce national resources. Outcomes include improved adoption of biosecurity measures by industry, increased confidence by domestic consumers in Australia’s livestock products and improved access to international markets for these products.

AHA is working with its members to refine the standards and improve the accountability and efficiency of their implementation. Areas to be addressed in the revised standards include the purpose of assessments, sharing of findings and use of the outcomes. Assessment and reporting against the revised standards will begin shortly.

1.1.3 SAFEMEAT

SAFEMEAT\(^{12}\) is a partnership between the peak red meat industry bodies,\(^{13}\) the Australian Government, and state and territory governments. Reporting to PISC, SAFEMEAT oversees and promotes sound management systems to deliver safe and hygienic products to the marketplace. Initiatives developed by SAFEMEAT include:

- targeted residue-monitoring programs — the National Residue Survey conducts testing on behalf of the red meat industries
- the National Livestock Identification System (NLIS) — developed for cattle, sheep, goats and pigs, with a similar system under development for alpacas (see Section 1.4.4)
- a system of national vendor declarations about the health of cattle, sheep, goats and pigs that are being traded
- strategies for animal disease issues affecting food safety, including the implications of transmissible spongiform encephalopathies such as bovine spongiform encephalopathy.

12 www.safemeat.com.au

Major activities during 2011 included:

- obtaining agreement with manufacturers of veterinary drugs on policy for placing export slaughter intervals on product labels
- developing management plans for metal shot in livestock
- further developing the NLIS (Sheep and Goats).

SAFEMEAT participated in a review of the NLIS (Sheep and Goats) by an independent consultant, following the traceability exercise, Sheepcatcher. The review was commissioned by PISC to identify improvements that would enable compliance with the National Livestock Traceability Performance Standards. The NLIS (Sheep and Goats) Management Committee identified two strategies for improvement, which were forwarded to PISC.

In 2011, SAFEMEAT instigated a review of various programs, including the NLIS, national vendor declarations and Livestock Production Assurance (see Section 1.5.1).

1.2 Biosecurity reforms

Australia’s economy and environment benefit significantly from a strong biosecurity system. The Australian Government continues to implement reforms to deliver a modern biosecurity system that is responsive and targeted, in a changing global trading environment.

During 2011, planning began for a revised system that has an integrated, end-to-end approach to managing biosecurity across the continuum from offshore (pre-border) to border to onshore (post-border). The system will deliver a range of benefits, including more efficient management of biosecurity risks, increased productivity in agriculture, facilitation of international trade and protection of Australia’s unique environment.

The reforms being implemented are consistent with the themes outlined in the 2008 (Beale) independent review of Australia’s quarantine and biosecurity arrangements:

- a risk-based approach to biosecurity operations in which resources are focused on the things that matter most
- a system that operates across the biosecurity continuum more effectively, rather than focusing on just the border
- a partnership approach with industry, states and territories, and trading partners
- a system that is evidence based and intelligence led
- a system that is underpinned by modern legislation and technological ability.
Current significant work that will be the focus of reforms over the next 12 months includes:

- progressing with development of new biosecurity legislation to replace the Quarantine Act 1908 and subordinate legislation
- progressing risk-based intervention initiatives across DAFF
- continuing to develop a decision-making framework for the allocation of resources
- developing a detailed implementation plan for biosecurity reform to ensure an efficient and effective transition for the organisation and for stakeholders as changes take place
- progressing future post-entry quarantine arrangements through detailed design work, site assessment and related procurement activities, including refurbishment of facilities
- continuing to redevelop the import conditions database to improve its usability and the quality and consistency of information
- continuing to build a partnership approach with key biosecurity stakeholders.

Further reforms will focus on:

- strengthening partnerships between the Australian Government, states and territories, industry, trading partners and the community
- improving import and export market access
- updating import conditions and facilitating more efficient importation of goods
- increasing the management of risks offshore
- improving co-regulatory arrangements with Australia’s trading partners
- building capability and capacity to proactively anticipate, detect and respond to threats from pests and diseases.

The reform to Australia’s biosecurity system will occur over a number of years.

1.3  Service delivery

1.3.1 Australian Government animal health services

Under the Australian constitution, the Australian Government is responsible for quarantine and international animal health matters, including disease reporting, export certification and trade negotiation. It also provides advice on, and coordinates, national policy. In some circumstances, it provides financial assistance for national animal disease-control programs. The Australian Government’s activities in animal health are delivered by DAFF.

The Australian Government is Australia’s largest single employer of veterinarians, providing an important reserve for the state and territory governments in the event of an outbreak of a major EAD.

DAFF’s quarantine and biosecurity functions, including animal health, have been brought together in 2011 in the Animal Division to deliver more effective risk-based services across the biosecurity continuum (pre-border, border and post-border). The restructure reflects a national approach to biosecurity, simplifies domestic and international communications, and improves responsiveness.

In 2011, DAFF Biosecurity, Animal Division, had the following branches and offices:

- Office of the Australian Chief Veterinary Officer
- Animal Health Programs
- Animal Biosecurity
- Animal Export Operations
- Animal Quarantine Operations
- Biological Quarantine Operations and Marine Pests.

Office of the Chief Veterinary Officer

The Office of the Chief Veterinary Officer\(^{14}\) provides national leadership and direction on priority policy issues relating to animal health in Australia. As an international reference point on animal health, it manages international disease intelligence gathering, Australia’s commitments to the

Animal Health Programs

The Animal Health Programs branch represents DAFF on national animal health programs. It coordinates national animal surveillance and laboratory strategies; livestock disease prevention and preparedness activities; and EAD planning, training and awareness programs. The branch supports animal and human health, biodiversity and trade by collaborating with human health authorities and managing programs in wildlife health, aquatic animal health and veterinary public health.

The branch provides technical, executive and administrative support to national animal health committees, and their working groups and programs.

Animal Biosecurity

The Animal Biosecurity branch conducts science-based assessments of biosecurity risk, and provides policy advice to protect Australia’s favourable animal health status.

Animal Biosecurity’s work includes import risk analyses and policy reviews relevant to importation of live animals, animal reproductive material and animal products. The branch also provides technical advice that is used to negotiate improved access to export markets for live animals and animal reproductive material. To support both import and export market access, the branch contributes expertise to the development of relevant international standards for animals and animal products.

Animal Export Operations

The Animal Export Operations branch manages the export of live animals and animal genetic material by certifying that Australian exports meet importing country requirements. The branch provides export inspection and certification for live animals and animal reproductive material; it is one of several DAFF branches that deliver export certification services. The branch also contributes to maintaining, gaining and improving market access for live animals and animal genetic material.

Animal Quarantine Operations

The Animal Quarantine Operations branch manages the importation of live animals and animal reproductive material to minimise the risk of exotic animal pests and diseases entering Australia. The branch provides import inspection and clearance for live animals and animal reproductive material, and manages the government-operated post-entry animal quarantine stations. It is one of several DAFF branches that deliver quarantine field services and manage quarantine controls at Australia’s border.

Biological Quarantine Operations and Marine Pests

The Biological Quarantine Operations and Marine Pests branch helps to maintain Australia’s favourable animal disease and marine pest status by establishing and implementing import conditions for biological products, and managing national measures to prevent and manage marine pest incursions.

The branch is divided into two programs that reflect its major functions: the Biological Imports Program and the Invasive Marine Species Program. The Biological Imports Program manages the quarantine risks of imported biological products by assessing and granting import permits, providing advice to clients and regulatory staff, and conducting audits and verification of systems and producers who import biological products into Australia. Imported products that may require a permit include skins and hides, veterinary and human therapeutic products, veterinary vaccines, laboratory materials, soil and water samples, pet foods, stock feed supplements, and foods containing animal products (such as fish, seafood, egg, dairy and meat).

The Invasive Marine Species Program is currently developing Australia’s biofouling management requirements, as well as managing the Australian Government’s marine pest responsibilities. The program also coordinates national emergency responses to any marine pest incursions detected in Australian waters.

1.3.2 Australian Government animal welfare programs

Animal welfare policy in 2011 was the responsibility of the Livestock Industries and Animal Welfare branch of the Agricultural Productivity Division. This branch focuses on helping livestock industries to improve their responsiveness to changing markets, facilitating nationally consistent approaches to animal welfare, and supporting OIE initiatives in member countries to encourage adoption of international animal welfare guidelines. The branch advises the minister and the Australian Government on issues relating to the
meat, wool, dairy, intensive livestock and game industries, and on animal welfare for livestock, aquaculture and nonproduction sectors.

The Livestock Industries and Animal Welfare branch liaises with industry, the community and government, particularly through representative organisations and agencies. Relevant issues include opportunities for (and impediments to) industry development, and the development of Australian animal welfare standards and guidelines. The branch coordinates the implementation of the Australian Animal Welfare Strategy, delivers administered funding, facilitates statutory funding, administers industry-related legislation, and provides leadership and support for the implementation of the Regional Animal Welfare Strategy for Asia, the Far East and Oceania. More information about animal welfare in Australia and the Australian Animal Welfare Strategy can be found in Chapter 8.

1.3.3 Other Australian Government services and programs

Animal health outcomes are supported by a number of other DAFF programs. Food safety and product integrity fall within Food Division, which has the following branches:

- Export Standards
- Food Exports
- Residues and Food Safety
- Export Reform.

The Trade and Market Access Division of DAFF also provides policy and strategic support for DAFF’s international activities.

1.3.4 Other national animal health services and programs

**Australian Wildlife Health Network**

The AWHN is a not-for-profit organisation initiated by the Australian Government, with funding from DAFF, and managed by the Wildlife Health and Environment Program of DAFF. The network was established to promote and facilitate collaborative links in the investigation and management of wildlife health, to support human and animal health, biodiversity and trade. The AWHN actively encourages collaboration between organisations.

The network has a major focus on free-ranging populations of wild animals. It works closely with human health, animal health, agriculture and environment agencies, as well as universities, zoos and wildlife parks.

The AWHN manages a network of more than 450 wildlife health professionals and carers around Australia, including individual subscribers and institutional representatives from national, state and territory departments of conservation, agriculture and human health; universities; zoos; hunting groups; wildlife and other industries; diagnostic pathology services; private practitioners; and wildlife carers. The Chair of the AWHN is Australia’s OIE Wildlife Focal Point.
The AWHN coordinates national wildlife health surveillance, wildlife health expertise and resources, and research needs and priorities. It collates national data on wild fauna mass mortalities, and manages specific datasets, such as those from avian influenza surveillance in wild birds and Australian bat lyssavirus monitoring. As well, the AWHN monitors for new and emerging diseases in wildlife, particularly those that could affect humans and production animals.

Activities of the AWHN include:

- managing Australia’s national database of wildlife health information
- organising and providing national communication about wildlife disease and emerging incidents
- participating in the development of regional and national strategies for wildlife health emergency preparedness and response
- facilitating and monitoring field investigations of disease incidents
- advancing education and training in wildlife health
- publishing fact sheets about wildlife and its role in diseases of national importance
- providing information about wildlife health to the community.

**Animal health laboratories**

Australia’s animal health laboratories provide diagnostic and research services for endemic and exotic animal diseases, including transboundary animal diseases and emerging zoonoses (diseases of animals that can be transmitted to humans). The Australian Government, state and territory governments, CSIRO-AAHL, veterinary schools and the private laboratory sector maintain a network of world-class animal health laboratories — the Animal Health Laboratory Network. Although laboratories in the different sectors and jurisdictions are managed separately, their activities, policies and standards relevant to EADs are coordinated nationally through SCAHLS.

SCAHLS advises the AHC on issues that are relevant to the national animal health reference laboratories for specific EADs that could affect trade and zoonotic EADs. It also supports the activities of the Australian Association of Veterinary Laboratory Diagnosticians, which provides forums and opportunities for professional development and scientific exchanges among laboratory staff. Development and adoption of new diagnostic tests for major EADs is facilitated by SCAHLS through its evaluation process for new tests and a comprehensive series of Australian and New Zealand Standard Diagnostic Procedures (ANZSDPs).

The ANZSDPs reflect the relevant international standards elaborated by the OIE. National laboratory preparedness for EADs is primarily led by the Laboratories for Emergency Animal Disease Diagnosis and Response network. CSIRO-AAHL maintains diagnostic capability for all the major exotic animal diseases and continues to play a key role in transferring testing capabilities for major EAD surveillance to state and territory laboratories under controlled quality assurance conditions.

SCAHLS oversees the Laboratories for Emergency Animal Disease Diagnosis and Response network, which was formed in 2009 with members from the Australian Government, CSIRO-AAHL, and the state and territory government laboratories. It aims to harmonise or standardise testing services for targeted EADs in terrestrial and aquatic animals across all member laboratories. This ensures a nationally coordinated approach and maximises the availability of national resources to meet demands for large-scale testing during a major EAD outbreak, or at other times.

CSIRO-AAHL, which is co-funded by DAFF and CSIRO, is Australia’s national animal health laboratory and an OIE reference laboratory for a number of transboundary animal diseases. It develops and improves diagnostic technologies, and provides diagnostic services, exotic and emergency disease support, and independent scientific advice. The high-level containment facility within CSIRO-AAHL is vital to maintaining Australia’s capability to quickly diagnose EADs (including exotic diseases) that may threaten Australia’s livestock, aquaculture species, wildlife or people.

The state and territory government laboratories specialise in services for endemic diseases and are the primary providers of testing in support of animal exports. Some states have outsourced laboratory testing to the private sector, and this has led to a number of companies offering veterinary diagnostic services that are important to Australia’s EAD surveillance. Veterinary schools at universities also offer diagnostic services in specialty areas and for teaching purposes.

All government and most private animal health laboratories in Australia are accredited to the ISO/IEC 17025:2005 standard (General requirements for the competence of testing and calibration laboratories), which is administered by the National Association of Testing Authorities (NATA) — a member of the International Laboratory Accreditation Cooperation. NATA accreditation is obligatory for laboratories that participate in official EAD testing, including

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16 www.scahls.org.au
17 www.scahls.org.au/procedures/anzsdps
18 www.csiro.au/li
19 www.iso.org/iso/catalogue_detail?csnumber=39883
those that provide testing to support the international movement of animals and disease-control programs.

Under the SCAHLS umbrella, the Australian National Quality Assurance Program (ANQAP)²⁰ provides proficiency testing programs to determine the performance of individual laboratories in Australia, and a series of ANZSDPs ensure that national standard testing procedures are used for specific EADs. ANQAP is an international proficiency testing provider that is managed by the Victorian Department of Primary Industries on behalf of SCAHLS. It supports a range of proficiency testing programs for veterinary serology, virology and bacteriology on a fee-for-service basis. Most proficiency testing programs are used by laboratories that perform veterinary tests associated with quarantine, export health certification and disease-control programs. However, participation is not restricted to the local laboratories, and overseas laboratories are encouraged to use the service. More than 30 animal health laboratories from Australia, New Zealand, Asia, Europe, Africa and North America currently participate in ANQAP.

CSIRO-AAHL also collaborates with laboratories nationally and internationally to develop and implement proficiency testing programs for real-time polymerase chain reaction tests for detection of pathogen genomes, and various enzyme-linked immunosorbent assays, mainly for antibody detection.

The Australian Animal Pathology Standards Program, managed by AHA, offers a histopathology proficiency testing service for veterinary pathologists. The program was launched in 2006, and currently has 24 participating laboratories in Australia and overseas.

**Aquatic Animal Health Program**

The Aquatic Animal Health Program (AAHP) of DAFF leads and coordinates the national management of aquatic animal health (finfish, crustaceans, molluscs and amphibians). The AAHP supports the development and implementation of AQUIAPLAN — Australia’s National Strategic Plan for Aquatic Animal Health — and coordinates the national response to aquatic animal disease emergencies, based on the Australian Aquatic Veterinary Emergency Plan (AQUAVETPLAN).

The AAHP coordinates domestic surveillance and reporting of aquatic animal health to ensure a comprehensive, consistent and informed approach to preparedness and response activities, and is involved in developing EAD response mechanisms for the protection of Australia’s aquatic animal industries. The program manages Australia’s international reporting commitments to the OIE and other international agencies, and coordinates formulation of Australia’s comments on draft standards developed by the OIE Aquatic Animal Health Standards Commission.

The AAHP provides technical, executive and administrative support to aquatic animal health committees, and their working groups and programs.

### 1.3.5 State and territory animal health services

Under the Australian constitution, state and territory governments are responsible for animal health services within their respective borders (jurisdictions). State and territory agricultural authorities aim to protect the interests of livestock producers and the community by providing world-class biosecurity systems that protect and benefit the economy, the environment and public wellbeing. This is achieved through a combination of legislation and service delivery. Although the mechanisms differ among jurisdictions, the AHC ensures a harmonised outcome by coordinating the jurisdictions’ approaches to national animal health issues.

The state and territory governments develop and administer legislation governing the surveillance, control, investigation and reporting of diseases and chemical residues. The jurisdictions deliver their services through government-appointed or government-accredited animal health personnel — district veterinarians, regional veterinary officers and local livestock inspectors — who are responsible for administering the relevant state and territory legislation. The work of these personnel includes:

- surveying, controlling, investigating and reporting livestock diseases, including EADs
- controlling specified endemic livestock diseases, in partnership with relevant livestock industries in the jurisdiction
- monitoring and ensuring compliance with animal identification systems and the supply of vendor declarations
- maintaining appropriate controls on the movement of livestock for animal disease-control programs operating within the jurisdiction
- investigating reports of chemical contamination of livestock and implementing response plans to protect consumers from chemical residues
- maintaining producer awareness of best practice in local livestock management systems
- ensuring compliance with nationally agreed standards for livestock welfare

²⁰ [www.anqap.com](http://www.anqap.com)
• monitoring the health of feral animals and native wildlife to detect the emergence of new or exotic diseases
• educating livestock producers, industry organisations and service providers (transport and marketing) on their legislative obligations, relevant biosecurity, welfare and market assurance programs, and technological developments.

Notifiable diseases
Under state and territory legislation, jurisdictions proclaim certain diseases as ‘notifiable’. Animal owners and veterinarians have a legal requirement to report notifiable diseases to the government agricultural authorities when such diseases are suspected or diagnosed.

Notifiable diseases for each state and territory are those listed on the National Notifiable Animal Diseases list21 (i.e. exotic, emergency and endemic diseases of national significance), and additional diseases of regional significance in that jurisdiction. Government-appointed veterinarians and livestock inspectors monitor notifiable diseases and implement regulatory control programs, where necessary. They are authorised, in defined circumstances, to inspect, quarantine, test, treat and destroy affected livestock as part of regulated disease control or eradication.

Over the past 50 years, the coordinated efforts of state and territory animal health services (often assisted by nationally coordinated arrangements) have eradicated many notifiable diseases, including contagious bovine pleuropneumonia, bovine tuberculosis, bovine brucellosis, classical swine fever, equine influenza, highly pathogenic avian influenza, Newcastle disease and Menangle virus disease. Provisional freedom from enzootic bovine leucosis in Australia’s dairy cattle herd was declared in 2010, and there have been marked reductions in the prevalence of tick fevers, footrot and anthrax. The scale of these achievements is unique in world animal health systems.

Chemical residues
Chemical residue programs aim to keep animal products free from unacceptable levels of chemical contamination. Without these programs, animal products could contain a wide range of chemicals, including pesticides from soil, pasture or stockfeed; lead from discarded batteries; and veterinary drugs, such as anthelmintics, antibiotics and acaricides. Legislated chemical or residue-avoidance protocols and monitoring programs minimise the risk of chemical contamination, and severe penalties apply to livestock owners who fail to comply.

Livestock identification and tracing
State and territory animal health services enforce livestock identification and tracing legislation. All cattle, sheep and goat producers must identify their stock and record movements of stock on and off their properties on the NLIS database. This provides lifetime traceability of each animal and the ability to identify all other stock that each identified animal has had contact with during its lifetime. Pig and alpaca producers are currently developing NLIS systems with database recording.

Surveillance and other research
As well as administering legislation, state and territory animal health personnel conduct general surveillance and other applied research projects. They constantly watch for the emergence of new infectious diseases, whose impacts can be significantly reduced by early recognition and understanding. A number of recent emerging diseases have been detected in Australia and around the world, including
Hendra virus (a zoonosis). It is estimated that, worldwide, approximately 70% of emerging diseases have the potential to infect humans. This work requires close links with livestock producers, industry organisations, private veterinarians, veterinary laboratories, livestock transport and marketing agents, and other stakeholders.

State and territory animal health personnel provide disease diagnostic services, particularly for cases that are not routinely managed by private veterinarians, such as detailed investigations for exotic and emerging diseases and postmortem examination of livestock. The field staff are supported by government or government-contracted veterinary diagnostic laboratories, which provide reports to government.

Data gathered during these activities are recorded in disease information databases, to maintain disease profiles of districts and individual properties. Information that is collected, collated and analysed by the state and territory animal health systems is collated through the National Animal Health Information System; the information is used to issue health certificates for domestic and international trade and to produce reports on Australia’s animal disease status for the OIE.

Collaborative activities

Most of the advances in Australia in understanding and managing livestock diseases during the past 50 years have come from the partnership between government laboratories and field workers. This applied research has contributed significantly to the international veterinary textbooks on production animal diseases. Extension of this research to producers improves animal production and offers further opportunities for producer contact, which contributes to even better livestock disease intelligence.

Collaboration with industry strengthens government animal health services and contributes to high-quality policy decisions. It also leads to joint industry–government programs for awareness and improvement of biosecurity and welfare. Such programs have been applied for ovine brucellosis, ovine footrot, Johne’s disease, caprine arthritis–encephalitis, feedlot management and poultry production systems. To promote government–industry partnerships, the jurisdictions train livestock industry staff to work in EAD control centres.

Protecting human health from diseases and pests of animals and animal products is a key role of the jurisdictional animal health personnel, who work closely with their government public health counterparts in a joint approach to zoonoses such as chlamydophilosis, avian influenza and Hendra virus infection. Government animal health personnel also collaborate with wildlife organisations and national parks to ensure that disease outbreaks in wild and feral animals are managed to minimise their impact on livestock production and human health.

1.3.6 Private veterinary services and veterinary education

Private veterinary practitioners play a vital role in rural communities by providing livestock owners with animal health advice, and by investigating and treating disease. They also play an integral role in programs for detecting and responding to disease incidents in Australia’s livestock industries.

Veterinary practitioners must be registered in the state or territory in which they practise. Competence in recognising and diagnosing livestock diseases is an important part of veterinary education in Australia, and a prerequisite for registration as a veterinarian. All veterinary practitioners must be able to recognise the possibility of an EAD and be familiar with the procedures to initiate an immediate response. To maintain this awareness, state and territory authorities conduct awareness programs on notifiable and exotic livestock diseases for private veterinarians, particularly those involved in livestock industries.

The Accreditation Program for Australian Veterinarians is a national program that is designed to integrate private veterinary practitioners into the national animal health system, thus supporting the international standing of Australia’s animal health capability. The aim of the program is to accredit nongovernment veterinarians who can use their skills and knowledge effectively to contribute to government and industry animal disease-control programs.

Other national programs that involve private veterinarians in the national animal health system are the Australian Veterinary Practitioner Surveillance Network (see Section 3.2.4), the Australian Veterinary Reserve (see Section 4.2.2) and the National Significant Disease Investigation Program (see Section 3.4.4).

Australia has seven veterinary schools. Six of these — at the University of Queensland, the University of Sydney, the University of Melbourne, Murdoch University, Charles Sturt University and James Cook University — are currently producing graduates. The University of Adelaide, which opened its school of veterinary science in 2008, will see its first students graduate in 2014. All Australian veterinary courses include strong undergraduate programs in the health of horses, companion animals, farmed livestock and

The veterinary schools also provide research, continuing education and postgraduate training relevant to Australia’s livestock industries.

Once every six years, an accreditation committee audits the curriculum, facilities, staffing and outcomes of each of the established veterinary schools. Since 1999, this audit has been conducted by the Australasian Veterinary Boards Council, whose accreditation committee includes an international representative. The council sets the standards for veterinary registration in Australia and New Zealand, and conducts the National Veterinary Examination for overseas-qualified veterinarians.

### 1.3.7 Agricultural colleges and other registered training organisations

Agricultural colleges and other registered training organisations within the Australian vocational education and training sector provide training for veterinary nurses, animal technologists, farm managers and others whose work involves the care of animals. Students can participate in full-time training, mix part-time training with work, or begin their program while they are still at school. One of the hallmarks of the system is the active involvement of industry groups and employers in providing training opportunities and work experience. This training meets the requirements of national competency standards and vocational qualifications under the Australian Qualifications Framework. The standards are agreed by industry, professional organisations and each jurisdiction.

In 2011, a number of training package qualifications and units of competency relevant to the livestock and animal industries were reviewed and validated by industry representatives and state training authorities to ensure that they continued to meet the needs of industry.

### 1.4 National Livestock Identification System

The NLIS is Australia’s system for livestock identification and traceability. When fully implemented for a type of livestock, such as sheep, it should be a permanent, whole-of-life system that allows animals to be identified — individually or by mob — and tracked from property of birth to slaughter, for the purposes of food safety, product integrity and market access. Australia’s state and territory governments are responsible for the legislation that governs animal movements, and therefore for the implementation of the NLIS.

Information on animal movements is recorded on movement documents and submitted to the NLIS database by producers, saleyard operators, livestock agents and processors. The NLIS has been fully implemented for cattle, and improvements are being made to the system for sheep, goats and pigs. The NLIS is being developed for alpacas.

NLIS Limited administers the NLIS database on behalf of industry and government stakeholders. This includes managing the development and operation of the database in accordance with stakeholder requirements.

#### 1.4.1 NLIS for cattle

Development of the NLIS tracing system for cattle is now complete. NLIS (Cattle) is an electronic identification system in which each animal is tagged with an individual radio frequency identification device and accompanied by movement documentation when moved from a property. Animal movements from properties are recorded electronically in the NLIS database. Legislation in all states and territories requires animals to be identified and their movement recorded. During 2011, the system was further developed to enable animals to be identified with regard to residue and disease status. This involves assigning individual animals a status against their electronic tag number on the database. It was also agreed that the remaining exemptions from tagging would be removed.

#### 1.4.2 NLIS for sheep and goats

NLIS (Sheep and Goats) is a mob-based system for tracing mobs of sheep and farmed goats. It uses visually readable ear tags that have property identification codes printed on them. When mobs are transported, they are accompanied by a movement document, such as a National Vendor Declaration (NVD) or a waybill.

The NLIS (Sheep and Goats) Advisory Committee continued work on improving the system in response to issues identified following the traceability exercise, Exercise Sheepcatcher, which was held in 2007. The major change has been the introduction of mob-based recording on the central NLIS database. An independent working group has been established to evaluate the feasibility of individual electronic identification for sheep and goats from 2014.

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1.4.3 NLIS for pigs

The pig industry is continuing to develop NLIS (Pigs), working towards compliance with National Livestock Traceability Performance Standards. Currently, NLIS (Pigs) is a mob-based system based on tattoos and brands to identify the property of birth, along with movement documents.

During 2009, a pig tracing exercise, Exercise Pigcatcher, was conducted to test the system and identify areas requiring improvement. The exercise led to several recommendations for improving the system. Business rules for the operations of NLIS (Pigs) are now being developed.

1.4.4 NLIS for alpacas

NLIS (Alpaca) is under development. The alpaca industry is advocating the use of radio frequency identification tags that incorporate both radio frequency and visual readability in the one tag for animal identification. Currently, the system is voluntary.

1.5 Livestock industry quality assurance programs

The peak livestock industry associations contribute to national animal health policies and strategies, implement industry biosecurity plans and promote sound animal health management practices to livestock producers. Quality assurance (QA) programs in the livestock industries are central to on-farm biosecurity and food-safety practices. In general, there is an increasing demand for industries to meet high QA expectations. Examples of livestock industry QA programs are detailed below.

1.5.1 Livestock Production Assurance for the red meat industry

The Australian red meat industry (cattle, sheep and goats) has developed and implemented integrity systems to verify and assure food safety and other quality attributes of livestock.

Livestock Production Assurance (LPA), which began on 1 March 2004, is an on-farm food-safety certification program for cattle, sheep and goats. It was developed by Meat & Livestock Australia, in conjunction with industry peak councils and stakeholders.

The LPA program is associated with on-farm food-safety guidelines, which underpin food-safety declarations on NVDs displaying the LPA logo. The LPA food-safety program (Level 1) standards follow hazard analysis and critical control points (HACCP) principles and comprise five elements:

- property risk assessment — ensures that livestock are not exposed to areas on a property that are contaminated with organochlorides or other persistent chemicals
- safe and responsible animal treatments — ensures that livestock intended for human consumption do not contain unacceptable chemical residues or physical hazards
- stock foods, fodder crops, grain and pasture treatments — ensures that livestock are not exposed to feeds containing unacceptable contamination, especially animal products or unacceptable chemical residues
- preparation for dispatch of livestock — ensures that livestock to be transported are fit for the journey and not unduly stressed, and that contamination is minimised during on-farm assembly and transport to the destination
- livestock transactions and movements — ensures that the movement of livestock can be traced, if necessary, and that the livestock are accompanied by information on their status with regard to exposure to chemical residues.

The LPA on-farm QA program (Level 2) incorporates the CATTLECARE and FLOCKCARE programs, and consists of three modules: Food Safety Management (LPA Level 1), Systems Management and Livestock Management. This industry-recognised QA program emphasises internal and external systems review.

Systems Management comprises:

- training
- internal auditing and document control
- quality records
- chemical inventory.

Livestock Management comprises:

- livestock husbandry and preparation
- livestock-handling facilities
- livestock transport
- animal welfare
- accredited livestock.

The LPA programs are managed on behalf of the red meat industry by AUS-MEAT through the LPA Advisory Committee.

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25 HACCP is a systematic preventive approach to food safety that addresses physical, chemical and biological hazards by prevention, rather than inspection of the finished product. HACCP is used in the food industry to identify potential food safety hazards, so that key actions, known as critical control points, can be taken to reduce or eliminate the risk of the hazards being realised.
This committee includes representatives from industry sectors, including cattle, sheep, goat and dairy producers, processors and livestock agents. The Australian Government participates through representation from DAFF Biosecurity.

1.5.2 National Feedlot Accreditation Scheme

The Australian feedlot industry was the first agriculturally based industry in Australia to embrace QA, and its National Feedlot Accreditation Scheme (NFAS) has been in place since 1995. This self-regulatory program, which has accredited approximately 600 feedlots, covers animal health and welfare, environmental conservation and product integrity. Third-party annual auditing of every accredited feedlot ensures that the scheme’s high standards are met.

The Australian Lot Feeders’ Association (ALFA), the peak body of Australia’s feedlot industry, works with governments and other industry bodies to ensure continuous improvement of the NFAS, so that it keeps abreast of developments in legislation, codes of practice, guidelines, technology, best management practice and science.

The NFAS is managed by the Feedlot Industry Accreditation Committee, which comprises government and industry representatives from around Australia. The independence of the committee from ALFA provides the scheme with important autonomy, while government representation on the committee ensures its integrity and credibility.

Relevant technical information on heat stress, biosecurity and pertinent disease issues is compiled by Meat & Livestock Australia, ALFA and AHA, and is used to develop and continually update standards and awareness materials, which are incorporated into the accreditation scheme. This ensures that feedlot managers operate in accordance with the requirements and expectations of consumers, markets, regulatory authorities and the wider community.

Lot feeders receive new technical information from several sources. An annual feedlot conference, which highlights research and best management practices from Australia and around the world, aims to improve knowledge, systems and awareness of animal health and welfare. ALFA holds animal health and welfare workshops in regions across Australia each year, with the participation of experienced feedlot veterinarians. These well-attended workshops provide practical information for the day-to-day management of animal health and welfare on feedlots. Other promotional materials, including DVDs and fact sheets containing industry case studies, have been used to deliver information on heat stress, biosecurity and other matters.

A new version of the NFAS, with updated rules and standards, was released in early 2011, following an extensive review. The key changes were reinforced to lot feeders at a series of workshops around Australia and at the ALFA BeefWorks conference in October 2011.

1.5.3 Dairy industry quality assurance program

Australia has comprehensive food standards, legislation and regulation that apply across the dairy production and processing chain, from farm to consumer, under the requirements of the Australia New Zealand Food Standards Code (Standard 4.2.4: Primary production and processing standard for dairy products). The production and processing chain monitors compliance with food standards to ensure the integrity of the dairy supply chain.

The Australian dairy food-safety scheme has three elements:

- Dairy farms and dairy companies must have a food-safety program that is developed, validated and approved by the competent government authority to national and international standards.
- Individual programs must be verified under legislation from farm through to retail or export.
- Each business (farm or manufacturing company) is licensed, and compliance against the food-safety program is checked by audit.

Industry and government support programs underpin the scheme, and the partnership between industry and government is a critical factor in its success. The food-safety requirements of the dairy industry on-farm QA programs are complemented by recommended biosecurity elements to protect animal health and cover provisions of national disease-control programs, including for enzootic bovine leucosis and Johnne’s disease.

The state dairy food-safety authorities license the operation of farm businesses. All on-farm dairy food-safety programs are HACCP based and cover the following core areas, which are relevant to both milk and meat production:

- physical, chemical and microbiological contaminants
- herd health programs (including safe and responsible animal treatments)
- dairy milking premises
- hygienic milking
- water supply and quality
- cleaning and sanitising
- identification of animals from birth
traceability systems for both farm inputs (including treatment of animal feeds and pasture) and farm outputs (milk, and animal or meat products)
appropriate records to enable verification
the competence of personnel.

All dairy companies have product identification and traceability systems to follow raw materials and products from farm to consumer.

1.5.4 Australian Pork Industry Quality Assurance Program

The Australian Pork Industry Quality Assurance Program (APIQ✓) is owned and administered by Australian Pork Limited on behalf of the Australian pork industry. As at 30 September 2011, APIQ✓ covered 85% of the Australian breeding herd and 557 pig farm enterprises.

APIQ✓ is an independently audited on-farm QA system, based on managing farm risks by following good agricultural practices, using HACCP principles. To gain APIQ✓ certification, producers must meet standards in five key areas:
• management
• food safety
• animal welfare
• biosecurity
• traceability.

APIQP® became the sole QA program for pork producers following an in-depth review of industry QA in 2009–10, which led to replacement of the PigPass Quality Assurance (PPQA) program and APIQ by APIQP®. PPQA was a food-safety program only; by January 2012, there will be no producers certified under PPQA. Since implementation of APIQP®, approximately 80% of PPQA-certified producers have made the transition to APIQP®. Some producers have left the industry, and others no longer maintain QA because it is not required by their buyers.

Rollout of APIQ✓ began in October 2010 and will be completed by March 2012. Existing APIQ-certified producers will move to APIQ✓ as their annual renewals fall due, and new producers will move directly to APIQ✓.

All pig production systems, including free-range, outdoor-bred and indoor systems, are covered by APIQ✓. Two categories of producers — Small Holders and Large Holders — are recognised, with specific tools available to assist them with record keeping, which is a requirement of the APIQP® standards. The Small Holder category covers producers who own or manage 20 or fewer sows or sell 400 or fewer pigs annually. Traditionally, these producers have found it difficult to participate in QA.

All APIQ✓-certified producers must have an annual on-site compliance audit conducted by a certified independent auditor and meet all the certification requirements. Auditors must be APIQ✓ registered, be accredited by RABQSA (the Registrar Accreditation Board and the Quality Society of Australasia), have a minimum accreditation as a National Food Safety Auditor, Level 2, with APIQ✓ Scope (an examination to test knowledge of the pig industry), and have attended the APIQP® auditor training program. They must be a third party with no conflicting interests and must not audit the same piggery for more than three consecutive years. Each auditor’s skills and practices are assessed annually through an independent on-farm witness audit process. APIQ✓ auditors must renew their registration each year.

The APIQ✓ system and program are audited annually by an independent certifying body to ensure that their policies, processes and administration are robust, reliable and of a high standard.

The APIQ Panel, comprising independent experts, has been established to consider major or critical incidents involving producers and auditors, and determine courses of action, in accordance with APIQ✓ certification policies.

APIQ✓ also underpins the PigPass NVD, which includes sections relating to pig ownership and health status (withholding periods, export slaughter intervals and food safety). When the PigPass NVD is linked to a certified and audited on-farm QA program such as APIQ✓, it meets the requirements of the state food authorities and DAFF Biosecurity under the Australian standard Hygienic Production and Transportation of Meat and Meat Products for Human Consumption (AS 4696:2007).
1.5.5 Egg Corp Assured, the national egg quality assurance program

On behalf of the egg industry, the Australian Egg Corporation Limited (AECL) maintains the EggCorp Assured (ECA) national QA program. The program is an integral part of the egg industry’s commitment as a signatory to the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses (Emergency Animal Disease Response Agreement) and to the industry’s corporate social responsibility. ECA provides standards for best practice in the egg industry relating to:

- animal welfare
- animal health
- quarantine and biosecurity
- food safety
- egg labelling
- environmental management.

Launched in November 2004, the program is governed by certification rules; a registered trademark; a registration and licensing process; a suite of policies and procedures; and an independent, third-party auditing regime. Voluntary uptake of the program by industry has led to ECA registering 177 farms in 2011. The program covers more than 11.5 million laying hens — 79% of the national flock.

To ensure that the program remains relevant and continues to improve, ECA was reviewed during 2009. It has since been converted to a standard, drawing on the resources of a technical advisory committee of experts and industry representatives. The new egg standard will be launched to both the egg industry and customers in 2012; the current ECA program will be phased out at the same time.

AECL, the ECA trademark owner and program administrator, has licensed auditors who have RABQSA accreditation and have attended the ECA auditor training program. All auditor accreditations must be renewed each year. Prerequisites are that auditors complete at least four ECA audits and attend an egg-related auditor training workshop each year.

With the pending launch of the new egg standard in 2012, AECL has moved to global auditing companies to manage the audit regime of the standard. Two such companies have been given exclusive auditing rights. AECL has appointed two senior auditors to review every audit and has implemented a program of spot audits of at least 20% of licensees each year. Other features of the ECA program are unique identification master logos for egg businesses with multiple farm sites, and an Egg Labelling Integrity Panel to approve label designs and critical market information, to ensure market transparency.

A series of QA training workshops is held annually in all states and territories for egg producers, ECA-licensed farms and ECA-accredited auditors. The purpose of the workshops is to educate and inform attendees on how to incorporate any new components of the national QA program, from both a practical farm point of view and an auditor’s perspective. The program is continually being improved to maintain its relevance to a changing marketplace and improve its integrity.

1.5.6 Australian Chicken Meat Federation’s customer-driven quality systems

In 2010, the Australian Chicken Meat Federation produced and distributed a revised version of the National Farm Biosecurity Manual for Chicken Growers. The revision was based on the original 2002 Biosecurity Manual for Contract Growers and informed by the National Farm Biosecurity Manual for Poultry Production, which was published in 2009 as a result of a joint effort between DAFF, AHA and the poultry industry. The revised manual has an auditable checklist. It is an important component of the industry’s promotional and training activities, which will continue in 2011–12.

All jurisdictions have agreed that implementation of the National Farm Biosecurity Manual for Chicken Growers will satisfy the requirements for farming of poultry in the new Primary Production and Processing Standard for Poultry Meat, issued by Food Standards Australia New Zealand. The new standard will come into effect on 20 May 2012.

An auditable industry animal welfare standard for all aspects of the chicken meat industry was finalised in 2009. Processors are encouraged to integrate these industry standards into their in-house QA systems.

Implementation of these welfare standards and biosecurity measures relies heavily on the integrated nature of much of the chicken meat industry — processors have contractual arrangements with growers and are themselves bound by the requirements of customers, especially the quick-service restaurants and supermarket chains.

1.5.7 Q-Alpaca

Q-Alpaca, designed and managed by the Australian Alpaca Association Ltd, is a QA program for voluntary use by Australian alpaca breeders and owners. Q-Alpaca is fully endorsed by all Australian Government and state and territory animal health authorities.
Q-Alpaca has a number of intentions:

- The program encourages development and adoption of easier and more affordable processes for diagnosis, monitoring and management of known diseases.
- The program reduces the risk that a defined EAD could affect a herd in the event of a disease outbreak.
- The health of participating alpaca herds is closely monitored. All deaths within the herd must be investigated by an approved veterinarian — this requirement relates to all dead alpacas 12 months of age and over, and all dead alpacas under 12 months of age that show signs of wasting and diarrhoea (resulting in Johne’s disease in the differential diagnosis). Necropsy is required to eliminate Johne’s disease, severe worm infestation, liver disease, gastric ulceration, liver fluke infestation and coccidiosis. The program allows other diseases to be investigated in the necropsy, if required.
- The program is fully auditable — owners of participating alpaca herds are required to keep movement records and adopt sound biosecurity practices with regard to new arrivals to the herd, and appropriate and adequate fencing.
- An agreement signed between the participant and the approved veterinarian forms the basis of a partnership for adhering to the requirements of Q-Alpaca and the adoption of best practice in biosecurity.
- There is minimal chance of introducing certain preventable infections and infestations or transferring them to another alpaca herd. Preventable conditions include Johne’s disease, severe worm infestation, liver disease, gastric ulceration, liver fluke infestation and coccidiosis.

1.5.8 Other quality assurance programs

In 2011, the first edition of the National Zoo Biosecurity Manual was produced as a cooperative initiative between the Zoo and Aquarium Association, the AWHN, DAFF and the Australian zoo industry. The Zoo Animal Health Reference Group, representing large and small Australian zoos, provided significant technical input.

The Code of Practice for the Manufacturing and Marketing of Pet Food, produced by the Pet Food Industry Association of Australia, was upgraded to an Australian standard through the Standards Australia process. The new Australian standard Manufacturing and Marketing of Pet Food (AS 5812:2011) was published in March 2011, and pet food manufacturers can now become AS 5812:2011 accredited by demonstrating compliance with the standard. The focus of the standard is on the safety of multi-ingredient manufactured food for feeding to pets, and on ensuring that products are accurately labelled and do not mislead purchasers.

The Australian Veterinary Association and the Pet Food Industry Association of Australia are developing a system for gathering and analysing information about suspected pet food safety incidents, so that potential problems can be identified and action taken. The system — Pet Food Adverse Event System of Tracking — is in its final stages of development and is expected to be operational in early 2012.
Note: The zones indicated on this map are broad and small areas of different microclimates may exist within larger zones. Unexpected weather events can also lead to different local microclimates.
Australia has a long history of freedom from the major epidemic diseases of livestock. The geographical isolation of the continent provides a natural quarantine barrier, which is supported by sound quarantine policies and a history of successful disease-eradication campaigns.

The spread of some endemic diseases in animals in Australia is limited by climate and the animal production enterprises present in a particular area. Tick fever, for example, occurs only in parts of northern Australia where the climate is suitable for the tick vectors.
Control and eradication of animal diseases are managed by state and territory governments, often with the support of industry accreditation schemes. Chapter 1 describes the coordinating mechanisms that are in place to provide national consistency — for example, the Animal Health Committee (AHC). For some endemic diseases (e.g. Johne’s disease), government and industry have agreed that a nationally coordinated program is necessary to reduce the risk of disease spread between regions and individual properties.

This chapter provides information about Australia’s reporting system for animal diseases, Australia’s status for all nationally significant terrestrial animal diseases, and control programs for endemic diseases of national significance in terrestrial animals.

### 2.1 Nationally notifiable animal diseases

The national list of notifiable animal diseases facilitates disease reporting and control by ensuring that unusual incidents involving animal mortality or sickness, and diseases of public health significance, are investigated, and by requiring reporting of diseases on the list. The list is regularly reviewed by the AHC, and was last reviewed during 2010. It takes into account key diseases on the list of diseases that are notifiable to the World Organisation for Animal Health (OIE), and also includes endemic diseases of national significance.

The requirement to report a notifiable disease is contained in state and territory legislation. State and territory lists of notifiable diseases contain all the diseases on the national list, as well as others that are of particular interest to an individual state or territory.

### 2.2 International reporting

Australia provides the OIE with routine information about OIE-listed diseases through reports every six months. Information on other diseases of interest to the OIE is reported through annual questionnaires. Tables 2.1 and 2.2 show Australia’s status for both these categories in 2011.

#### Table 2.1 Australia’s status for OIE-listed diseases of terrestrial animals, 2011

<table>
<thead>
<tr>
<th>Disease</th>
<th>Status</th>
<th>Date of last occurrence and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple-species diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anthrax</td>
<td>Present</td>
<td>Limited distribution; last occurrence 2010</td>
</tr>
<tr>
<td>Aujeszky’s disease</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Bluetongue</td>
<td>Viruses present</td>
<td>Restricted to specific northern areas of Australia; sentinel herd program</td>
</tr>
<tr>
<td>Brucellosis (Brucella abortus)</td>
<td>Free</td>
<td>Australia declared freedom in 1989</td>
</tr>
<tr>
<td>Brucellosis (B. melitensis)</td>
<td>Free</td>
<td></td>
</tr>
<tr>
<td>Brucellosis (B. suis)</td>
<td>Serological</td>
<td>Maintained in feral pigs in northern Australia; rare occurrence in domestic pigs; occurred in a free-range piggery in 2010</td>
</tr>
<tr>
<td>Crimean Congo haemorrhagic fever</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Echinococcosis/hydatidosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Epizootic haemorrhagic disease</td>
<td>Virus present</td>
<td>Disease has not been reported</td>
</tr>
<tr>
<td>Equine encephalomyelitis (eastern)</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Foot-and-mouth disease</td>
<td>Free</td>
<td>1872; officially recognised by the OIE as free without vaccination</td>
</tr>
<tr>
<td>Heartwater</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>Serological</td>
<td>Detected annually in Torres Strait, and on Cape York in 1998 and 2004</td>
</tr>
<tr>
<td>New World screw-worm fly (Cochliomyia hominivorax)</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Old World screw-worm fly (Chrysomya bezziana)</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Paratuberculosis</td>
<td>Present</td>
<td>National control/management programs</td>
</tr>
</tbody>
</table>
Table 2.1 Australia’s status for OIE-listed diseases of terrestrial animals, 2011 (continued)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Status</th>
<th>Date of last occurrence and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q fever</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Rabies</td>
<td>Free</td>
<td>1867</td>
</tr>
<tr>
<td>Rift Valley fever</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Rinderpest</td>
<td>Free</td>
<td>1923</td>
</tr>
<tr>
<td>Trichinosis</td>
<td>Not reported</td>
<td><em>Trichinella spiralis</em> not present; <em>T. pseudospiralis</em> present in wildlife</td>
</tr>
<tr>
<td>Tularaemia</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Vesicular stomatitis</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>West Nile fever</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td><strong>Cattle diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bovine anaplasmosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Bovine babesiosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Bovine genital campylobacteriosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Bovine spongiform encephalopathy</td>
<td>Free</td>
<td>Never occurred; National Transmissible Spongiform Encephalopathies Freedom Assurance Program includes surveillance; official OIE ‘negligible risk’ status</td>
</tr>
<tr>
<td>Bovine tuberculosis</td>
<td>Free</td>
<td>Australia declared freedom in 1997; last case in any species (including free-living) reported in 2002</td>
</tr>
<tr>
<td>Bovine viral diarrhoea</td>
<td>Present</td>
<td>Bovine viral diarrhoea virus (BVDV) 1 — present; BVDV-2 — never occurred</td>
</tr>
<tr>
<td>Contagious bovine pleuropneumonia</td>
<td>Free</td>
<td>1967; Australia declared freedom in 1973; officially recognised by the OIE as free</td>
</tr>
<tr>
<td>Enzootic bovine leucosis</td>
<td>Present</td>
<td>Licensed dairy cattle herds monitored free of disease; Australia declared provisional freedom of the Australian dairy herd in 2010</td>
</tr>
<tr>
<td>Haemorrhagic septicaemia</td>
<td>Free</td>
<td>Never occurred; strains of <em>Pasteurella multocida</em> present, but not the 6b or 6e strains that cause haemorrhagic septicaemia</td>
</tr>
<tr>
<td>Infectious bovine rhinotracheitis/infectious pustular vulvovaginitis</td>
<td>Present</td>
<td>Bovine herpesvirus (BHV) 1.2b — present; BHV-1.1 and 1.2a — never occurred</td>
</tr>
<tr>
<td>Lumpy skin disease</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Theileriosis</td>
<td>Free</td>
<td><em>Theileria parva</em> and <em>T. annulata</em> not present</td>
</tr>
<tr>
<td>Trichomonosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Trypanosomosis (tsetse borne)</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td><strong>Sheep and goat diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caprine arthritis–encephalitis</td>
<td>Present</td>
<td>Voluntary accreditation schemes exist</td>
</tr>
<tr>
<td>Contagious agalactia</td>
<td>Not reported</td>
<td><em>Mycoplasma agalactiae</em> has been isolated, but Australian strains do not produce agalactia in sheep</td>
</tr>
<tr>
<td>Contagious caprine pleuropneumonia</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Enzootic abortion of ewes (ovine chlamydiosis)</td>
<td>Not reported</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Maedi–visna</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Nairobi sheep disease</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Ovine epididymitis (<em>Brucella ovis</em>)</td>
<td>Present</td>
<td>Voluntary accreditation schemes in all states</td>
</tr>
<tr>
<td>Peste des petits ruminants</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
</tbody>
</table>
Table 2.1 Australia’s status for OIE-listed diseases of terrestrial animals, 2011 (continued)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Status</th>
<th>Date of last occurrence and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonellosis (Salmonella Abortusovis)</td>
<td>Free</td>
<td>Never occurred; Salmonella Abortusovis was isolated in 1994 from two children, but surveillance has shown no evidence of infection in sheep</td>
</tr>
<tr>
<td>Scrapie</td>
<td>Free</td>
<td>1952</td>
</tr>
<tr>
<td>Sheep pox and goat pox</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td><strong>Equine diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African horse sickness</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Contagious equine metritis</td>
<td>Free</td>
<td>1980</td>
</tr>
<tr>
<td>Dourine</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Equine encephalomyelitis (western)</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Equine infectious anaemia</td>
<td>Present</td>
<td>Limited distribution/sporadic occurrence</td>
</tr>
<tr>
<td>Equine influenza</td>
<td>Free</td>
<td>Australia’s first outbreak of equine influenza occurred between 24 August and 25 December 2007; Australia declared freedom according to OIE standards on 25 December 2008</td>
</tr>
<tr>
<td>Equine piroplasmosis</td>
<td>Free</td>
<td>1976</td>
</tr>
<tr>
<td>Equine rhinopneumonitis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Equine viral arteritis</td>
<td>Serological evidence</td>
<td></td>
</tr>
<tr>
<td>Glanders</td>
<td>Free</td>
<td>1891</td>
</tr>
<tr>
<td>Venezuelan equine encephalomyelitis</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td><strong>Swine diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African swine fever</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Classical swine fever</td>
<td>Free</td>
<td>1962</td>
</tr>
<tr>
<td>Nipah virus encephalitis</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Porcine cysticercosis</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Porcine reproductive and respiratory syndrome</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Swine vesicular disease</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Transmissible gastroenteritis</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td><strong>Avian diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avian chlamydiosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Avian infectious bronchitis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Avian infectious laryngotracheitis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Avian mycoplasmosis (Mycoplasma gallisepticum)</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Avian mycoplasmosis (M. synoviae)</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Duck virus hepatitis</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Fowl cholera</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Fowl typhoid</td>
<td>Free</td>
<td>1952</td>
</tr>
<tr>
<td>Highly pathogenic avian influenza</td>
<td>Free</td>
<td>1997</td>
</tr>
<tr>
<td>Infectious bursal disease (Gumboro disease)</td>
<td>Present</td>
<td>Infectious bursal disease occurs in a mild form; very virulent strains not present</td>
</tr>
<tr>
<td>Low pathogenic notifiable avian influenza (poultry)</td>
<td>Free</td>
<td>Not reported in commercial poultry</td>
</tr>
<tr>
<td>Newcastle disease in poultry</td>
<td>Lentogenic viruses present</td>
<td>Virulent Newcastle disease last occurred in poultry in 2002</td>
</tr>
<tr>
<td>Pullorum disease</td>
<td>Present</td>
<td>Not in commercial chickens</td>
</tr>
</tbody>
</table>
### Table 2.1 Australia’s status for OIE-listed diseases of terrestrial animals, 2011 (continued)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Status</th>
<th>Date of last occurrence and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey rhinotracheitis</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td><strong>Lagomorph diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myxomatosis</td>
<td>Present</td>
<td>Used as a biological control agent for wild rabbits</td>
</tr>
<tr>
<td>Rabbit haemorrhagic disease</td>
<td>Present</td>
<td>Used as a biological control agent for wild rabbits</td>
</tr>
<tr>
<td><strong>Bee diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acarapisosis of honey bees</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>American foulbrood of honey bees</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>European foulbrood of honey bees</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Small hive beetle</td>
<td>Present</td>
<td>Restricted distribution</td>
</tr>
<tr>
<td><em>Tropilaelaps</em> infestation of honey bees</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Varroosis of honey bees</td>
<td>Free</td>
<td><em>Varroa destructor</em> has never been reported in Australia</td>
</tr>
<tr>
<td><strong>Other diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camel pox</td>
<td>Free</td>
<td>Never occurred</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>Novel organism found</td>
<td>A new <em>Leishmania</em> species has been isolated from skin lesions in a group of captive red kangaroos. Occasionally, cases of leishmaniasis are reported in imported dogs</td>
</tr>
</tbody>
</table>

*OIE = World Organisation for Animal Health*

*a In August 2011 a paramyxovirus not previously reported in Australia was detected in owned pigeons in Victoria. Disease caused by this avian paramyxovirus has not spread to poultry. Further details of this incident can be found in Section 4.6.3.*

### Table 2.2 Australia’s status for other diseases of terrestrial animals that are reported to the OIE each year, 2011

<table>
<thead>
<tr>
<th>Disease</th>
<th>Status</th>
<th>Date of last occurrence and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actinomycosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Avian encephalomyelitis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Avian leucosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Avian salmonellosis (excluding fowl typhoid and pullorum disease)</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Avian spirochaetosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Blackleg</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Botulism</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Caseous lymphadenitis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Coccidiosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Contagious ophthalmia</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Contagious pustular dermatitis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Distomatosis (liver fluke)</td>
<td>Present</td>
<td>Restricted distribution</td>
</tr>
<tr>
<td>Enterotoxaemia</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Equine coital exanthema</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Filariosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Footrot</td>
<td>Present</td>
<td>Restricted distribution</td>
</tr>
<tr>
<td>Infectious coryza</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Intestinal <em>Salmonella</em> infections</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Listeriosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Melioidiosis</td>
<td>Present</td>
<td>Restricted distribution</td>
</tr>
<tr>
<td>Nosemosis of bees</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Salmonellosis (<em>Salmonella</em> Abortusequi)</td>
<td>Free</td>
<td>Never reported</td>
</tr>
<tr>
<td>Sheep mange</td>
<td>Free</td>
<td>1896</td>
</tr>
</tbody>
</table>
Table 2.2 Australia’s status for other diseases of terrestrial animals that are reported to the OIE each year, 2011 (continued)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Status</th>
<th>Date of last occurrence and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strangles</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Swine erysipelas</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Toxoplasmosis</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Ulcerative lymphangitis</td>
<td>Free</td>
<td>Never reported</td>
</tr>
<tr>
<td>Vibronic dysentery</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Warble fly infestation</td>
<td>Free</td>
<td>Never reported</td>
</tr>
<tr>
<td>Other clostridial infections</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>Other pasteurelloses</td>
<td>Present</td>
<td></td>
</tr>
</tbody>
</table>

OIE = World Organisation for Animal Health

2.3 National reporting system for animal diseases in Australia

Australia’s National Animal Health Information System (NAHIS), redeveloped and launched in January 2006, collates data from a wide range of government and nongovernment surveillance and monitoring programs to provide an overview of animal health in Australia. The information in NAHIS is essential for supporting trade in animal commodities and meeting Australia’s international reporting obligations.

Figure 2.1 summarises the sources of data in NAHIS, including surveillance and monitoring programs, control programs, diagnostic laboratories and veterinary investigations.

In 2009, NAHIS was expanded to house data that are accessed by two other surveillance program applications — NAMPInfo (information system for the National Arbovirus Monitoring Program) and EDIS (Endemic Disease Information System). All applications managed by NAHIS use the same underlying Central Animal Health Database, but maintain separate and distinct web interfaces. NAHIS provides selected summaries of national animal health data and disease information sheets; NAMPInfo provides the official interactive bluetongue virus zone map; and EDIS has a searchable register of herds and flocks in the Australian Johne’s disease Market Assurance Program.

NAHIS data are routinely reported, together with case reports of veterinary investigations, in the Animal Health Surveillance Quarterly newsletter, and are used by the Australian Government in reports to the OIE, the Food and Agriculture Organization of the United Nations, and the World Health Organization. Current disease surveillance reports and publications are available on the NAHIS page of the Animal Health Australia (AHA) website.26

2.4 Endemic diseases of national significance

This section describes the status of, and programs for, endemic animal diseases of national significance in 2011. Disease notifications for the Australian Capital Territory are included within New South Wales reporting.

2.4.1 American foulbrood

American foulbrood (AFB) is a brood disease of honey bees caused by the spore-forming bacterium *Paenibacillus larvae* subsp. *larvae* (formerly *Bacillus larvae*). The disease attacks bee larvae, eventually killing the affected hive. It is particularly difficult to treat because the bacteria form spores that are resistant to heat, drying and chemicals. The recommended treatment for AFB-infected hives is to depopulate the hives; burn or bury the dead bees; then burn, bury or irradiate the hive material.

AFB is nationally notifiable and subject to control programs in several states. It is endemic in New South Wales, Queensland, South Australia (except for Kangaroo Island, which remains free), Tasmania, Victoria and Western Australia. It has not been reported in the Northern Territory.

**New South Wales**

In New South Wales, from December 2010 to November 2011, there was an increase in the number of beekeepers that had an officially recorded outbreak of AFB (including beekeepers with no previous history of the disease), although fewer individual beehives were officially recorded as being infected.

In areas where there has been a high incidence of AFB, the Compliance Unit of the New South Wales Department of Primary Industries has conducted special apiary compliance operations. These aim to raise awareness of the apiary industry’s responsibilities under the New South Wales Apiaries Act 1985, to detect breaches of the Act and to allow action to be taken, where necessary. The industry
Figure 2.1 Sources of data in the National Animal Health Information System (NAHIS)

- National Significant Disease Investigation Program (private practitioners)
- Freedom assurance programs (screw-worm fly and transmissible spongiform encephalopathy)
- Government veterinary investigations (suspect emergency or notifiable diseases)
- Laboratory testing (for surveillance, export testing and endemic disease management)
- Northern Australia Quarantine Strategy

- National Residue Survey (meat)
- Australian Milk Residue Analysis Survey
- National Enteric Pathogen Surveillance Scheme
- National Notifiable Diseases Surveillance System (zoonoses)
- Australian Wildlife Health Network

Publicly available outputs
- *Animal Health Surveillance Quarterly* report
- *Animal Health in Australia* — annual report
- NAHIS disease information sheets
- Project-based surveillance reports (summary data)
- *JD News* (Johne’s disease)
- NAMP annual report

- Primary animal health data managed in the Central Animal Health Database
- Summary data collated and reproduced in the database from an external animal health source
- Summary data collated and reproduced in the database from an external public health source
- Descriptive reports of wildlife morbidity and mortality events from an external source
has assisted New South Wales Department of Primary Industries apiary inspectors during these operations with information about the location of abandoned, neglected and/or diseased hives and with the removal of such hives for destruction.

**Queensland**

During 2011, some areas of Queensland, including the Sunshine Coast, experienced an increase in AFB outbreaks. Biosecurity Queensland apiary staff conduct monthly information sessions for beekeepers in various locations, which cover sterilisation, control and management techniques.

**South Australia**

AFB is present to varying degrees throughout South Australia, except for Kangaroo Island, which remains free from the disease. Detection of AFB is achieved predominantly through a combination of apiarist reporting, packer testing and active disease surveillance.

**Tasmania**

Tasmania has no government control program for AFB, but the Tasmanian apiary industry has established the Apiary Industry Disease Control Program for voluntarily registered beekeepers. Registration fees fund the testing of honey samples for AFB. This assists in disease surveillance by encouraging broad participation by both commercial and recreational beekeepers.

The Tasmanian Department of Primary Industries, Parks, Water and Environment offers free inspection of hives and an advisory service to apiarists when positive hives are identified from honey samples. In 2011, 213 honey samples were submitted to the laboratory for testing, and 90 of these tested positive for AFB.

**Victoria**

Until mid-2011, the Victorian Department of Primary Industries managed the AFB Smart Program, an initiative to help beekeepers detect AFB early and control the disease. From 2002, free honey culture tests were offered to all registered beekeepers. Although the program and testing subsidy have been suspended in Victoria, beekeepers are encouraged to seek laboratory confirmation of AFB when it is suspected.

**Western Australia**

Beekeepers in Western Australia are required to register their beehives and report occurrences of AFB in their apiaries. Eradication action is also required, and failure to take action can lead to the imposition of quarantine measures and a requirement to follow a management plan. The Department of Agriculture and Food Western Australia provides a diagnostic service that allows beekeepers to monitor the AFB status of their apiaries and allows the department to monitor infected apiaries. These measures support a quality assurance program, B-Qual, which has been adopted by the industry. The percentage of infected apiaries in 2011 remains low (6–10%).

### 2.4.2 Anthrax

Anthrax is on the list of nationally notifiable diseases and is subject to compulsory government controls, including quarantine, disposal of carcasses, and vaccination and tracing of at-risk animals and their products. Areas at risk of anthrax occurrence, which are well defined, include the northern and north-eastern districts of Victoria and central New South Wales. In these areas, anthrax has a low prevalence and occurs only sporadically (Figure 2.2).

Anthrax has never been recorded in the Northern Territory. In Queensland, the most recent confirmed cases were in 2002 (six animals) and 1993 (one animal). South Australia’s last recorded anthrax outbreak was in 1914, and Tasmania’s was more than 77 years ago. The only case in Western Australia was an isolated case in 1994.

All suspect cases of anthrax are investigated and controlled according to an agreed jurisdictional program.

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**Figure 2.2** Areas of Australia where anthrax is known to occur sporadically; lighter colour indicates fewer occurrences
New South Wales

No reports of anthrax were made in New South Wales during 2011. This appears to be the longest period on record with no cases in the state, with the last reported case being in early November 2010. A total of 59 investigations were undertaken to exclude anthrax as the cause of death — 25 on cattle, 1 on bison, 27 on sheep, 5 on horses and 2 on pigs (one of which involved sheep). These represent 26,466 animals at risk (i.e. those that are susceptible and potentially exposed), involving 447 deaths.

An immunochromatographic test (ICT) for anthrax (see ‘Victoria’, below) was introduced in New South Wales in late 2010. Of the anthrax exclusions, diagnosis was made on the basis of the ICT alone in 12 cases.

Victoria

No cases of anthrax were detected in Victoria in 2011. A total of 52 submissions, representing 167 cases of sudden death mostly in cattle, were received for anthrax exclusion by the Attwood laboratory of the Victorian Department of Primary Industries. An ‘animal-side’ ICT has been used for the past several years in Victoria as a rapid anthrax-screening field test for investigating sudden, unexplained deaths in ruminant livestock. Following approval of this test in 2010 by the Sub-Committee on Animal Health Laboratory Standards, the ICT kits have been manufactured at the department’s Attwood site and are being supplied for use in other states.

2.4.3 Caprine arthritis–encephalitis

Caprine retrovirus causes caprine arthritis–encephalitis (CAE), a multisystemic, inflammatory condition of goats. The disease is found in most countries in the world, including Australia, and has been reported in all Australian states and territories apart from the Northern Territory. CAE is not included on the list of nationally notifiable diseases in Australia. Although Australia has no regulatory control programs for CAE, there are some voluntary accreditation programs based on serological testing. Animals testing positive are removed from the herd.

In New South Wales, a voluntary control program is available to goat producers and currently includes 10 CAE-accredited herds. Clinical cases of CAE have been reported in two dairy goat herds.

In South Australia, where CAE is present, the Dairy Goat Society of South Australia has a voluntary market assurance scheme.

Queensland has had a voluntary control program for dairy goats since 1987. In December 2011, the program had 86 CAE-accredited herds.

CAE is a notifiable disease in Victoria. Two clinical cases were reported during 2011.

CAE is not a notifiable disease in Western Australia. The voluntary CAE accreditation scheme ceased in 2005.

2.4.4 Cattle tick and tick fever

The cattle tick, *Rhipicephalus microplus* (previously *Boophilus microplus*), was introduced to Australia in the late 19th century. It spread steadily from Darwin over northern Australia, stabilising to its current distribution in northern and north-eastern coastal regions by about 1918. The distribution of cattle tick is determined largely by climatic factors — the tick needs high humidity and ambient temperatures of at least 15–20 °C for egg laying and hatching.

Cattle ticks mainly infest cattle but may occasionally affect horses, sheep, goats, camelids, deer and water buffalo. Tick infestations cause damage to hides, reduced production, anaemia and death. Cattle tick can also transmit tick fever (bovine babesiosis or anaplasmosis), caused by *Babesia bigemina*, *B. bovis* or *Anaplasma marginale*. Babesiosis and anaplasmosis are nationally notifiable diseases in tick-free areas.

Acaricide treatment (dipping, pour-on treatments or spraying) has been widely used for tick control in endemic areas. Inspection and treatment are compulsory for cattle leaving defined tick areas in the Northern Territory, Queensland and Western Australia, and for cattle leaving known infested properties in New South Wales. Spread of ticks from endemic areas is restricted by state-managed zoning policies. In addition, many producers in the tick endemic area have changed to *Bos indicus*–type cattle because of the greater resistance of these breeds to tick infestation.

No incursions of cattle ticks or cases of tick fever were reported in South Australia, Tasmania or Victoria during 2011.

New South Wales

Cattle tick generally occurs only in the far north-eastern corner of New South Wales. The state Department of Primary Industries maintains a surveillance program at all far north-coast saleyards, where all cattle presented for sale are inspected. Cattle returning to a property from a sale are treated with acaricide (by dipping) by inspectors before their dispatch. Regular surveillance is also undertaken at north-coast abattoirs. Infested and at-risk properties are quarantined, and eradication programs and movement controls are implemented. Surveillance cameras at seven sites along the New South Wales – Queensland border
monitor livestock movements into New South Wales from the tick-infested area of Queensland. Led and tractable livestock may be treated at the Kirra border crossing before they enter New South Wales from tick-infested areas of Queensland. Other stock originating from tick-infested areas are treated at official clearing facilities on the Queensland tick line before entering New South Wales.

Since 1997, the average number of new cattle tick infestations each year in New South Wales has been 74 (range 37–110). In the 2011 season, 60 new infestations were detected, all in the far north-coast region.

Tick fever is a sporadic disease in New South Wales, with an average of one occurrence every two years, usually on the far north coast. Unusually, there were four outbreaks in the 2011 season. The most recent was in May 2011, near Kyogle.

**Northern Territory**

Three cattle tick areas are gazetted under Northern Territory legislation. Cattle tick occurs only in the northern tropical and subtropical regions; the southern half of the Northern Territory is a cattle tick–free zone. A buffer zone, known as the cattle tick control zone, separates the infested and free areas. Cattle tick was detected during 2009 on several properties in the control zone and two properties in the free zone that were previously free from ticks. The control zone was extended in 2010 to include these two properties. An active surveillance program on properties in the control zone and northern free zone confirmed that the spread of ticks was limited to four small areas in the control zone. The cattle tick has been confined to these areas with movement controls and property management plans.

Tick fever is not commonly diagnosed in the Northern Territory, although the organisms responsible for babesiosis and anaplasmosis are present. Tick fever is seen mainly in cattle that have had little or no previous exposure to ticks.

Parkhurst-strain ticks, which are resistant to the synthetic pyrethroids that are often used as acaricides, are present on 20 properties in the Darwin region. Movement controls and dipping with a different acaricide are used to minimise the risk of further spread of these ticks. An active surveillance program is in place to detect changes in their distribution.

**Queensland**

Queensland regulates the movement of stock to control cattle ticks through the declaration of three zones: infected, free and control. The control zone is used as a buffer between the free and infected zones in parts of Queensland to minimise the risk of incursions, and owners of stock are encouraged to take measures to eradicate or prevent the spread of cattle ticks. Stock moving from an infected zone, or from restricted properties in either of the other zones, may be inspected or treated (or both) before movement.

For movements from the infected zone, Biosecurity Queensland has a system of approved third-party providers (TPPs) for inspecting and supervising treatment of stock at official clearing facilities. The TPPs currently operate at 27 clearing dips and two livestock inspection centres (spray stations), which undertake more than 95% of all stock clearances from the infected zone.

Biosecurity Queensland inspectors provide regulatory and advisory services for cattle tick control, eradication and management. They also provide inspection and treatment services for the restricted properties in the free and control zones, and at four clearing facilities that have not progressed to the approved TPP system. Biosecurity Queensland provides laboratory services for the analysis of dip fluids, and for testing and identification of acaricide-resistant strains of cattle ticks.

At the end of June 2011, when the Queensland cattle tick season ended, 90 infected properties in the free zone and 137 infected properties in the control zone were under movement restrictions and treatment.

Live vaccines produced by Biosecurity Queensland’s Tick Fever Centre are used to control babesiosis and anaplasmosis. During 2011, the centre sold 681 335 doses of trivalent vaccine (96% chilled and 4% frozen). Sales have dropped significantly in the past few years, reflecting changes in climatic conditions and the viability of the beef industry. Sales were quite poor in the first half of 2011 because of wet conditions and flooding, which delayed mustering and weaning throughout large areas of Queensland. Stock losses resulting from widespread flooding, particularly in central Queensland, may also have affected sales. Sales partially rebounded in the second half of 2011.

**Western Australia**

The cattle tick–infested area in Western Australia includes the Kimberley in the north; the southern boundary is generally along the line of 20° south. Cattle moving from the tick-infested area to the tick-free area of the state are inspected and treated for ticks. There are no regulatory control measures for ticks within the tick-infested area, and almost no strategic treatment for ticks or vaccination for tick fever.

The last two detections of cattle tick in the tick-free area were in 1979 and 2001, and the cattle ticks were eradicated successfully. Acaricide-resistant ticks have not been detected in Western Australia.
2.4.5 Enzootic bovine leucosis

Enzootic bovine leucosis (EBL) is a nationally notifiable disease that occurs rarely in Australia.

All states have tested their dairy herds for many years. In 2008, building on the state-based programs, the Australian Dairy Industry Council and animal health authorities implemented the National EBL Eradication Program.

Provisional freedom from EBL in Australia’s dairy herd was achieved in 2010. All licensed dairy herds in Australia have been tested, either individually or through herd bulk milk samples, according to the requirements in the Australian Standard Definitions and Rules for Control and Eradication of Enzootic Bovine Leucosis in Dairy Cattle.

Declaration of freedom from EBL in the Australian dairy herd is expected in 2012, following the completion of the monitoring program.

At the end of 2011, more than 99.9% of dairy herds in Australia had ‘monitored free’ status for EBL. EBL is still present at a very low prevalence in sectors of the Australian beef herd. The free status of the Australian dairy herd will be maintained by ongoing strict controls on the introduction of beef cattle.

2.4.6 Equine herpesvirus 1

Equine herpesvirus 1 (EHV-1) is a respiratory pathogen of horses that occasionally causes abortion and, rarely, neurological disease. The abortigenic and neurological strains are on the list of nationally notifiable diseases. EHV-1 abortions are generally sporadic, but outbreaks do occur. EHV-1 neurological disease is an emerging disease of increasing prevalence overseas, and new cases have been diagnosed recently in Australia.

Herpesvirus infection can be diagnosed by detection of intranuclear inclusion bodies during examination of tissue samples under a microscope; however, definitive diagnosis of EHV-1 infection, in cases of either abortion or neurological disease, requires detection of the virus by polymerase chain reaction (PCR) or virus isolation. Virus detection and categorisation are essential when EHV-1 is suspected, as there are nine EHV serotypes. As well, there is evidence that EHV-1 neurological disease could be associated with a nucleotide substitution in the EHV-1 polymerase gene; virus isolation and sequence analysis can provide information on the prevalence of this mutation in Australian isolates.

During 2011, no cases of EHV-1 abortion or neurological disease were reported in South Australia, Queensland, Western Australia, Tasmania or the Northern Territory.

2.4.7 European foulbrood

European foulbrood (EFB) is a disease of bee larvae caused by the bacterium Melissococcus (formerly Streptococcus) pluton. The disease is usually acquired only by larvae less than 48 hours old, which generally die at 4–5 days of age, particularly in early spring when the colonies are growing rapidly. Colonies infected with EFB release a characteristic odour, and infected larvae die and turn brown during the coiled stage, giving a peppered appearance to the brood. Because of the young age at which larvae are affected, cells with diseased larvae are usually unsealed. The disease causes high levels of mortality, and reduces the longevity of queens.

EFB occurs in many regions around the world. It was first reported in Australia in 1977 and is now found in all the eastern states, including Tasmania. Western Australia remains free from the disease and maintains stringent control measures to minimise the risk of its introduction. The Northern Territory has a small beekeeping industry that is thought to be free from EFB; disease freedom is supported by geographic isolation from affected states, well-informed beekeepers and health import regulations.

New South Wales

Abortion due to EHV-1 occurred on four thoroughbred studs in the Hunter Valley in 2011. Most cases involved only a single mare, but one stud had two mares abort in July and two more in October. On several other studs, low antibody titres to EHV-1 were detected — on some of these studs, sampling was not repeated; on others, the titre in the second sample was not high enough to confirm EHV-1 as the cause of abortion.

Victoria

During 2011, one case of equine abortion caused by EHV-1, in a mare in a group of 30, was confirmed by PCR.
2.4.8 Infectious bovine rhinotracheitis

Infectious bovine rhinotracheitis is caused by bovine herpesvirus 1 (BHV-1), which also causes infectious pustular vulvovaginitis, infectious balanoposthitis and several other clinical syndromes. BHV-1 occurs in most cattle-raising countries.

Three subtypes of BHV-1 are recognised worldwide: BHV-1.1, BHV-1.2a and BHV-1.2b. Subtypes 1.1 and 1.2a are more virulent than subtype 1.2b, and subtype 1.2a can cause severe respiratory disease and several other syndromes, including abortion. These virulent subtypes are present in North America, Europe and many other parts of the world, but only the benign BHV-1.2b is present in Australia. The absence of virulent subtypes and a predominance of pasture-based grazing means that disease due to infectious bovine rhinotracheitis is rare in Australia.

2.4.9 Johne’s disease

Johne’s disease (or paratuberculosis) is a chronic mycobacterial infection, primarily of the intestines, that causes illthrift, wasting and death in several species of grazing animals. In Australia, there are two main types of Mycobacterium avium subsp. paratuberculosis; the sheep type is largely restricted to sheep, while the cattle type affects cattle, goats, alpaca and deer. The livestock industries, governments and the veterinary profession collaboratively manage the Australian National Johne’s Disease Control Program. The program aims to reduce the impact of both the infection and the measures taken to control it. In partnership with governments, each affected industry has implemented strategies that suit its particular needs and disease situation. Key elements of the program are Australian Johne’s Disease Market Assurance Programs for cattle, sheep, goats and alpaca, which provide a high level of assurance that participating herds and flocks are not infected with Johne’s disease. Details of market assurance program herds and flocks are maintained in NAHIS (see Figure 2.1) and are available on the AHA website.

Regulatory programs for Johne’s disease operate in the north of Australia, but the emphasis in southern Australia is on control of the disease by producers, especially in the south-eastern dairy and sheep industries, where Johne’s disease is endemic. In 2011, Western Australia retained its status as a bovine Johne’s disease (BJD) free zone. Queensland, the Northern Territory and northern South Australia’s protected zones maintained controls on introductions to manage the risk of entry of BJD. Johne’s disease is rare in the alpaca industry, and no cases were detected in 2011.

**Beef cattle**

Johne’s disease has rarely been detected in the northern and western beef industry, but a clinical case occurred in a small beef herd in Queensland in late 2011. Control procedures and tracing are currently under way to minimise the potential for spread.

Johne’s disease is also uncommon in beef herds in south-eastern Australia. To help protect this situation, producers whose herds have had little or no contact with dairy cattle are encouraged to make a written declaration that the breeding cattle they are selling meet the criteria to be classified as low risk (‘Beef Only’).

Although the disease is uncommon, the impacts can be serious for individual infected herds. The National BJD Financial and Non-Financial Assistance Package helps owners of infected herds to eliminate Johne’s disease, thus contributing to the low prevalence of BJD in the beef industry. Since the scheme started in 2004, it has assisted 240 producers, of whom about 150 have had their herds’ infected or suspect statuses resolved.

**Dairy cattle**

In south-eastern Australia, the dairy industry promotes hygienic calf rearing to help reduce the incidence of Johne’s disease in replacement heifers. Buyers seeking Johne’s disease assurance are also encouraged to ask the seller for a written declaration of the National Dairy BJD Assurance Score for the cattle. A score of 10 indicates a very high level of confidence that the cattle are not infected. New South Wales and South Australia require sellers to declare the dairy score when selling dairy cattle.

**Sheep**

A major review of the control program for Johne’s disease in sheep (ovine Johne’s disease — OJD) was conducted in 2011. It found that effective prevention of the disease provides substantial benefits, at both the farm level and the national level. However, it also found that significant improvements in the assessment, management and communication of risk would be needed to achieve effective prevention across the country. The sheep industries have agreed to energetically support risk-based control of Johne’s disease for a further five years. A key tool to help producers manage their own farm biosecurity is the National Sheep Health Statement, which enables buyers to assess the risk for OJD and other diseases.

Abattoir surveillance provides feedback to individual farmers and the wider sheep industry on the occurrence of OJD and other significant endemic disease conditions. In 2011, the sheep industry continued working with AHA and the meat-processing industry to support abattoir surveillance at several sites across southern Australia. In the 2010–11 financial year, approximately 4700 consignments, comprising 910 000 adult sheep, were inspected for evidence of OJD. The data from this project are used each year to assess the regional flock prevalence of OJD. In parts of south-eastern Australia, the estimated prevalence of OJD and its impact on infected flocks continued to rise.

**Goats**

The goat industry has established a risk-based trading approach that uses a National Goat Health Statement with a nationally agreed risk ranking system. This owner declaration includes a risk rating for Johne’s disease and provides herd information on other conditions that can easily spread from herd to herd with movements of goats. A component of the strategy is a National Kid Rearing Plan to help protect young goats from infections, such as Johne’s disease and caprine arthritis–encephalitis.

### 2.4.10 Newcastle disease

Newcastle disease (ND) is a viral disease of domestic poultry and wild birds, which is characterised by gastrointestinal, respiratory and nervous signs. Australia has been free from outbreaks of virulent ND since 2002, when two incidents of ND of Australian origin occurred in Victoria and New South Wales; these outbreaks were eradicated as prescribed by the Australian Veterinary Emergency Plan (AUSVETPLAN). Subsequently, the National ND Management Plan was developed to minimise the risk of Australian-origin virulent ND outbreaks in Australian commercial chicken flocks.

The plan is overseen by a steering committee that includes representatives from the commercial chicken sector, the Australian Government, most state governments and the Commonwealth Scientific and Industrial Research Organisation Australian Animal Health Laboratory. Membership also includes experts in poultry vaccination and poultry disease management. AHA manages the plan and chairs the committee.

The goal of the current ND Management Plan (2008–12) is to minimise the risk of Australian-origin ND outbreaks by strategically applying vaccination (using live V4 and inactivated vaccines), together with surveillance and poultry industry biosecurity plans.

The primary objective of the vaccination program is for the vaccine strain of the virus to out-compete potential precursor strains of ND virus — that is, strains that have genome sequences similar to the virulent sequence and might result in the emergence of virulent ND virus. Based on the level of risk of an outbreak of Australian-origin virulent ND in each state or territory, chickens of different classes (meat chickens, laying hens and chickens used for breeding) are vaccinated and surveyed according to standard operating procedures (SOPs). Vaccination compliance is monitored through reconciliation of data on vaccine sales with commercial chicken numbers, and industry intelligence.

The Surveillance Working Group of the steering committee reviewed the evidence from surveillance in 2010, including results from unvaccinated sentinel flocks, on the current prevalence of progenitor, precursor or virulent ND viruses in Australia. The working group determined that, in the presence of vaccination and despite extensive surveillance, there has not been any occurrence of clinical Newcastle disease in Australian commercial poultry flocks for at least the past five years, and there has been no finding of virulent or precursor strains of ND virus since 2002.

The 2008–12 plan is designed to lead to a risk-based exit strategy that might result in minimal or no vaccination in chicken flocks at the end of the management period. An Exit Strategy Working Group has been established to determine the best method of achieving this result. The working group is due to report to the steering committee in the first half of 2012.

**New South Wales**

The national SOPs require flocks to meet adequate antibody titres within four weeks of completion of the vaccination course. Monitoring of vaccinated pullet flocks in New South Wales has found that 90% of the flocks meet these requirements. A survey of broilers originating from hatcheries vaccinating one-day-old chickens against ND by coarse spray, or from companies vaccinating at 7–14 days in the field via drinking water, found that the required titres were mostly achieved, regardless of the maternal antibodies of the donor flocks — overall, the technique was capable of delivering the titres required by the SOPs.
In 2010, the steering committee decided to continue monitoring vaccination compliance for layers and breeders only. From 2011, ND vaccine coverage, as indicated by permits and sales data, was almost 100% of the state’s known commercial layer and breeder chickens. Prosecution procedures have been instigated against one egg producer who was not complying with the vaccination requirements.

No precursor or virulent ND viruses were found during ongoing surveillance of both commercial flocks and unvaccinated, noncommercial flocks.

Northern Territory
There are no commercial poultry flocks in the Northern Territory.

Queensland
In Queensland, all commercial operators of farms with 500 or more birds are required by law to vaccinate their poultry against ND. Vaccination is in accordance with the national SOPs for a medium-risk state, as agreed by the national steering committee, even though an ND risk assessment has indicated that Queensland is a low-risk jurisdiction. The requirements will be reassessed once national surveillance results have been analysed, with the expectation that Queensland will then be able to follow the national SOPs for a low-risk state.

A successful compliance audit in 2011 demonstrated a high level of compliance with the vaccination program in the commercial poultry sector, including increased take-up of vaccination by the layer group. No virulent ND or precursor ND viruses have been detected — all detections of ND virus have been categorised as a vaccine-like strain.

South Australia
In South Australia, it is mandatory for all birds in commercial poultry flocks, including breeder and genetic stock, to be vaccinated against ND. The vaccine is a restricted product whose use requires approval from the Chief Veterinary Officer. Producers apply for purchase of the vaccine through a permit system.
Terrestrial animal health

In Tasmania, meat chickens are exempt from the requirement to vaccinate flocks with more than 1000 birds, provided that they comply with testing requirements. Meat chicken breeders are not included in this exemption. Vaccine is obtained from the supplier under licence from the Chief Veterinary Officer. It must be used according to the manufacturer’s instructions and the SOPs noted in the licence conditions.

**Victoria**

Owners of commercial poultry flocks with more than 1000 birds are required by law in Victoria to vaccinate against ND. In 2011, permits were issued for the purchase and use of approximately 97 million doses of ND vaccine.

**Western Australia**

In Western Australia, owners of 1000 or more chickens are required to apply for a permit to purchase ND vaccine, and must vaccinate their birds (except meat chickens), keep records, assist with inspections and undertake any testing required for auditing purposes. Targeted auditing of producer compliance is undertaken. All targeted surveillance of meat chicken flocks, and imported eggs and day-old chicks required by the National ND Management Plan is reported. Reporting of, and sample collection from, any flock meeting the ND case definition is compulsory.

2.4.11 Ovine brucellosis (*Brucella ovis*)

Ovine brucellosis, caused by *Brucella ovis*, is endemic in commercial sheep flocks in some states, but its prevalence is low. It is not on the list of nationally notifiable diseases. Accreditation schemes for stud flocks are well supported and are managed by state animal health authorities and breed societies. The numbers of accredited flocks at the end of 2011 are shown in Table 2.3.

<table>
<thead>
<tr>
<th>State</th>
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<td>Queensland</td>
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<tr>
<td>Western Australia</td>
<td>190</td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td><strong>2230</strong></td>
</tr>
</tbody>
</table>

**New South Wales**

The New South Wales Ovine Brucellosis Accreditation Scheme has been operating since 1981, with some flocks maintaining continuous accreditation. The scheme requires the adoption of a biosecurity plan and a testing regime. Flocks are tested by accredited private veterinary practitioners every year, every second year or every third year, depending on how long they have been in the scheme. The program is strongly supported by the New South Wales sheep industry and show societies, and accreditation is a requirement for entry to many major shows and sales. At the end of 2011, the scheme covered 860 flocks, predominantly stud flocks.

**Northern Territory**

The Northern Territory has no sheep industry.

**Queensland**

Queensland has a voluntary ovine brucellosis accreditation scheme for stud flocks, which is administered by Biosecurity Queensland on behalf of the state’s sheep industry. In December 2011, there were 68 accredited flocks (17 Merino/Poll Merino flocks and 51 flocks of other breeds). The historically low incidence of ovine brucellosis reported in the state’s flocks did not change significantly during 2011.

**South Australia**

A voluntary ovine brucellosis accreditation scheme operates in South Australia. There are currently 423 accredited producers and 538 accredited flocks. No change occurred in 2011 in the historically low incidence of ovine brucellosis reported in South Australia’s flocks.

**Tasmania**

Ovine brucellosis has not been confirmed in any sheep in Tasmania since 1988. The Tasmanian Department of Primary Industries, Parks, Water and Environment, in conjunction with veterinary practitioners and industry, has developed a voluntary ovine brucellosis accreditation scheme to control the disease in Tasmanian flocks. Accredited private veterinary practitioners test the flocks, and the department keeps the records. Tasmania currently has 82 accredited ovine brucellosis–free flocks. No reactors were detected during 2011.

**Victoria**

Ovine brucellosis is present at low levels in Victorian sheep flocks. During 2011, infection was detected in nine flocks after fertility issues were noted during testing for flock accreditation.
A voluntary ovine brucellosis accreditation scheme, which is administered by the Victorian Department of Primary Industries, provides assurance that rams are free from ovine brucellosis. This assurance is required for sales, interstate movement, overseas export and attendance at shows. The scheme is based on property risk assessment, regular testing, adherence to best-practice flock management and investigation of suspect cases. Both departmental staff and private veterinary practitioners are involved in implementing the program across Victoria. At December 2011, 491 flocks were accredited as being free from ovine brucellosis.

The department also supports the operation of the Mallee Ovine Brucellosis Control Area. Ovine brucellosis was historically of particular significance and high prevalence in the Mallee region (north-west Victoria) as a result of a lack of suitable fencing and low interest in sheep management in wheat and sheep enterprises. Voluntary schemes had been unsuccessful. Since 1996, government and industry have implemented a compulsory, systematic program of control in the Mallee, and a dramatic decline in the prevalence of ovine brucellosis across the region has been recorded. No surveillance testing for this control program was undertaken during 2011.

Western Australia

A voluntary ovine brucellosis accreditation scheme is available to ram breeders in Western Australia. In December 2011, the scheme had 190 accredited flocks. During 2011, no flocks had their accreditation cancelled following the detection of infected rams.

2.4.12 Ovine footrot

Ovine footrot, caused by *Dichelobacter nodosus* infection, was probably introduced in the early days of the Australian sheep industry. Virulent ovine footrot causes significant economic loss in southern Australia. Ovine footrot is not on the list of nationally notifiable diseases.

Several states have eradication or control programs. New South Wales has implemented the NSW Footrot Strategic Plan for the past 20 years, and the state was declared a protected area for footrot in August 2009. The prevalence of virulent footrot in New South Wales was less than 0.1% of flocks in 2011. However, about 20 newly infected flocks were detected in late 2011, partly due to the movement of infected sheep from interstate.

South Australia and Western Australia also operate control programs. In Western Australia, less than 1% of flocks are infected with virulent footrot. Tasmania and Victoria do not have official control programs for footrot, although legislation is available to quarantine properties if required.

Footrot is not regarded as a significant problem in Queensland, and no clinical cases were reported in 2011. There are no commercial sheep flocks in the Northern Territory.

2.4.13 Small hive beetle

The small hive beetle (SHB) (*Aethina tumida*) invades honey bee hives and can cause serious economic concern to some producers and processors, especially under hot and humid conditions in which they thrive. SHB is on the list of nationally notifiable diseases. Eradication from Australia has not been attempted; the agreed management strategies aim to reduce the impact of SHB on productivity, slow its spread and minimise damage in infested apiaries.

Government apiary officers provide advice and guidance to the honey bee industry. Researchers are investigating the potential to use chemicals to minimise the impact of SHB on beeswax and honey.

New South Wales

SHB was first detected in New South Wales in 2002. It is well established along the coast and is periodically moved inland by commercial beekeepers, although it does not appear to be persisting in inland areas. The beetle has a significant impact on hive management; it has caused significant losses of honey bee colonies and is a major pest in honey extraction sheds. No regulatory action is taken in New South Wales, although reported cases of SHB are recorded for the purposes of certifying interstate movement of beehives and export of live bees.

Northern Territory

A survey of registered beekeepers in the Northern Territory in 2010 confirmed the absence of SHB. Import controls to restrict entry of the pest are in place.

Queensland

SHB is identified as a major pest species and is now endemic in most coastal regions of Queensland. It is present in other, drier areas as a result of beekeepers moving their apiaries to access seasonal flora. The prevalence is increasing in the northern part of the state each season, and increases after rain in warmer months of the year.

A survey of the costs to beekeepers of SHB, conducted by Biosecurity Queensland in 2010–11 (with 1302 respondents), estimated a loss of $3 million, with a complete loss of 12–15% of hives. The impact of the loss
of pollination services on the agricultural and horticultural industries was not calculated. A decline in numbers of honey bees could have important consequences for food production.

A trap trial was conducted in February 2009, and Biosecurity Queensland is providing beekeepers with information on the most efficient trapping methods. Scientific research is continuing on fungal control, as well as yeast identification and the relationship of yeast to the SHB lifecycle.

**South Australia**

In July 2011, SHB was detected in a national park in South Australia in hives belonging to an interstate apiarist. The apiarist was ordered to leave the state, and the risk of spread from this location was assessed as being minimal, given the extremely cold weather at the time. Six months later, there was no evidence of SHB in the hives of other apiarists or sentinel trap hives in the national park.

To assist in keeping the state free from SHB, hives, package bees, used hive equipment, beeswax, bee-collected pollen, propolis, used appliances, queen cells, queens and escorts, and any other bee products are prohibited entry into South Australia unless accompanied by both written permission from the Chief Veterinary Officer and a completed health certificate declaring freedom from all stages of SHB. Before countersigning any health certificate, state departments are encouraged to request evidence that beekeepers have undertaken significant inspections to confirm absence of SHB.

**Tasmania**

There is no evidence of SHB in Tasmania. Apiarists are encouraged to inspect their hives regularly and to submit suspect insects to the state laboratory for identification. Entry into Tasmania of used beekeeping equipment, packaged bees and unmelted beeswax is prohibited. Queen bees, queen cells and escorts may be imported but must be in SHB-proof containers and accompanied by a completed health certificate declaring freedom from SHB.

**Western Australia**

In September 2007, SHB was detected in Western Australia at Kununurra. Surveillance, monitoring and tracing have contained the beetle within the Kununurra area. Zoning under legislation has identified an infested area and a free area of the state. Targeted surveillance was carried out in 2005 and 2006, and none of the samples collected confirmed the presence of SHB. Import controls to restrict entry of SHB are in place.

**2.4.14 Swine brucellosis**

Swine brucellosis resulting from infection with *Brucella suis* causes sterility and abortion in sows and orchitis in boars. Other livestock species may be infected but do not show clinical signs. The disease is a zoonosis — humans can also be infected.

In 2011, no cases of *B. suis* infection in pigs were reported from the Northern Territory, New South Wales, Victoria, Western Australia, South Australia or Tasmania. The latter four states have specific import controls for breeding pigs from areas where *B. suis* is known to occur.

**Northern Territory**

A limited survey of feral pigs in the Katherine region during 2007 did not detect the presence of swine brucellosis. Ongoing opportunistic sampling of feral pigs from the northern floodplains has not detected any clinical signs or serological evidence of brucellosis.

**Queensland**

In Queensland, *B. suis* is confined to some populations of feral pigs. Detection of *B. suis* in a free-range piggery in the last quarter of 2010 was resolved following destocking of the property.

The *B. suis* Accredited Herd Scheme is administered by Biosecurity Queensland on behalf of the industry and currently has 11 member herds. The scheme aims to ensure piggery freedom from *B. suis* and to provide a secure source of disease-free breeding stock for pig producers.

**South Australia**

SHB was first detected in apiaries in north-western Victoria and the Goulburn Valley in north-eastern Victoria in 2005. Subsequent detections of both beetles and larval activity, including some isolated cases of damage to combs, have been in north-western, north-eastern and central Victoria, suburban Melbourne and Gippsland. Beetle sightings decrease with low humidity and increased temperatures. The occurrence of SHB continues to be monitored by the Victorian Department of Primary Industries.
The Australian Government and the state and territory governments regard disease surveillance and monitoring as a major function of the animal health system.

Australia’s surveillance and monitoring capability is underpinned by a network of government field veterinary officers, government and private veterinary diagnostic laboratories, private veterinarians, researchers and livestock owners. This network implements surveillance plans to identify and treat risks from notifiable, emerging and exotic diseases. It is supported by the National Livestock Identification System (see Chapter 1), which enables livestock to be identified and traced from property of birth to slaughter, and the National Animal Health Information System (NAHIS; see Chapter 2) for collating data.

This chapter describes government and nongovernment programs that contribute to disease surveillance and monitoring capability at a national level. These programs are listed in Box 3.1 and described in detail below.
3.1 Towards a National General Surveillance Program

General surveillance is the background level of passive reporting by animal health professionals, paraprofessionals, animal owners, producers, processors and others across the Australian livestock industries. Key observation points for livestock include the farm, the saleyard and the abattoir. General surveillance tends to be opportunistic in nature, and is most likely to detect diseases that are associated with unusual or obvious clinical signs.

During 2011, the Animal Health Committee (AHC) made significant progress in developing a framework for a risk-based National General Surveillance Program. An AHC General Surveillance Epidemiology Working Group was formed, which:

- divided Australia into 12 livestock regions and then assessed the relative likelihood of the introduction, establishment and spread of a group of significant exotic diseases
- compared the distribution of current general surveillance activities with the disease likelihood maps
- developed a general surveillance assessment tool that enabled the effectiveness of current general surveillance activities to be assessed
- evaluated the effect of delays in detection on the potential size of an outbreak of foot-and-mouth disease, and identified key steps in the reporting process.

The findings are being used to focus future activities and to develop options to strengthen Australia’s general surveillance system.

In parallel with this work, the AHC also began drafting a document describing the key principles and approaches for the National General Surveillance Program. The major challenge is to ensure that Australia’s general surveillance effort continues to address the assessed risks. Priorities are to focus on post-border surveillance to reduce gaps in surveillance and the time for detection of an emergency animal disease, and to improve engagement among stakeholders.

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Box 3.1 National surveillance and monitoring activities

**Managed by Animal Health Australia**
- National Arbovirus Monitoring Program
- Transmissible Spongiform Encephalopathy Freedom Assurance Program
- Screw-worm Fly Freedom Assurance Program
- National Significant Disease Investigation Program

**Managed by the Australian Wildlife Health Network**
- Wildlife Health Information System and intelligence on diseases emerging from wildlife
- Avian influenza surveillance in wild birds
- Surveillance of bats

**Managed by other organisations**
- Bovine tuberculosis surveillance
- Surveillance at sea ports
  - National Sentinel Hive Program
  - trapping for Culicoides midges
- Bovine brucellosis surveillance
- Australian Veterinary Practitioner Surveillance Network

**Managed by state and territory governments**
- Field and laboratory diagnosis of significant livestock diseases
- Targeted surveillance for priority diseases
- Identification, research and reporting of emerging diseases
- Collection, collation and analysis of data on, and reporting of, notifiable diseases
- Investigation of the epidemiology, distribution and prevalence of animal diseases
- Investigations of suspected emergency animal diseases

**Participation by private veterinarians**
- Initial field investigations of suspect notifiable diseases
- Field surveillance of animal diseases
- Endemic disease management programs (if contracted)

**Surveillance programs in northern Australia**
- Northern Australia Quarantine Strategy
  - Japanese encephalitis surveillance
- Animal biosecurity in the north Queensland tropics

**Public health surveillance for zoonotic diseases**
- National Notifiable Diseases Surveillance System
- National Enteric Pathogen Surveillance Scheme
3.2 Surveillance programs managed by Animal Health Australia

Animal Health Australia (AHA) responds to members’ needs for general and targeted national surveillance programs, and supports the AHC in developing and implementing national surveillance policy. Surveillance programs managed by AHA are listed in Box 3.1. In addition, AHA builds and strengthens Australia’s surveillance outputs by maintaining national data standards and supporting the wildlife coordinators managed by the Australian Wildlife Health Network (AWHN).

The National Animal Health Surveillance Strategy (2007) provides the framework for animal disease surveillance in Australia. The strategy describes the surveillance that is required to demonstrate Australia’s animal health status. It gives priority to areas that could affect human health, animal welfare, wildlife health, livestock productivity and market access.

In 2009, a surveillance strategy reference group reported its recommendations on Australia’s future surveillance needs to the AHA board. The reference group’s view was that Australia has a solid reputation internationally for its surveillance activities, and this reputation is critical to maintaining consumer confidence and market access for livestock products. The Australian animal disease surveillance system is effective in detecting new and emerging disease; however, it needs to improve if it is to meet future challenges. In making its recommendations, the reference group considered the national and international context, including the One World, One Health principle, and the ‘drivers’ of future needs from government, industry and animal health perspectives.

3.2.1 National Arbovirus Monitoring Program

The National Arbovirus Monitoring Program (NAMP) monitors the distribution of economically important arboviruses (insect-borne viruses) of livestock and their insect vectors in Australia. Important arboviruses include bluetongue, Akabane and bovine ephemeral fever (BEF) viruses. Clinical bluetongue disease has not been observed in commercial livestock flocks and herds in Australia.

Australia’s economy benefits from the export of ruminants (for both slaughter and breeding) and their semen and embryos. This trade depends on a shared confidence between Australia and its trading partners that any risks to the animal health status of the importing country can be accurately assessed and properly managed. NAMP was established to provide credible data on the nature and distribution of important arboviral infections in Australia, for use by regulatory agencies in Australia and overseas, and by livestock exporters. The program enables the Australian Government to certify to trading partners that ruminants are sourced from areas free from important arboviruses. In addition, NAMP data assist overseas countries to develop animal health requirements for the importation of Australian livestock and livestock semen and embryos.

NAMP is jointly funded by its primary beneficiaries: the cattle, sheep and goat industries; the livestock export industry; and the state, territory and Australian governments.

Objectives of NAMP

NAMP has three specific objectives:

- trade support — to facilitate the export of live sheep, cattle and goats, and ruminant genetic material to countries with concerns about bluetongue, Akabane and BEF viruses by providing scientific information for developing animal health requirements and to meet export certification requirements
- bluetongue early warning — to detect incursions into Australia of exotic strains of bluetongue virus (BTV) and Culicoides midge species (the vectors of BTV in Australia) by surveillance of the northern BTV endemic area
- risk management — to detect changes in the seasonal distribution of endemic bluetongue, Akabane and BEF viruses and their vectors in Australia, in support of livestock exporters and producers.

Operation of NAMP

NAMP data are gathered throughout Australia by serological monitoring of cattle in sentinel herds, strategic serological surveys of cattle herds and trapping of insect vectors. Blood samples from groups of young cattle that have not previously been exposed to arboviral infection are tested at regular intervals for evidence of new infection with bluetongue, Akabane and BEF viruses. The frequency of blood sampling relates to the probability of arbovirus transmission; that is, the greater the likelihood of virus transmission, the more frequent the sampling. Insect traps to detect Culicoides species are positioned near the monitored herds during the period of testing.

References:

28 www.animalhealthaustralia.com.au
The number and locations of herds are selected to enable the distribution of important arboviruses to be determined. Hence, most sentinel sites are located either along the border between the zone where infection is expected and the zone where infection is not expected, or in areas where infection occurs sporadically. In addition, areas expected to be arbovirus free are monitored to verify their freedom, and known infected areas are sampled to assess the seasonal intensity of infection with each arbovirus. The location of monitoring sites in 2010–11 is shown in Figure 3.1.

To detect incursions of arboviruses from overseas, virus isolation tests (using culture) are routinely done on blood samples from one herd in the Northern Territory and four herds in northern Queensland. Virus isolation and molecular testing are also applied strategically in other herds in the Northern Territory, Queensland, Western Australia and New South Wales after seroconversions are detected. NAMP surveillance data relating to bluetongue early warning are supplemented by targeted surveillance activities conducted by the Northern Australia Quarantine Strategy (NAQS) of the Australian Government Department of Agriculture, Fisheries and Forestry in remote coastal regions of northern Australia, including the Torres Strait.

Figure 3.1 Location of NAMP monitoring sites in Australia, 2010–11

**Monitoring data for 2010–11**

This report describes the limits of vector and virus distribution, and the free areas for bluetongue, Akabane and BEF viruses in the 2010–11 arbovirus transmission season.

**Vector distribution and climate**

The distribution of bluetongue, Akabane and BEF viruses across the Australian continent is determined by the distribution of their insect vectors. Complex interactions with geography, climate, host animals and the viruses prevent the vectors from establishing in the southern and inland areas of Australia. Consequently, these areas are continuously free from these arboviruses. In the north, and in some of the eastern and western coastal areas, the distribution of arboviruses fluctuates from year to year, depending on the distribution of their insect vectors. The principal climatic factors influencing vector distribution are rainfall and temperature.

BTV is biologically transmitted by a limited number of species of *Culicoides* midges. The important vector species in Australia feed on cattle and have all arrived in Australia on air currents from neighbouring countries. The biting midge *C. brevitarsis* is the main vector of BTV and Akabane virus in Australia. There is a close relationship between the southern Australian limits of *C. brevitarsis* and the distribution of the two viruses, although the viruses are less widely distributed than their vectors. Other vectors of BTV in Australia, which are less widely distributed, include *C. actoni*, *C. dumdumi*, *C. fulvus* and *C. wadai*. The main vector of BEF virus is believed to be the mosquito *Culex annulirostris*. This mosquito is less susceptible to climatic extremes than *C. brevitarsis* and often has a wider distribution.

In Western Australia, during the 2010–11 arbovirus season, rainfall was well-above average for most of the state except the south-west region, where the rainfall was well-below average. *Culicoides* trapping occurred throughout the state. Vector species were found only in the Kimberley region, except for a single specimen of *C. actoni* that was collected in the Pilbara region. This is an extension of the known distribution of *C. actoni*; it was significantly west of all previous NAMP records. The usual western boundary of *C. actoni* distribution is the centre of the Kimberley. DNA (deoxyribonucleic acid) analysis showed that this specimen is likely to have come from the Kimberley rather than Indonesia. *C. actoni* was found in larger numbers in the Kimberley than during the previous year and in record numbers for the region at a new east Kimberley site. The other vectors collected were *C. brevitarsis*, *C. fulvus* and *C. wadai*, which were trapped in similar numbers and distribution to previous years.

In the Northern Territory, there was a very early start to the wet season and well-above average rainfall in the Darwin area, with continuing rain in the Alice Springs region. For the entire wet season, well-above average rainfall — exceeding records in some areas — was received throughout the Northern Territory. The number of *C. brevitarsis* specimens collected, and the duration of the seasonal activity of *C. brevitarsis*, were both similar to the previous year.

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This species was found at all the northern sites, including Garrithiya in east Arnhem Land (eastern Northern Territory) in most months. *C. actoni* was restricted to the northern sites where it was collected in lower numbers than usual and not in all months. *C. fulvus* and *C. wadai* were also restricted in distribution, being found only at the northern sites. No exotic species of *Culicoides* were found.

In Queensland, very heavy rainfall occurred over most of the state from August 2010 to February 2011, leading to flooding in some southern and central regions. Extreme cyclonic conditions were experienced in the north near Townsville during this period, followed by a cool and dry winter. The distribution of *C. brevitarsis* was more extensive than in most previous years — it extended well into south-western Queensland, where it is normally rare. The distributions of *C. actoni* and *C. wadai* followed the east coast, as in previous years. *C. dumdumi* was collected at Cooktown, and *C. fulvus* was identified from Weipa and Cooktown. This is the first record of *C. fulvus* in Queensland (specimens previously recorded in Queensland were reclassified as *C. dumdumi* in 2005), and its presence in two geographically separate sites suggests that this species is established in the state. A single female specimen of *C. flavipunctatus*, a species that is exotic to Australia, was collected at Saibai Island in the Torres Strait in November 2010. No further specimens were trapped at this location or on neighbouring islands, suggesting that this is not an established population. *C. oxystoma*, a vector of Akabane virus, was collected for the first time at Cooktown, and *C. fulvus* followed the east coast, as in previous years. *C. wadai* was restricted to the northern sites. BTV also occurred within its usual limits in the Northern Territory, Queensland and New South Wales (Figure 3.2).

Clinical bluetongue disease has not been observed in commercial flocks and herds of any susceptible species in Australia. The limits of BTV transmission in Australia are shown on the interactive BTV zone map, which defines areas in which no viral transmission has been detected for the past two years.

Monitoring data showed that BTV continued to be endemic in far northern Australia, including the Kimberley region of Western Australia, where serotypes BTV-20 and BTV-21 were detected. BTV also occurred within its usual limits in the Northern Territory, Queensland and New South Wales (Figure 3.2).

In the Northern Territory, activity was widespread in the north. BTV was detected at Beatrice Hill in November 2010, at Katherine and Victoria River in October 2010, and in all northern sentinel herds between January and June 2011. Serotypes BTV-1, BTV-2, BTV-7 and BTV-20 were identified by isolation at Beatrice Hill, and BTV-1 was identified by serology (virus neutralisation testing) at all other sentinel sites. BTV-7 seropositives were also detected at two northern

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32 Viral transmission is defined as detection or evidence of viral infection based on serological monitoring of sentinel cattle.
sites. The detection of BTV-1 activity in a serosurvey herd in the southern Victoria River district resulted in an extension of the BTV zone.

Most of the Queensland sites showed evidence of BTV transmission in March and April 2011. This included two herds in the south-west (Cunnamulla and Quilpie), which resulted in an expansion of the BTV surveillance zone in the south-west of the state. Only BTV-1 and BTV-21 were detected, by serology and virus isolation, in Queensland, with BTV-21 being more active. BTV-2 was not detected in Queensland from July 2010 to July 2011.

In New South Wales, BTV transmission was recorded from March to June 2011 and was limited to the far north coast at Casino. Only BTV-1 was found in New South Wales.

All regions in southern Australia and most pastoral regions in eastern Australia remain BTV free.

**Akabane virus distribution**
Monitoring data continued to show Akabane virus transmission in the Pilbara and Kimberley regions of Western Australia, throughout the north of the Northern Territory and throughout Queensland, where distribution of the virus was similar to that of BTV. The highest prevalence in Queensland was in herds in the central and south-eastern regions.

In New South Wales, Akabane virus was detected over a similar range to 2009–10 — within the known endemic range but with extension west to Collarenebri along the Queensland border. Transmission was detected along the coastal plain as far south as Paterson by April, extending west onto the ranges and into the Hunter Valley.

Akabane virus was not detected in the southern states of South Australia, Victoria or Tasmania (Figure 3.3).

**Bovine ephemeral fever virus distribution**
BEF virus was widespread throughout the Northern Territory and Queensland (as in previous years) and was detected at two sites in Western Australia — in the Kimberley and Pilbara regions. The distribution of BEF virus was very limited in New South Wales; transmission was detected at single sites in both central and northern New South Wales.

During February to April 2011, clinical cases of BEF were reported in central and southern regions of Queensland, on the northern tablelands of New South Wales adjacent to the Queensland border, and on the north coast of New South Wales.

BEF virus was not detected in the southern states of Tasmania, Victoria and South Australia (Figure 3.4).
3.2.2 Transmissible Spongiform Encephalopathy Freedom Assurance Program

In 2011, Australia continued to be recognised as a country of negligible risk for bovine spongiform encephalopathy (BSE) and free from classical scrapie. These diseases are types of transmissible spongiform encephalopathies (TSEs). The purpose of the TSE Freedom Assurance Program (TSEFAP) is to increase market confidence that Australian animals and animal products are free from TSEs. This is achieved through the structured and nationally integrated management of animal-related TSE activities.

Projects that operate under the TSEFAP are:

- the National TSEs Surveillance Program (NTSESP)
- the Australian ruminant feed-ban scheme, including inspections and testing
- imported animal surveillance, including traceback schemes for certain imported cattle
- communications.

National Transmissible Spongiform Encephalopathies Surveillance Program

The NTSESP aims to demonstrate Australia’s continuing ability to meet the requirements for a BSE negligible risk and classical scrapie-free country, and provide early detection of these diseases should they occur. It involves the collection of samples from ‘clinically consistent’ sheep and from ‘clinically consistent’,33 ‘fallen’34 and ‘casualty slaughter’35 cattle. Details of the sampling program for sheep and cattle are provided in the NTSESP National Guidelines for Field Operations.36

For sheep, the NTSESP is a targeted surveillance program that has an annual sampling intensity designed to be 99% confident of detecting scrapie if it is present in at least one in a million adult sheep. This is achieved by the annual laboratory examination of a minimum of 440 sheep brains, collected from animals showing clinical signs of a neurological disorder (as stated in the World Organisation for Animal Health (OIE) Terrestrial Animal Health Code37).

33 A clinically consistent animal is defined by the AUSVETPLAN disease strategy for BSE as ‘an animal that is found with clinical signs considered consistent with BSE’. This is analogous with the term ‘clinical suspect’ used in the OIE Terrestrial Animal Health Code, Article 11.5.21, on surveillance for BSE.

34 Fallen cattle are defined by the OIE Terrestrial Animal Health Code, Article 11.5.21, as ‘cattle over 30 months of age which are found dead or killed on farm, during transport or at an abattoir’.

35 Casualty slaughter cattle are defined by the OIE as ‘cattle over 30 months of age that are non-ambulatory, recumbent, unable to rise or to walk without assistance; cattle over 30 months of age sent for emergency slaughter or condemned at ante-mortem inspection’.


37 www.oie.int/en/international-standard-setting/terrestrial-code/access-online
For cattle, Australia is assessed by the OIE as BSE ‘negligible risk’. This means that Australia should implement OIE Type B surveillance, which is designed to allow the detection of at least one BSE case per 50,000 in the adult cattle population at a confidence level of 95%. Surveillance points are assigned to cattle samples according to the animal’s age and subpopulation category (i.e. the likelihood of detecting BSE). Australia’s target is to achieve a minimum of 150,000 surveillance points during a seven-year moving window. Australia also aims to meet OIE recommendations to investigate all ‘clinically consistent’ cattle, and ensure that cattle from the fallen and casualty slaughter subpopulations are tested.

AHA manages the NTSESP with funding from 10 industry stakeholders (livestock and associated industries), the Australian Government, and the state and territory governments. Table 3.1 shows the results from the NTSESP for the 2010–11 financial year. Data for other periods are available from the NAHIS database.38

### Australian ruminant feed-ban scheme

Since 1997, Australia has had a total ban on the feeding of ruminant meat and bone meal to ruminants. In 1999, this ban was extended to cover feeding of specified mammalian materials to all ruminants. From 2002, feeding of ruminants with any meals derived from vertebrates (including fish and birds) has been banned. The ban is enforced under legislation in each state and territory and by a uniform approach to the inspection of all parts of the ruminant production chain. It does not include tallow, gelatine, milk products, poultry or fish oils.

In the 2010–11 financial year, 543 operations were inspected, from renderers to end users. This revealed 34 instances of noncompliance, none of which required prosecution. Approximately 10,119 audits were completed through industry quality assurance programs during the same period. Thirty-nine required referral to the relevant central agency.

### Imported animal tracing

All cattle imported between 1996 and 2002 from countries that have experienced a native-born case of BSE are placed under lifetime quarantine, electronically tagged as part of the National Livestock Identification System for cattle, and inspected by government authorities every six months. These animals may not enter the human or animal feed chains. They are slaughtered and tested as part of the NTSESP, then incinerated or buried. The Cattle Council of Australia funds the removal of the cattle from the Australian herd.

### Program communications

During 2010–11, TSEFAP communications included:

- a pamphlet aimed at producers, directing them to supply the relevant government agencies (as part of the NTSESP) with sheep and cattle brains from any animals showing clinical signs similar to a TSE case
- a series of pamphlets for stockfeed manufacturers and users, promoting awareness of their responsibilities under the ruminant feed-ban legislation
- a series of media releases on the ruminant feed ban and its importance in keeping the Australian ruminant industries free from TSEs.

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The objectives of the Screw-worm Fly Freedom Assurance Program are:

- to coordinate and oversee surveillance for the early detection of an incursion of screw-worm fly (SWF)
- to ensure that expertise is available within government agencies to identify and manage SWF risks and incursions
- to ensure a nationally coordinated approach to research and development relating to SWF
- to ensure that Australia is adequately prepared to respond appropriately to an incursion of SWF
- to oversee emerging SWF-related issues and provide a framework for their management, if required
- to provide a forum that involves all stakeholders in addressing SWF issues
- to ensure that animal-related SWF activities are managed efficiently and consistently
- to manage communication to stakeholders and the public relating to the program.

During 2011, members endorsed a business plan providing a summary of activities for the next five years (July 2011 to June 2016), and implementation of the business plan began. Other activities are described below.

### Screw-worm fly surveillance

Screw-worm fly surveillance uses a multifaceted approach by DAFF Biosecurity (formerly the Australian Quarantine and Inspection Service) for AHA and NAQS. It includes adult fly trapping in Torres Strait and seaports, sample collection from myiasis cases at livestock aggregation sites (i.e. pre-export and post-export quarantine facilities where host animals aggregate), wildlife and animal surveys, negative surveillance data and reports of myiasis in humans. This approach increases the capacity for the early detection of SWF incursions, which increases the probability of a successful eradication program. The surveillance data are reported in NAHIS (see Table 3.2).

### Communications

A widespread communications program focuses on producers in northern Australia, live export yards and abattoirs. In addition, NAQS provides awareness material through its dealings with local villages and visitors to the Torres Strait region.

### Research and development

Research and development relating to SWF largely focuses on mitigation strategies in the early stages of an incursion. A joint project by the Indonesian Government and the Australian Government Department of Employment, Economic Development and Innovation — funded by Meat & Livestock Australia — is trialling the application of chemicals to control SWF.

### 3.2.4 National Significant Disease Investigation Program

Ongoing general surveillance (see Section 3.1) is important in maintaining Australia’s favourable animal health status and ensuring early detection of animal disease emergencies. Its value has been demonstrated by the early detection of outbreaks of emergency diseases in Australia: Menangle virus in a New South Wales piggery in 1997, sporadic Hendra virus infection in Queensland horses since 1994, and sporadic anthrax in New South Wales and Victoria.

Veterinary practitioners play a key role in general surveillance in Australia, providing expertise for evaluating, clinically investigating and reporting outbreaks of significant disease in animals. The National Significant Disease Investigation Program (NSDIP) was initiated to encourage veterinarians to conduct full investigations, which can otherwise be limited by competing priorities and commercial realities, such as the low economic value of individual animals relative to the cost of veterinary services.

Managed by AHA and funded from livestock industry and government subscriptions, the NSDIP began in June 2009. The program aims to boost Australia’s capacity for

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Table 3.2 Summary of adult screw-worm fly trapping in 2011

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<td>Ports surveillance</td>
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Note: Excludes traps with identification results pending.

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the early detection of emerging and emergency animal diseases (EADs) by increasing the participation of veterinary practitioners in disease investigations. Registered, nongovernment veterinarians who are engaged in clinical veterinary medicine — including all veterinary practitioners in university clinics, zoos and wildlife parks — are eligible to participate in the program. Significant diseases are broadly defined as those that may impact trade or market access, farm productivity, public health or wildlife biodiversity conservation.

Subsidies are available for the initial clinical evaluation and a follow-up investigation, if required. In return, the practitioner must provide a case report of the investigation to their government animal health authority.

During 2010–11, private veterinary practitioners reported 578 significant disease investigations under the NSDIP. The program funded approximately 220 investigations, and the remainder were independently funded by some jurisdictions as part of investigations in their states (see Section 3.6).

Summary data of investigations by species and financial year are shown in Figure 3.5, and by syndrome and species in Figure 3.6. The incidence of nervous signs and weakness/depression/anorexia/malaise relative to other syndromes in horses (Figure 3.6), and the incidence of horse investigations (Figure 3.5) are both over-represented in 2010–11 compared with the previous year. The incidence of nervous signs in horses relative to any syndrome investigated in any other species is also over-represented (Figure 3.6). These data are consistent with the outbreak of arbovirus disease in horses in south-eastern Australia in the first half of 2011 and the increasing awareness of Hendra virus among private veterinarians.

During 2011–12, there is a budget for investigating approximately 350 cases across Australia. A payment is available for an initial field and clinical investigation, and also for a follow-up investigation. Larger payments are available in some states due to additional contributions from state government departments. In return for payment, the practitioner must provide a case report of the investigation to their government department.

Where there is a genuine suspicion of a notifiable animal disease, it is the veterinary practitioner’s legal responsibility to notify their state or territory animal health authority.

Section 3.6 provides further information on the role of private veterinary practitioners in disease surveillance and management.

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Terrestrial animal disease surveillance and monitoring

3.3 Programs and activities managed by the Australian Wildlife Health Network

Wildlife disease surveillance is coordinated nationally through the AWHN, with a wildlife coordinator in each state and territory. The network promotes and facilitates collaboration around Australia in the investigation and management of wildlife health, focusing on potential risks to human and animal health, trade and biodiversity. General surveillance is focused on six disease categories: diseases listed by the OIE, bat viral diseases, mass or unusual mortality events, Salmonella cases, arbovirus infections, and diseases that wildlife coordinators consider unusual or interesting.

As well as managing surveillance, the AWHN assists with disease investigations and research in wildlife and feral animals, and facilitates education and training to ensure that Australia is well prepared for serious disease outbreaks in livestock, and in wild and feral animal populations.

The AWHN administers a ‘first-alert system’, which allows email alerts to be sent to more than 500 individuals and agencies around Australia with expertise or interest in
wildlife health issues. The network also produces weekly electronic digests of wildlife health information relevant to Australia, which are circulated nationally and to OIE member countries within the region.

In 2011, the focus of activities for AWHN was:

- assisting Australia’s states, territories and national agencies in general wildlife health surveillance and coordination for wildlife disease incidents
- supporting the work of NAHIS
- assisting AHA in incorporating wildlife into the NSDIP
- providing wildlife health information for national and international reports prepared by the Australian Government
- managing and coordinating the avian influenza surveillance program in wild birds
- horizon scanning to identify issues where wildlife is part of the ecology, which could impact on Australia’s trade, human health or biodiversity
- coordinating a network of wildlife health expertise, including organising working groups with a particular focus (e.g. a group focusing on university researchers’ contributions to national wildlife health issues; a group focusing on Australian bat lyssavirus and rabies; and a group focusing on the zoo industry and its wildlife hospitals — the Zoo Animal Health Reference Group), and encouraging collaboration, communication and engagement among national, state and local government and nongovernment agencies
- assisting the AHC by providing information on wildlife health events to the working group examining the development of a national general animal disease surveillance program (see Section 3.1) that includes wildlife.

The Zoo Animal Health Reference Group, which is coordinated by the AWHN, includes representatives from Australia’s major zoos and provides advice to the Australian Chief Veterinary Officer. In 2011, the Zoo Animal Health Reference Group conducted a zoo-based wildlife disease surveillance pilot project. This collaborative project — between the Zoo and Aquarium Association (the peak body representing Australian zoos), Zoo Animal Health Reference Group, the AWHN, Australia’s states and territories, the Australian Government and the Australian Centre of Excellence for Risk Analysis — used the wildlife health expertise in Australian zoos and zoo-based wildlife health hospitals, and their examination of about 10 000 free-living wild and feral animals each year. During the 12-month pilot project, zoo veterinarians from six major Australian zoos reported disease events in free-ranging wildlife and wildlife in rehabilitation centres directly into the National Wildlife Health Information System (the national system that holds wild animal health information) to support NAHIS. An independent review that assesses the value of the program and the potential for its expansion into other zoos and wildlife parks around Australia is in progress. The project is being extended for a further six months while the results are evaluated.

More than 553 wildlife disease investigation events were added to the national database in 2011. About one-third of these events were bats submitted for exclusion testing for Australian bat lyssavirus (ABLV).

Wild bird mortalities accounted for approximately 40% of investigations. Where appropriate, diagnostic tests included exclusion of avian influenza, avian paramyxovirus and West Nile virus. No wild bird mortality events were attributed to avian influenza or West Nile virus. During October and November 2011, avian paramyxovirus 1 was detected by polymerase chain reaction in wild and domestic rock doves (Columba livia) in Victoria. The rock dove (or rock pigeon) is one of three introduced species of columbid in Australia.

Since all the rock doves confirmed to be infected with this virus were found dead near known infected domestic pigeon holdings, it is most likely that the source of infection in the wild pigeons was domestic pigeons (see Section 4.6.3 for further information).

Findings in bird mortality events included trauma, poisonings, spirochelosis, aspergillosis, trichomoniasis, avian chlamydophilosis, botulism and salmonellosis.

3.3.1 Avian influenza surveillance in wild birds

The National Avian Influenza Wild Bird Surveillance Program targets a combination of live (healthy or sick) and dead (including hunter-killed) wild birds. Sources for targeted wild bird surveillance data include state and territory government agencies, universities, the Victorian Waders Study Group, and the NAQS program. Samples from sick birds include submissions from members of the public, private practitioners, universities, zoos and wildlife sanctuaries. In 2011, targeted wild bird surveillance occurred in New South Wales, Queensland, Victoria, Tasmania, South Australia and the Northern Territory, with a total of 7972 birds sampled. Most samples were collected from waterbirds (ducks and waders). No highly pathogenic avian influenza viruses were identified. However, surveillance activities continue to find evidence of a wide range of subtypes of low pathogenic avian influenza viruses, including H1–H13, H15 and H16.

The national surveillance program continues to assist in informing policy for prevention and management of avian
influenza outbreaks in Australian poultry flocks. This program plays an important role as a key source of samples that are positive for avian influenza viruses, which allow development of current and specific diagnostic primers and probes. These are essential for continued confidence that the tests being used in Australia will detect any H5/ H7 strains of highly pathogenic avian influenza virus in the event of an outbreak in poultry. The program also ensures that laboratory capacity for high-throughput molecular testing is available in Australia. The multi-agency and cross-jurisdictional approach of this project has led to an improved relationship between the participating parties and fostered development of a collaborative One Health approach. This will provide benefits to future collaborative efforts to manage national animal health issues.

3.3.2 Surveillance of bats

Surveillance of bats, which has a particular focus on pathogens threatening livestock and public health, targeted five agents in 2010–11: ABLV, coronaviruses, Hendra virus, leptospirosis and Nipah virus. Nipah virus and the coronaviruses responsible for severe acute respiratory syndrome (SARS) have not been found in Australian bats. Surveillance outcomes also increase understanding of the ecology of diseases of Australian bats — in other countries, for example, diseases of bats can alter bat-facilitated pollination and insect control in ecosystems. Information about bat diseases in Australia will contribute to activities to safeguard Australia’s biodiversity.

State animal and public health laboratories and the Commonwealth Scientific and Industrial Research Organisation Australian Animal Health Laboratory (CSIRO-AAHL) continue to screen Australian bats for ABLV. The AWHN collates and publishes national ABLV test results, in collaboration with NAHIS. The AWHN also manages a working group that focuses on improving national coordination of issues associated with ABLV.

A total of 173 bats were tested for ABLV in 2011. Of these, five tested positive: three grey-headed flying foxes (*Pteropus poliocephalus*) and two black flying foxes (*P. alecto*).

In response to the recent cases of Hendra virus in Queensland, Biosecurity Queensland (in collaboration with CSIRO-AAHL) continues to survey Australian bats for evidence of infection with Hendra or Nipah viruses. The Queensland Centre for Emerging Infectious Diseases targets Hendra virus. Key research objectives are to understand the disease ecology and epidemiology of Hendra virus, including bat–virus interactions and strain diversity, bat–horse interactions and the transmission pathway, and spatial and temporal patterns of infection.

3.4 Programs and activities managed by other organisations

3.4.1 Bovine tuberculosis surveillance

Australia was officially declared free of bovine tuberculosis (TB) caused by *Mycobacterium bovis* on 31 December 1997. Australia’s Brucellosis and Tuberculosis Eradication Campaign ran from 1970 to 1997, achieving freedom from bovine TB by OIE standards several years before the end of the campaign. The last cases of bovine TB were in December 2000 in cattle and in January 2002 in buffalo. Traceforward and traceback slaughter was completed in both instances according to the Tuberculosis Freedom Assurance Program.

In 2010, bovine TB surveillance data were evaluated quantitatively using a scenario-tree methodology, which enabled the analysis of multiple sources of surveillance data collected over a number of years. The aim was to estimate the sensitivity of historical surveillance practices and quantify the level of certainty in Australia’s freedom from bovine TB. The analysis provided a very high level of confidence (approaching 100%) that Australia is free from bovine TB and that, if the disease were present, it would have been detected.

Meat inspection for lymph-node granulomas (by DAFF) has been the primary surveillance activity for bovine TB since 1992. This involves the collection and submission for laboratory testing of any granuloma suspected of being due to bovine TB or any granuloma of uncertain cause (especially if it was located in a lymph node in the head or lungs of cattle).

All Australian laboratories examining granulomas must be accredited for veterinary testing by the National Association of Testing Authorities under ISO/IEC 17025 (General requirements for the competence of testing and calibration

In addition, laboratories approved for culture of *Mycobacterium bovis* must pass an annual external quality assurance program, run by the Australian Reference Laboratory for Bovine Tuberculosis at the Department of Agriculture and Food Western Australia. The reference laboratory also supports epidemiological investigations when a case of bovine TB is suspected or investigated.

In 2011, no positive identifications of bovine TB were made from surveillance. Summary surveillance data are reported online by NAHIS and in *Animal Health Surveillance Quarterly*, published by AHA.

In the unlikely event of a bovine TB case, eradication activities will be guided by the current *Bovine Tuberculosis Case Response Manual — Managing an Incident of Bovine Tuberculosis*,[^43] which is endorsed by cattle industry representatives. This provides for an ‘approved property or herd’ eradication program agreed by the owner and the relevant state or territory government. Funding agreements, including reimbursement for destroyed livestock, are included in the *Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses* (Emergency Animal Disease Response Agreement — EADRA).[^44]

### 3.4.2 Surveillance at sea ports

Surveillance is conducted at sea ports for exotic bee mites and bees (National Sentinel Hive Program) and *Culicoides* midges (the insect vector for bluetongue and Akabane viruses in Australia), because sea ports that service returning livestock vessels are considered to be high-risk locations for incursions of these pests and vectors. DAFF Biosecurity manages both programs.

The National Sentinel Hive Program (NSHP) was established in 2000 to improve post-border monitoring around Australia for exotic pests of honey bees, including varroa mite (*Varroa destructor* and *V. jacobsoni*), *Tropilaelaps* mite (*Tropilaelaps clareae*) and tracheal mite (*Acarapis woodi*). Early detection of these exotic pests is critical to eradicating an incursion, and to limiting the size and cost of an eradication program.

In 2011, the NSHP was transferred to Plant Health Australia, following changes in the responsibilities for bees from the Office of the Chief Veterinary Officer to the Office of the Chief Plant Protection Officer within DAFF Biosecurity. This will lead to changes in bee surveillance processes in 2012.

During 2011, 26 sentinel hives for bee parasites were maintained at sea ports and airports across Australia that receive significant volumes of imported cargo or regular berthing of vessels from international locations where exotic pests of honey bees are known to occur. In addition, coconut log traps for Asian honey bee (*Apis cerana*) were maintained at the ports of Darwin, Gove and Brisbane. Trap boxes (empty hives) are deployed at many southern ports as an additional surveillance measure for detecting swarms of exotic bees.

As well as providing early detection of exotic bee parasites and bees, the NSHP supplies data to support health certification for exports of live bees.

#### Table 3.3 Samples examined for parasites of bees and pest bee species, by state or territory, 2011

<table>
<thead>
<tr>
<th>State or territory</th>
<th>Specimens examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>34</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>91</td>
</tr>
<tr>
<td>Queensland</td>
<td>63</td>
</tr>
<tr>
<td>South Australia</td>
<td>18</td>
</tr>
<tr>
<td>Tasmania</td>
<td>10</td>
</tr>
<tr>
<td>Victoria</td>
<td>30</td>
</tr>
<tr>
<td>Western Australia</td>
<td>62</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>308</strong></td>
</tr>
</tbody>
</table>

#### Table 3.4 Samples examined for parasites of bees and pest bee species, by agent, 2011

<table>
<thead>
<tr>
<th>Agent</th>
<th>Samples examined</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Apis cerana</em></td>
<td>73</td>
</tr>
<tr>
<td>Tracheal mites</td>
<td>115</td>
</tr>
<tr>
<td><em>Varroa/Tropilaelaps</em> mites</td>
<td>120</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>308</strong></td>
</tr>
</tbody>
</table>


Section 4.6.4 provides an update on the emergency response to an incursion of *A. cerana* by the Queensland Department of Employment, Economic Development and Innovation.

**Trapping for Culicoides midges**

*Culicoides* surveillance supports the livestock export trade by confirming the continuous or seasonal absence of *Culicoides* vectors at ports from which livestock are loaded.

### 3.4.3 Bovine brucellosis surveillance

After an eradication campaign that began in 1970, Australia achieved freedom from bovine brucellosis (caused by *Brucella abortus*) in July 1989, and remains free from this disease. Targeted serological surveillance, performed by serological testing of blood samples collected from adult female cattle at slaughter, continued until the end of 1993. Since then, extensive general surveillance by investigation of abortions has demonstrated ongoing freedom from bovine brucellosis.

Table 3.5 shows the number of serological tests for *B. abortus* carried out at state veterinary laboratories as part of abortion investigations. Table 3.6 shows the number of tests performed for other reasons, such as export requirements. Sampling is conducted on other species, as shown in the tables, on an ad hoc basis.

#### 3.4.4 Australian Veterinary Practitioner Surveillance Network

The Australian Veterinary Practitioner Surveillance Network is a web-based system that collects information about the frequency of on-farm investigations by selected nongovernment veterinarians, complementing surveillance undertaken by state and territory field services. Veterinarians are recruited strategically across Australia’s animal production regions, ensuring geographic coverage as well as coverage of the range of livestock industries and animal production systems in Australia. The data are organised geographically, by livestock type and by reasons and outcomes for farm visits.

The network supports Australia’s disease-free reputation by providing quantitative evidence of the amount of general surveillance, at the farm level, performed by a selected group of nongovernment veterinarians. The network also raises awareness of EADs among practitioners working in all production areas of Australia.

The network was initiated by the Australian Government and is managed by DAFF; it reports annually to NAHIS.

---

**Table 3.5 Serological tests for *Brucella abortus* in Australia, abortion serology, 2005–11**

<table>
<thead>
<tr>
<th>Species</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>1165</td>
<td>746</td>
<td>293</td>
<td>626</td>
<td>289</td>
<td>1313</td>
<td>939</td>
</tr>
<tr>
<td>Horse</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sheep</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1165</strong></td>
<td><strong>765</strong></td>
<td><strong>293</strong></td>
<td><strong>626</strong></td>
<td><strong>289</strong></td>
<td><strong>1313</strong></td>
<td><strong>939</strong></td>
</tr>
</tbody>
</table>

a All test results were negative for *Brucella abortus*.

Note: In previous years, *Animal Health in Australia* presented aggregated totals for brucellosis surveillance.

**Table 3.6 Serological tests for *Brucella abortus* in Australia, other serology, 2005–11**

<table>
<thead>
<tr>
<th>Species</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpaca</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cattle</td>
<td>4 975</td>
<td>9 875</td>
<td>13 209</td>
<td>9 860</td>
<td>5 672</td>
<td>11 398</td>
<td>4 936</td>
</tr>
<tr>
<td>Deer</td>
<td>0</td>
<td>0</td>
<td>519</td>
<td>0</td>
<td>53</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dog</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Goat</td>
<td>0</td>
<td>473</td>
<td>2 190</td>
<td>0</td>
<td>905</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Horse</td>
<td>0</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Pig</td>
<td>0</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>33</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sheep</td>
<td>37</td>
<td>361</td>
<td>273</td>
<td>45</td>
<td>5</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5 012</strong></td>
<td><strong>10 754</strong></td>
<td><strong>16 200</strong></td>
<td><strong>9 905</strong></td>
<td><strong>6 676</strong></td>
<td><strong>11 400</strong></td>
<td><strong>4 949</strong></td>
</tr>
</tbody>
</table>

a All test results were negative for *Brucella abortus*.

Note: In previous years, *Animal Health in Australia* presented aggregated totals for brucellosis surveillance.
3.5 Surveillance programs managed by state and territory governments

Most of the infrastructure for general animal disease surveillance is provided and coordinated by state and territory governments. State and territory laws require animal owners and veterinarians to report any suspicion of ‘notifiable’ diseases — that is, diseases that might require government intervention and management — to animal health authorities. The identification of emerging diseases such as ABLV, Hendra virus disease of horses and Bungowannah virus infection of pigs is part of the surveillance role of the states and territories.

The state and territory governments employ networks of official field veterinarians and diagnostic veterinary laboratory pathologists to gather intelligence about notifiable diseases. In some cases, private veterinary practitioners are contracted to the government for this work. Governments also contract and liaise with the private sector to ensure that surveillance for these diseases is effective. Through these networks, as well as through their research and extension facilities, they obtain knowledge about the distribution and prevalence of a wide range of animal diseases, not just notifiable ones.

State and territory government surveillance plans have a common objective — to ensure that relevant information from general animal disease surveillance is readily available for assessing and managing risks to trade in livestock and products, public health and animal production efficiency. Historically, this has led to:

- early detection of emergency and emerging diseases
- demonstration of freedom from diseases or disease agents
- determination of, and detection of changes in, the distribution, prevalence and incidence of diseases and disease agents
- detection of changes in factors or events that influence the risk of diseases.

Official veterinarians in regions of the state or territory attend disease outbreaks that a private practitioner cannot attend, or that involve a suspected endemic notifiable disease or exotic animal disease. Incursions or outbreaks of diseases such as avian influenza, anthrax, equine influenza and Newcastle disease have been detected in this way. When high levels of mortality are beyond the investigative and resource capacity of owners and private veterinarians, the disease investigation might require the services of a government veterinarian. Most investigations are not emergencies, but government veterinarians have ready access to equipment that minimises the risk that they will spread any diseases from farm to farm. Government veterinarians are also skilled in postmortem examination and diagnosis.

Samples for laboratory confirmation or exclusion of disease are quickly taken and dispatched. Laboratory diagnosis is free of charge to the submitter for many categories of submission. Samples may be submitted to government laboratories with access to specialist diagnostic pathologists or to contracted private laboratories that meet prescribed standards. In all cases of suspected exotic diseases or EADs, samples are also submitted to CSIRO-AAHL in Geelong.

Laboratory quality assurance is maintained by compulsory accreditation of laboratories by the National Association of Testing Authorities, as well as compulsory participation in interlaboratory quality assurance programs (see Chapter 1 for further information).

The information collected by state and territory field and laboratory staff is recorded in information management systems. Property-of-origin health certificates and official reports of regional and national disease status to various authorities (including the OIE) can readily be extracted from these systems. The information is also fed back to the veterinary networks through surveillance reports that keep state and territory field and laboratory staff informed about disease patterns.

Many veterinarians conduct targeted animal disease surveillance projects with the aim of publishing the information in refereed journals and presenting it at national and international conferences. This leads to the development and maintenance of specialist epidemiology units that can apply the most recent surveillance tools to the analysis of existing or emerging animal diseases.

3.6 Participation by private veterinarians in disease surveillance and management

Private veterinary practitioners contribute to national surveillance programs (particularly the NTSESP), and information about on-farm investigations conducted by nongovernment veterinarians is collected through the Australian Veterinary Practitioner Surveillance Network. Australia’s states and territories have legislation that requires all farmers, private veterinary practitioners and laboratories to report suspicion or confirmation of a notifiable disease (see Section 3.5).
3.6.1 New South Wales
In New South Wales, suspect notifiable diseases are usually investigated after private practitioners submit diagnostic specimens to a veterinary laboratory in the New South Wales Department of Industry and Investment. District government veterinary officers collate data from these investigations, and often assist in the investigation or manage cases referred by private practitioners. Private practitioners receive subsidised laboratory testing for cases in which notifiable diseases are suspected. They also receive training in sample submission and disease investigation for some notifiable diseases.

3.6.2 Northern Territory
Private practitioners in the Northern Territory are asked to report significant animal disease events to veterinary officers in the Northern Territory Department of Resources, who manage the investigations. Practitioners are encouraged to submit livestock samples for laboratory investigation, which is performed free of charge.

3.6.3 Queensland
Private veterinary practitioners involved in large animal and equine practice are regularly visited or contacted by veterinary or biosecurity officers from the Queensland Department of Employment, Economic Development and Innovation to discuss disease incidents in their area. Private practitioners are reminded of the importance of reporting significant animal disease events, including notifiable diseases and suspect EADs. In response to outbreaks of Hendra virus, the department has increased the frequency and content of these contacts and has prepared a package of printed material to promote the management of zoonoses (diseases of animals that can be transmitted to humans). The department conducts occasional training sessions with private practitioners, focusing on the use of personal protective equipment in Hendra virus investigations.

Departmental veterinary officers also work with private veterinary consultants in the intensive pig and poultry industries to manage serious disease issues. The department funds a senior veterinary pathologist to assist private practitioners and field veterinary officers to investigate complex disease cases, particularly where no clear cause for the problem has been identified.

Since 2010, veterinary officers in Townsville have been involved in structured teaching activities with veterinary science students at James Cook University. New graduates are entering the veterinary profession with a deeper appreciation of state veterinary medicine and an established relationship with the department.

3.6.4 South Australia
The Biosecurity Division of Primary Industries and Resources South Australia (Biosecurity SA) maintains close communication with rural private veterinary practitioners. Biosecurity SA has an Enhanced Disease Surveillance Program to help promote disease incident investigations in South Australian livestock. The program funds laboratory submissions for suspect infectious diseases in livestock and reimburses contracted private veterinary practitioners for costs incurred investigating unusual disease events when requested.

Biosecurity SA also offers practitioners training and refresher courses in necropsy technique and disease investigations, as well as providing ongoing technical support, when required.

3.6.5 Tasmania
During 2011, the Tasmanian Department of Primary Industries, Parks, Water and Environment used both contracted and noncontracted veterinary practices to provide general surveillance information. Although the contractual arrangement that has been in place for the past seven years came to an end in June 2011, the relationship between private veterinary practices and the department is being maintained via an expanded application of the NSDIP and a greater emphasis on EAD communications — which includes the department providing materials on EADs to veterinarians, as well as veterinarians reporting suspect EADs to the department.

3.6.6 Victoria
Since 2005, private veterinary practitioners in Victoria have investigated significant disease events as part of the Victorian Significant Disease Investigation Program. Participating practitioners receive a payment from the Victorian Department of Primary Industries for reporting the investigation and a subsidy towards laboratory investigation costs. In 2010, the department also introduced a subsidy for cattle, sheep and goat owners who initiate an investigation of a significant disease event, to partially cover the cost of engaging a veterinary practitioner. During 2011, 303 significant disease events were investigated and reported by private veterinary practitioners in Victoria.

Private veterinary practitioners are also contracted by the Department of Primary Industries to undertake on-farm activities associated with endemic disease management programs, including for bovine Johne’s disease and enzootic bovine leucosis.

In 2011, the department offered two short courses in livestock disease investigation methods for private veterinary practitioners. Both courses were well attended.
3.6.7 Western Australia

In recent years, Western Australia has promoted surveillance and reporting of significant livestock disease events by private practitioners through personal networking by departmental veterinary officers, regional training workshops in disease investigation and the production of a quarterly surveillance newsletter. Laboratory diagnostic work on cases of suspect notifiable diseases, or cases that are considered to be of public benefit, is exempt from laboratory charges.

During 2011, the Department of Agriculture and Food Western Australia and the NSDIP sponsored approximately 120 investigations of significant disease in livestock by private veterinarians. This included payment of travel costs, waiving of laboratory fees and assistance with collecting and dispatching samples. Practitioners, district veterinary officers and pathologists liaise closely under the program.

3.7 Surveillance programs in northern Australia

3.7.1 Northern Australia Quarantine Strategy

NAQS is a program of DAFF Biosecurity that operates across coastal northern Australia from Broome in Western Australia to Cairns in Queensland, including Torres Strait.

NAQS contributes to national biosecurity through:

- identifying and evaluating the unique quarantine risks facing northern Australia
- developing and implementing measures for the early detection of targeted pests, diseases and weeds
- contributing to national and international initiatives relating to domestic surveillance for targeted pests and diseases
- managing the quarantine aspects of border movements through Torres Strait.

NAQS surveillance objectives are delivered through a program of integrated activities including:

- active surveillance for targeted pests and diseases through targeted surveys of domestic and feral animal populations, sentinel animal monitoring, insect and vector trapping, and fee-for-service programs delivered by Indigenous ranger groups
- a general surveillance strategy that educates residents and visitors to northern Australia about pests and diseases of concern, and encourages the reporting of unusual signs of pests and diseases through the program’s Quarantine TopWatch! campaign.

Strategy priorities

Key priorities for NAQS in 2011 included:

- a continued focus on risk-based delivery of domestic surveillance for the detection of NAQS target exotic animal pests and diseases, including highly pathogenic avian influenza, rabies, surra, SWF, foot-and-mouth disease and classical swine fever
- collaboration with a range of internal and external stakeholders on surveillance initiatives, including contributing to capacity building and animal health surveillance in Papua New Guinea and Timor-Leste (coordinated by the Office of the Chief Veterinary Officer in DAFF Biosecurity)
- conducting an expert review of risk areas across northern Australia to ensure that the NAQS surveillance effort continues to target areas considered to be of relative higher risk for the introduction and establishment of exotic animal pests and diseases within the scope of NAQS’ area of responsibility
- progressing initiatives to strengthen existing surveillance strategies relating to domestic animal health, including developing a pilot syndromic reporting project with Indigenous ranger groups to increase reporting of domestic animal health in Indigenous communities
- reviewing permit arrangements for the movement of animal and animal products from Torres Strait.

The program also continued to contribute to national surveillance programs, including NAMP, the Screw-worm Fly Freedom Assurance Program, and the National Avian Influenza Wild Bird Surveillance Program of the AWHN.

No targeted exotic pests or diseases were detected through NAQS activities in 2011.

Onshore surveillance

During 2011, NAQS conducted seven feral animal health surveys across northern Australia, one domestic animal health survey of Torres Strait and the Northern Peninsula area, and four surveys of wild waterfowl populations for the detection of avian influenza viruses. Twelve public awareness visits were conducted across more than 35 communities; they included education campaigns in schools, in health clinics, and with Indigenous ranger groups and pastoralists.

Other monitoring activities included regular testing of sentinel cattle herds for diseases, including exotic strains of bluetongue virus; and trapping for adult SWF and insect vectors, including Culicoides biting midge species. In 2011, NAQS monitored four sentinel cattle herds located in Queensland, the Northern Territory and Western Australia.
Insect traps were located on the islands of Saibai, Boigu, Dauan and Horn in Torres Strait and at each of the sentinel cattle sites.

**Japanese encephalitis**

Limited surveillance for Japanese encephalitis virus in Torres Strait and mainland Australia was undertaken in the 2011 wet season. Japanese encephalitis virus is exotic to mainland Australia but is considered to be seasonally present in Torres Strait. Testing of a sentinel pig herd at Bamaga, Cape York Peninsula, in Queensland has not shown any evidence of Japanese encephalitis circulation on the mainland since early 2004.

### 3.7.2 Animal biosecurity in the north Queensland tropics

Biosecurity Queensland conducts surveillance and awareness activities for emergency pests and diseases across tropical north Queensland. These activities complement those of other programs, such as border security and quarantine barrier activities undertaken by DAFF Biosecurity, including the NAQS program. They also contribute to national pest and disease surveillance programs, including:

- NAMP
- the NTSESP
- the NSHP for apiary surveillance
- the National Screw-worm Fly Freedom Assurance Program.

Activities are also conducted in aquatic animal health surveillance, EAD preparedness, and livestock identification and traceability.

Biosecurity Queensland personnel work to raise awareness about biosecurity. They provide guidance to the public and private sector on:

- managing the risk of exposure to zoonotic disease
- managing emergency pest and disease incidents, including decontamination procedures and movement controls
- on-farm biosecurity planning
- investigating suspect animal pests or diseases
- animal disease prevention strategies, including swill-feeding regulations
- animal welfare and animal ethics.

A key activity for Biosecurity Queensland is to investigate reported outbreaks of disease and losses in livestock and domestic animals. During 2011, north Queensland cases involving suspected EADs included several avian influenza and Newcastle disease exclusions in domestic poultry. All cases proved negative.

The only confirmed EAD detection in the north was a single case of Hendra virus disease near Kuranda (Atherton Tablelands) in July 2011, which resulted in a period of quarantine and testing of in-contact horses.

In 2011, an increase was seen in the number of arbovirus infections in horses, including infections with Ross River, Murray Valley encephalitis and Kunjin viruses (see Section 4.6.2). It is plausible that the intensity of the wet season at the beginning of the year contributed to the rise in cases.

Asian honey bee (*Apis cerana*) was first detected in Cairns in May 2007, when a nest was found in the mast of a fishing boat. Through surveillance activities and public awareness campaigns, 531 nests and swarms have been detected and destroyed since the original incursion. Of these, 207 nests and swarms were destroyed in 2011. The response to the incursion has included using a detector dog trained in bee detection. Following a national decision that Asian honey bee is not eradicable from the Cairns region, Biosecurity Queensland is currently working with the community and industry to make the transition from an eradication campaign to management of this pest bee (see Section 4.6.4).

Extension programs conducted in the northern tropics during 2011 included:

- an EAD and surveillance awareness workshop for private practitioners in Cairns
- visits by Queensland veterinary officers to private veterinary clinics to educate equine veterinary practitioners in the use of Hendra virus practice kits and personal protective equipment.
• promotional activities at agricultural shows and field
days, focusing on biosecurity programs
• presentations at the Cape York Peninsula and Torres
Strait training workshops for environmental health
workers and animal management workers, promoting
the importance of biosecurity awareness, animal welfare
and zoonotic diseases for Indigenous communities.

3.8 Public health surveillance for
zoonotic diseases

The Communicable Diseases Network Australia (see
Chapter 7) provides national leadership and coordination for
the surveillance, prevention and control of communicable
human diseases that pose a threat to public health. The
health departments of Queensland and New South Wales
coordinated the public health response to the numerous
Hendra virus incidents in their respective states this year
(see Chapter 4 for more information on this response).

3.8.1 National Notifiable Diseases
Surveillance System

The National Notifiable Diseases Surveillance System
(NNDSS) coordinates the national surveillance of more
than 50 communicable diseases or disease groups that can
affect people. Unit records of disease notifications made to
state or territory health authorities, under the provisions
of the public health legislation in each jurisdiction, are
supplied daily to the Office of Health Protection, Australian
Government Department of Health and Ageing. The data
are published weekly on the NNDSS website and quarterly
in the journal *Communicable Diseases Intelligence*. Data
on five important zoonoses are replicated in *Animal Health
Surveillance Quarterly*.

Table 3.7 Incidence of selected zoonotic diseases in humans, 2011

<table>
<thead>
<tr>
<th>Zoonotic disease</th>
<th>Number of casesa</th>
<th>2010</th>
<th>2011</th>
<th>5-year mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>1</td>
<td>0</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Barmah Forest virus infection</td>
<td>1459</td>
<td>1856</td>
<td>1799.8</td>
<td></td>
</tr>
<tr>
<td>Brucellosisb</td>
<td>21</td>
<td>40</td>
<td>36.8</td>
<td></td>
</tr>
<tr>
<td>Kunjin virus infection</td>
<td>2</td>
<td>1</td>
<td>1.8</td>
<td></td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>126</td>
<td>214</td>
<td>128.6</td>
<td></td>
</tr>
<tr>
<td>Murray Valley encephalitis virus infection</td>
<td>0</td>
<td>16</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Ornithosis</td>
<td>59</td>
<td>82</td>
<td>96.6</td>
<td></td>
</tr>
<tr>
<td>Q feverc</td>
<td>324</td>
<td>307</td>
<td>374.8</td>
<td></td>
</tr>
<tr>
<td>Ross River virus infection</td>
<td>5139</td>
<td>5108</td>
<td>5042.6</td>
<td></td>
</tr>
</tbody>
</table>

a Data accessed on 2 February 2012 by diagnosis date.
b Australia is free from zoonotic Brucella spp. except Brucella suis, which is endemic in feral pigs in some areas.
c The Australian Q Fever Register stores information on the Q fever immune status of individuals. The website www.qfever.org has general information on Q fever and information on the register.

3.8.2 National Enteric Pathogen
Surveillance Scheme

The National Enteric Pathogen Surveillance Scheme
collects, analyses and disseminates data on enteric
pathogens isolated from humans, animals, food, water, the
environment and other sources. The scheme is operated
and maintained by the Microbiological Diagnostic Unit at
the University of Melbourne. Data on pathogens — such as
*Salmonella* spp., pathogenic *Escherichia coli*, *Yersinia*
spp. and *Campylobacter* spp. — isolated from humans
and nonhuman sources are submitted from participating
laboratories around Australia. Data for human notifications
are reported within the NNDSS.

NNDSS data show that, as in recent years, the most
frequently reported foodborne infections in 2011 were
campylobacteriosis (17 709 cases) and salmonellosis
(12 255 cases).

46 This disease is not notifiable in New South Wales.
Emergency animal disease responses in Australia are coordinated nationally — governments, the private sector and other key players work together to ensure a successful outcome.

This chapter describes the arrangements and initiatives that are in place to prepare for, and respond to, emergency animal diseases (EADs). The chapter also provides information on disease incidents that occurred during 2011. Information on management of aquatic animal health emergencies and aquatic animal disease incidents during 2011 is provided in Chapter 5.

The Australian Government, state and territory governments, livestock industries, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), private veterinarians and laboratories, and other animal health workers all contribute to the management of EADs. Animal Health Australia (AHA) participates on behalf of its members.
4.1 Response plans and coordination

EAD responses in Australia are coordinated nationally — governments and industry work together to ensure a successful outcome. Responses are underpinned by the *Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses* (Emergency Animal Disease Response Agreement — EADRA), which ensures that the response:

- accommodates the relevant state’s or territory’s legislative, industry, government and community structures
- is guided by a nationally agreed plan — the Australian Veterinary Emergency Plan (AUSVETPLAN).

4.1.1 Emergency Animal Disease Response Agreement

The EADRA is a legally binding agreement between the Australian Government, the state and territory governments, livestock industries (currently 14 industries) and AHA. It supports a rapid and efficient response to an EAD outbreak.

The agreement, which is a world first, establishes basic operating principles and guidelines, and defines roles and responsibilities of the parties. It provides for formal consultation and dispute resolution between government and industry on resource allocation, funding, training, risk management and ongoing biosecurity arrangements.

The signatories to the EADRA are committed to:

- minimising the risk of EAD incursions by developing and implementing biosecurity plans for their jurisdictions or industries
- maintaining capacity to respond to an EAD by having adequate numbers of trained personnel available to fill roles specified in AUSVETPLAN
- participating in decision making relating to EAD responses, through representation on the Consultative Committee on Emergency Animal Diseases (CCEAD) and a National Management Group (NMG)
- sharing the eligible response costs of EAD incursions using pre-agreed cost-sharing formulas.

The EADRA is regularly reviewed so that it remains relevant, flexible and functional.

In 2011, changes to the EADRA included:

- addition of the four national horse organisations (Australian Racing Board, Harness Racing Australia, Australian Horse Industry Council and Equestrian Australia) as industry parties to the EADRA
- improvements to the provisions for the admission of new parties and the replacement of an industry party
- revised confidentiality arrangements for CCEAD and NMG consultations (which are now consistent with the Emergency Plant Pest Response Deed)
- a revised cost-sharing split between New South Wales and Queensland in the event of a screw-worm fly incident (other parties’ contributions remain unchanged)
- minor changes relating to procedures.

The latest version of the EADRA can be found on the AHA website.

An EADRA guidance document, *Guidelines for Determining Whether an Unlisted Disease is an EAD*, and a *Guide to Developing an Emergency Animal Disease Response Plan* were endorsed by parties to the EADRA and published on the AHA website.

With the assistance of a working group comprising governments, industry and Plant Health Australia, AHA has begun the process for the second five-year review of the EADRA (due in 2012). The review will take into account, among other things, the first five-year review of the Emergency Plant Pest Response Deed.

There were no EADs during 2011 for which cost sharing under the EADRA was invoked.

4.1.2 Australian Veterinary Emergency Plan

AUSVETPLAN is the national contingency planning framework that sets out the various roles, responsibilities and policies to be followed by all agencies in an EAD response. AHA manages the review, approval and publication of these manuals on behalf of its government and industry members.

The availability of agreed AUSVETPLAN disease strategies or response policy briefs for all diseases listed in the EADRA ensures that informed decisions about the policies and procedures needed to manage an EAD response are immediately at hand and that no time is lost in the event of an EAD outbreak. This requires that as many policy

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50 Response policy briefs cover EADs that are subject to cost sharing between governments and livestock industries but are not currently covered by full disease strategies.
principles as possible are agreed to in non-outbreak times. EAD responses are planned and implemented at three levels — national, state or territory, and local — and involve animal health authorities, emergency management agencies and industry organisations.

The disease strategies and response policy briefs are supported by operational procedures manuals, enterprise manuals, and other resource and guidance documents. The AUSVETPLAN Summary Document describes the components of AUSVETPLAN and outlines their functional relationships.

**Updating prioritised AUSVETPLAN manuals**

In 2011, AHA worked with the AUSVETPLAN Technical Review Group, the Australian Wildlife Health Network, industry and government experts, the Animal Health Committee (AHC), and scientific editors, to revise and publish updated prioritised AUSVETPLAN manuals for:

- equine influenza — a major revision that incorporates updated information in response to lessons learnt from the 2007 Australian equine influenza outbreak, the latest scientific knowledge about the disease and control and eradication strategies (including vaccination), updated diagnostic criteria, and refinements to the recommended quarantine and movement controls
- rabies — a major revision that incorporates relevant international guidelines and standards, the latest scientific knowledge about the disease (e.g. new lyssavirus genotypes, worldwide distribution, new maintenance and spillover hosts) and its control, updated diagnostic criteria, and refinements to the control policy
- wild animal response strategy — a revision that includes updated scientific information on wild animal diseases, additional diseases (Australian bat lyssavirus and avian influenza), information on ecology and biology of wild bird species, and revised operational guidelines
- avian influenza — a revision to include an updated policy on vaccination (which will be reviewed in 2012)
- pig industry (enterprise manual) — a new manual that is aimed at government officers and pork industry personnel who may be involved in EAD preparedness. For government officers, the manual provides an overview of the pork industry, and the nature and operations of piggeries in Australia. Piggery features that are relevant to disease control or eradication are described, and guidelines on managing an EAD on a piggery are provided. For owners or managers of piggeries, the manual provides information on EAD management and the procedures that would be used during an EAD response, as well as guidelines for preparing an EAD response plan.

Revisions were also made in 2011 to the AUSVETPLAN manuals for anthrax, bluetongue, bovine spongiform encephalopathy, Hendra virus, the major exotic pig diseases, and management manuals and enterprise manuals. These revisions are undergoing the formal development and approvals process before the revised manuals are published in 2012.

**Improved usability (AUSVETPLAN edition 4)**

The initial stages of a consultancy to ensure that AUSVETPLAN manuals remain relevant and current, and to improve their usability and functionality, were completed in 2011, including the development of a prototype of ‘AUSVETPLAN edition 4’. The system used for the new edition will allow manuals to be revised more efficiently, and will also allow those involved in outbreaks to download or print documents that are tailored to their particular operational needs.

**Foot-and-mouth disease response policy review**

An outbreak of foot-and-mouth disease (FMD) would result in the immediate closure of many of Australia’s major export markets for livestock and livestock products. The economic effects of even a small-scale outbreak would be enormous for individuals, the farming industry, and subsidiary and support industries. Significant flow-on losses would affect the Australian economy, including many businesses that rely on livestock industry revenue in rural and regional Australia. In 2002, the Productivity Commission estimated that the total cumulative loss to the national economy would be about $2–3 billion in gross domestic product for a short outbreak, rising to $8–13 billion for a 12-month outbreak. The Australian Bureau of Agricultural and Resource Economics and Sciences updated these figures in 2010 as part of a review of Australia’s preparedness for FMD. Expressed in 2009–10 dollars, the estimated direct economic losses to the livestock and meat-processing sector alone would range from $7.1 billion for a 3-month outbreak to $16 billion for a large, 12-month outbreak.

Australia’s response policy for an outbreak of FMD is to control and eradicate the disease through stamping out and to re-establish the FMD-free status of Australia as quickly as possible. However, experience with FMD outbreaks in other countries has shown that mass culling of animals to control an outbreak results in enormous livestock losses and is unacceptable to many people. In addition, simulations in

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Australia have shown that stamping out FMD — a disease that spreads very quickly — in a densely populated dairy farming area would be logistically challenging and could jeopardise the entire eradication effort if infection could not be contained.

Significant progress was made on the FMD response policy review during 2011. AHA convened a high-level roundtable consultation meeting between government and industry peak bodies in April 2011 to recommend policy framework options for revision of the AUSVETPLAN disease strategy for FMD. Government and industry representatives at the roundtable meeting agreed to a revised risk-based response policy framework for FMD that incorporates flexibility to deal with the particular circumstances and phases of an outbreak, and aims to balance effective disease control with business continuity.

AHA, with the valuable assistance of several industry and government experts, prepared a draft revision of the AUSVETPLAN disease strategy for FMD, in line with the outcomes of the roundtable meeting. The fundamental policy position — eradication without ongoing vaccination — will not change. However, the review ensures that Australia’s FMD response plans are current, reflect international best practice, and will allow effective eradication — assisted by vaccination, if required — with minimum disruption to industry. The draft revised manual will undergo extensive consultation in 2012 before being formally endorsed.

4.1.3 Nationally Agreed Standard Operating Procedures

Nationally Agreed Standard Operating Procedures (NASOPs) have been developed for use by states and territories during responses to EAD incidents and emergencies. They support national consistency and provide guidance to response personnel undertaking operational tasks. Although not formally a part of AUSVETPLAN, NASOPs underpin elements of AUSVETPLAN and describe the actions typically undertaken during a response to an incident. They are provided to guide states and territories in developing local procedures and work instructions.

NASOPs are prepared by the Sub-Committee on Emergency Animal Diseases, which has representation from the Australian Government, the governments of each state and the Northern Territory, and AHA (as an observer). The committee is chaired by a member of the AHC. NASOPs are reviewed, as necessary, to ensure that they remain up to date.

NASOPs currently published on the AHA website address EAD-specific topics such as personal decontamination, collecting samples, managing stock during a national livestock standstill and transport of carcasses.

The Biosecurity Emergency Preparedness Working Group of the National Biosecurity Committee has accepted responsibility for developing generic NASOPs that apply to all biosecurity responses, such as conducting briefings and debriefings.

4.1.4 What happens in a response?

Operational responsibility for the response to an EAD lies with the relevant state or territory, which develops an EAD response plan (EADRP). In most jurisdictions, the government department of agriculture or primary industries manages the response to an EAD outbreak and implements the EADRP. State and territory chief veterinary officers (CVOs) have leadership roles in the response, which also involves state emergency services, public safety services and other government departments, as needed. Pre-existing whole-of-government arrangements allow agriculture or primary industries departments to draw upon resources and expertise from these agencies.

The CCEAD is responsible for technical coordination of an EAD response. The committee is chaired by the Australian CVO or delegate, and comprises the state and territory CVOs, the Director of the Commonwealth Scientific and Industrial Research Organisation’s Australian Animal Health Laboratory (CSIRO-AAHL), members from Biosecurity in the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) and technical representatives from relevant industries. Industry representatives comprise one nominee agreed by all industry parties and one nominee from each of the affected industries. AHA attends CCEAD meetings as an observer.

To ensure a timely and effective response, the CCEAD oversees implementation of EADRPs, strategy development and planning, and the development of technical policy. The CCEAD provides advice to an NMG that is established for each incident. The secretary of DAFF chairs the NMG, and members are chief executives of the state and territory agriculture or primary industries departments, and chief executives from each affected industry. Representatives of AHA attend NMG meetings as observers.

When it receives technical advice from the CCEAD, the NMG considers policy and financial issues associated with the EADRP. The NMG’s agreement to an EADRP is an undertaking to share eligible costs under the EADRA.

This structure ensures that the resources needed for agriculture and animal health authorities to deal with an EAD are available and coordinated for the most effective response.

Further information about the mechanism of an EAD response and how cost-sharing provisions are implemented can be found in the AUSVETPLAN Summary Document.

4.2 Preparedness initiatives

4.2.1 Emergency Animal Disease Preparedness Program

Development of Australia’s preparedness to manage and respond to EADs is coordinated through the EAD Preparedness Program, which is managed by AHA. The main objective of the program is to ensure that Australia is well prepared for EAD incidents, through a range of activities, including public awareness, training, simulation exercises and surveillance. When outbreaks occur, preparedness ensures that Australia can mount a rapid and effective response with minimal disruption to livestock (including horse) industries and food industries. The program is funded through a tripartite arrangement between the Australian Government, state and territory governments, and livestock industry organisations.

4.2.2 National Emergency Animal Disease Training Program

In the event of an EAD incident, government officers, livestock producers, private veterinary practitioners and emergency workers are called upon to help eradicate or control the disease. AUSVETPLAN defines how a response to an EAD incident is to be conducted and the roles that require specific training.

The National Emergency Animal Disease Training Program was developed by AHA to provide education and training in the various response roles and functions. At the introductory level, face-to-face EAD awareness sessions provide government officers, private practitioners and industry members with a basic understanding of Australia’s agreed response strategies. More formal accredited training, covering the skills and knowledge needed to perform a role or function during an EAD response, is available for government officers through in-house jurisdictional programs, and for industry members through AHA.

AHA holds twice-yearly workshops for industry executives, technical specialists and senior government officers to train them to serve on the two key decision-making bodies — the NMG and the CCEAD — during an EAD response (see Section 4.1.4).

AHA continually improves its EAD Foundation online module as a generic introduction underpinning the National Emergency Animal Disease Training Program. The module provides a general understanding of the basic principles of an EAD response, the role of AUSVETPLAN, the people involved in a response and their responsibilities, and the importance of communications and information management during a response.

Australian Veterinary Reserve

The Australian Veterinary Reserve (AVR) was created in 2004 and now includes nearly 100 nongovernment and rural veterinary practitioners. The members of the AVR are trained to immediately adapt to the conditions of an EAD incident and perform veterinary response roles. In the response to the 2007 equine influenza outbreak, nearly half the AVR members were actively deployed to affected states and demonstrated their commitment, expertise and professionalism.

During non-outbreak times, AVR members maintain their skills and continue their professional development by attending dedicated AVR sessions at annual conferences of the Australian Veterinary Association. In addition, they monitor EAD developments worldwide through AVR Intelligence, an electronic bulletin produced by AHA specifically for the AVR.

Rapid Response Team

The national Rapid Response Team is an Australian Government initiative that was originally developed to assist smaller jurisdictions with limited expert resources to establish emergency control centres for disease outbreaks. Rapid Response Team members are employees of agriculture or primary industries departments who have expertise in establishing the key components of a local disease-control centre or a state disease-control headquarters. Members of the Rapid Response Team participate in professional development programs to maintain or increase their response skills.
The major activities in the Rapid Response Team calendar are professional development workshops and training exercises. The 2011 professional development activity, Exercise Golden Fleece, was based on an FMD scenario, and focused on the challenges of responding to an EAD outbreak in a remote location. During the activity, the Rapid Response Team visited saleyards and a property of interest, and set up a simulated local disease-control centre in rural South Australia.

**First response team training**

The EAD Response Preparedness and Capability Enhancement Program between 2009 and 2011 strengthened ‘first response capacity’ in the states and territories. This training program was designed to boost national EAD response capability and capacity by delivering EAD awareness and response training to state and territory government personnel.

During 2011, more than 50 Response Preparedness and Capability Enhancement Program training courses, attended by almost 1000 people, were delivered by the jurisdictions. Personnel were trained in a variety of response functions, including logistics, operations, planning and incident management.

**Industry training**

In 2011, several workshops were held for the sheepmeat and wool industries to train industry liaison officers. Industry liaison officers play an important part in local and state control centres during an emergency response, assisting with response planning and liaising between government and the affected industries and communities.

**4.2.3 International collaboration on modelling for preparedness**

To strengthen EAD preparedness, Australia is a key player in an international collaboration on epidemiology and disease modelling. The EpiTeam is a subgroup of the Emergency Management Working Group of the Quadrilateral Group of countries (Australia, Canada, New Zealand and the United States). The team was formed in May 2005, following a workshop on FMD modelling and policy. It includes members from the Quadrilateral Group, Ireland and the United Kingdom.

Key achievements of the EpiTeam to date include:

- completion of a comparison of countries’ FMD models
- formulation of a series of FMD outbreak scenarios to support policy development
- development of decision-support tools for use in the initial stages of an outbreak
- development of guidelines for the use of simulation models in contingency planning and during EAD outbreaks.

The use of vaccination to control an outbreak of FMD in a previously free country is increasingly recognised as an important factor in a response to FMD, particularly given the changes in the guidelines of the World Organisation for Animal Health (OIE) on regaining FMD-free status.\(^{54}\)

It would be valuable to understand the circumstances in which vaccination may (or, importantly, may not) offer benefits for effective and efficient management of an FMD incursion. In 2011, the EpiTeam initiated a modelling study to evaluate different vaccination strategies and identify conditions under which vaccination could be beneficial in managing an FMD outbreak. The study will be conducted by Australia, New Zealand, the United States and the United Kingdom, using their respective FMD modelling capabilities, and will draw on the recent United Kingdom FMD exercise (Exercise Silver Birch) as a basis for the work. This study will compare model outputs, identify any differences between the models, and test the findings under different country-specific scenarios.

**4.2.4 Review of foot-and-mouth disease preparedness**

During 2011, DAFF commissioned a consultancy —by Mr Ken Matthews, AO — to provide independent advice on Australia’s current level of preparedness and capacity to effectively manage the threat of FMD. The report of the consultancy, *A Review of Australia’s Preparedness for the Threat of Foot-and-Mouth Disease*, was released on the DAFF website in November 2011.\(^{55}\) The report acknowledges the many strengths in the Australian system, and recommends enhancements in 11 key areas.

Following finalisation of the Matthews report, the National Biosecurity Committee agreed to reinvigorate national action on improving Australia’s preparedness for FMD through the development of a National FMD Action Plan. The plan agreed by the committee identifies priorities for national action (to address policy and capacity gaps), action currently under way and areas to be addressed through industry–government collaboration.

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\(^{54}\) Under Article 8.5.9 of the OIE Terrestrial Animal Health Code, it will take six months before a country can regain its FMD-free status when a stamping out policy, emergency vaccination and serological surveillance are applied.

Implementation of the recommendations will require cooperation between all jurisdictions, relevant livestock industries and other key stakeholders, such as AHA and professional and community groups. For this reason, stakeholders have been requested to take responsibility for various elements of the National FMD Action Plan through working groups, such as those commissioned by the AHC.

The Australian Chief Veterinary Officer has also convened an Industry–Government Working Group, comprising representatives from industry, state government, AHA and the Australian Veterinary Association, to work collaboratively in areas identified by the Matthews report and the National Action Plan that require a shared-responsibility approach.

4.3 Increasing awareness and understanding

4.3.1 National communications arrangements for agricultural emergencies

In 2002, the Council of Australian Governments signed a communications memorandum of understanding requiring all jurisdictions to identify a key communications manager, limit public comment to key spokespeople, have consistent public comment and brief the media regularly.

The memorandum of understanding led to the establishment of the National Communications Network (NCN), which is a central part of the emergency communication arrangements. The NCN comprises communications managers from all Australian agricultural agencies and the communications manager from AHA, representing the industry signatories to the EADRA. It actively manages communications during emergencies, in accordance with the memorandum of understanding. Key roles of the NCN include:

- promoting collaborative communication activities
- reaching agreement on key messages and spokespeople
- disseminating information within jurisdictions and industry.

These arrangements were used extensively in the 2007 equine influenza response and are also used regularly for smaller incidents, such as the early detection of human pandemic H1N1 influenza in pigs in 2009.

The operations of the NCN are currently being reviewed in consultation with its members and the National Engagement and Communications working group.

**Market research supporting biosecurity awareness on the farm**

In 2011, the Australian Government commissioned market research to explore awareness of and attitudes towards biosecurity on the farm. This research will inform the development of effective communication and engagement strategies that build on the core principles of Australia’s biosecurity system — shared responsibility, voluntary compliance and management of risk across the continuum.

4.3.2 Farm Biosecurity campaign

The Australian Government, state and territory governments, and livestock industries all have biosecurity and communications initiatives to increase awareness of the biosecurity practices needed to protect landholdings and Australia against EADs.

Farm Biosecurity is a national awareness and engagement program that provides information to livestock producers and related service providers about farm biosecurity and prevention of animal diseases and plant pests. The program, a joint initiative of AHA and Plant Health Australia, encourages producers to identify risks to their livestock and plant products, and minimise these risks by using biosecurity measures as everyday practice in their enterprises.

Farm Biosecurity uses the media, educational materials and stakeholder engagement to deliver its messages. It promotes the Emergency Animal Disease Watch Hotline and the Exotic Plant Pest Hotline to report unusual signs of diseases or pests.

4.3.3 Practitioner awareness

The Australian Government provides funding to the jurisdictions for training veterinary practitioners in EAD recognition and response. These funds are used to conduct workshops that provide a technical update and specialist material related to EADs, with some coverage of basic emergency structures and policy (e.g. AUSVETPLAN, hotline numbers, and state or territory response arrangements). Material covered in the workshop is based on key EADs that are topical or changing in their epidemiology. Workshops are part of continuous professional development for field veterinarians and may be used by individual jurisdictions to deliver some EAD competency training. During 2011, workshops were held in Victoria, New South Wales, Queensland, South Australia and Western Australia.

56 Emergency Animal Disease Watch Hotline: 1800 675 888.
57 Exotic Plant Pest Hotline: 1800 084 881.
Emergency animal disease bulletins were published in the *Australian Veterinary Journal* on leishmaniasis and canine influenza, and three EAD newsletters provided updates on a wide range of EAD topics.\(^{58}\)

The Australian Veterinary Association published the *Guidelines for Veterinary Personal Biosecurity*. These guidelines provide the latest information about infection control and dealing with high-risk situations, and are equally relevant to veterinary practices of all types. The guidelines include a modifiable Word document that can be used to create an individual infection-control plan for every veterinary practice in Australia.\(^{59}\)

### 4.4 Biosecurity planning

Effective biosecurity at the enterprise and industry levels is extremely important in reducing the risk of introduction or spread of animal diseases. This is recognised by the Australian livestock industries and governments in the EADRA, which requires that all signatories develop, implement and maintain biosecurity plans at industry, regional and farm levels for their sector.

The farm-level biosecurity plans describe the measures to mitigate the risks of disease entry or spread. The plan for each EADRA signatory is endorsed by the other EADRA signatories and is subject to ongoing review and maintenance.

AHA continues to work with its members to ensure that the biosecurity plans are science based, relevant, cost-effective and contemporary. All plans can be found on the AHA website.\(^{60}\)

#### 4.4.1 Zoo biosecurity

Australia’s *National Zoo Biosecurity Manual*,\(^{61}\) published in 2011, was a cooperative initiative of Australia’s zoo industry, the Australian Wildlife Health Network (AWHN) and DAFF. The manual documents and raises awareness of best practice in zoo biosecurity. Designed as an industry resource, the manual can be used by individual zoos to gauge their own biosecurity requirements and to develop biosecurity plans suitable for their particular circumstances.

### 4.5 Preparedness against specific diseases

Historically, many of Australia’s EAD preparedness activities have targeted FMD. In 2011, a national review of the overall response policy for FMD progressed (see Section 4.1.2). Other important diseases were also a focus, and work continued on ensuring that Australia is well prepared for an incursion of avian influenza (AI).

#### 4.5.1 Avian influenza

Throughout 2011, reports continued of outbreaks of H5N1 highly pathogenic AI (HPAI) in wild birds, poultry and humans in Asia. Australia provides ongoing assistance with control of HPAI and other zoonotic and emerging diseases in neighbouring countries by delivering capacity-building programs that help countries to prevent, detect and respond to disease in animals. Regional activities conducted by DAFF in 2011 included:

- conducting One Health workshops with animal and human health representatives from Asia–Pacific Economic Cooperation member economies, Cambodia and the Lao People’s Democratic Republic
- maintaining the Avian Influenza Toolkit website,\(^{62}\) which provides resources to help countries manage the threat of AI and other EADs
- entering into an agreement with the United Nations Food and Agriculture Organization, which includes funding to improve monitoring and response capacity for EAD outbreaks and threats in Asia.

Although H5N1 HPAI has never been detected in wild birds or poultry in Australia, preparedness remains a high priority. DAFF works with the Australian poultry industries to continuously strengthen preparedness and response capacities for AI, and to maintain awareness of biosecurity among poultry owners. DAFF’s activities also focus on border security to detect illegally imported poultry and poultry products.

DAFF, through the AWHN, coordinates a national surveillance program for AI in wild birds to provide information on the prevalence and subtypes of AI viruses.

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\(^{62}\) [www.aitoolkit.org](www.aitoolkit.org)
in wild birds, and to act as an early warning system for the poultry industry. Samples were taken from 7972 wild birds during 2011, and a variety of low pathogenic AI virus subtypes (including H5 and H7) were found (see Chapter 3). In 2011, 214 poultry flocks were also tested for AI; all 894 samples from these flocks tested negative. The findings from these surveillance activities serve as an important reminder of the need to remain vigilant with biosecurity measures to ensure that circulating strains of low pathogenic AI viruses do not enter commercial production facilities.

DAFF convenes the National Avian Influenza Vaccination Expert Advisory Group (NAIVE), which includes experts from DAFF, state governments and the poultry industry, and provides advice to the AHC on AI vaccination policy. In 2011, NAIVE:

- developed national operating policy and procedures for the use of AI vaccination in outbreaks, which were endorsed by the AHC
- advised the AHC that, based on DAFF modelling work, emergency vaccination is unlikely to be a cost-effective strategy to control HPAI; however, vaccination might be useful for other purposes, such as the protection of rare and valuable birds
- commissioned CSIRO-AAHL to conduct experimental trials, funded by DAFF, to determine the efficacy of a commercial AI vaccine against Australian H7 HPAI virus; the trials showed that the vaccine protected chickens from clinical disease and viral shedding.

The fifth Australian Government – Poultry Industry Biosecurity Forum was held in July 2011, with attendees from DAFF, the Australian Government Department of Health and Ageing, state governments, the AIHN and the poultry industry. Participants considered advice from DAFF and NAIVE on vaccine policy and results of vaccine trials, discussed challenges with establishing vaccine supply arrangements, and discussed results from scenario-tree analysis of Australia’s AI surveillance in commercial and backyard poultry. The forum agreed that Australia’s AI surveillance objectives should remain to detect AI and maintain freedom from HPAI.

DAFF and Exhibition Stud Poultry Australia developed national biosecurity guidelines for the exhibition sector, which were published in a manual titled *Biosecurity Guidelines for Exhibition Poultry*. The manual was distributed through shows, state and territory government departments, and industry groups. Manuals on poultry farm biosecurity and water biosecurity were also distributed to producers, backyard poultry owners, feed suppliers, industry organisations and state governments. More than 900 feed scoops and notepads, displaying biosecurity messages and promoting the Emergency Animal Disease Watch Hotline, were distributed to feed suppliers and industry organisations, and at poultry shows.

### 4.5.2 Diseases in wildlife

The Wildlife and Exotic Disease Preparedness Program is a joint program of the Australian Government and state and territory governments. Established in 1984–85, it aims to develop practical field strategies for disease eradication, control and management in the event of an emergency, emerging or exotic disease that involves wild animals and could threaten Australia’s livestock industries. In recent years, the program has focused on improving wildlife disease surveillance.

The Wildlife and Exotic Disease Preparedness Program Management Group considered five project applications for 2011–12 and supported funding for four projects:

- **Mapping Hendra virus distribution and diversity.** Because Hendra virus causes fatal disease in humans and horses (see Section 4.6.1), more knowledge is urgently needed about the ecology of the virus in bats. The project’s aim is to expand investigations of Hendra virus strain diversity in flying foxes and to include targeted screening of feral horse and feral pig populations. This project has continued from 2010–11.

- **Avian migration and movement of pathogens in the Australo–Papuan context: developing novel methods for the accurate assessment of relevant connectivity between populations.** This project will determine the relatedness of populations of an Australian migrant bird species by using phylogenetics to analyse the population structure of a commensal infectious organism. Through this, the project will develop and refine technologies for surveillance, containment and control of wildlife diseases. This project has continued from 2010–11.

- **Evaluation of a real-time PCR to simultaneously detect and differentiate virulent and nonvirulent Newcastle disease virus.** The aim of this project is to evaluate a new polymerase chain reaction (PCR) test for Newcastle disease virus that will streamline current testing protocols, reducing the time required to differentiate between virulent and avirulent strains.

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Emergency and emerging diseases in wildlife in 2011

The risk of diseases emerging from wildlife is receiving increasing attention from agricultural agencies worldwide. Australia recognises the importance of monitoring wildlife health to address the impacts of diseases and mass mortalities in wild fauna on livestock, human health, agriculture, aquaculture, biodiversity and trade. The Australian Government, state and territory governments, and the AWHN are constantly on alert for emerging and emergency diseases in wildlife. One of the core duties of the AWHN is to operate a first-alert system to notify relevant authorities of outbreaks of disease in wildlife, such as wild bird and marine animal mortality events.

In late 2010 and early 2011, significant mortalities occurred in a number of tammar wallaby (Macropus eugenii) populations, epistaxis in kangaroos, and avian paramyxovirus type 1 (APMV-1) in pigeons. Investigations during 2011 included mortality events in wild fauna on livestock, human health, agriculture, aquaculture, biodiversity and trade. The Australian Government, state and territory governments, and the AWHN are constantly on alert for emerging and emergency diseases in wildlife. One of the core duties of the AWHN is to operate a first-alert system to notify relevant authorities of outbreaks of disease in wildlife, such as wild bird and marine animal mortality events.

In mid-2011, an outbreak of APMV-1 occurred in hobby pigeons in Victoria, with the virus also detected in a small number of wild feral pigeons. More information on this event is provided in Sections 3.3.1 and 4.6.3.

4.6 Emergency animal disease responses in 2011

Appendix 3 lists investigations of suspect exotic and other emergency diseases in Australia during 2011. Responses to several diseases are discussed below.

4.6.1 Hendra virus incidents

From 1994 to 2010, 13 separate Hendra virus incidents in horses were identified in Queensland and one in New South Wales. In 2011, there was an unprecedented number of Hendra virus incidents. From June to October, 23 horses and one dog were infected in 10 separate incidents in Queensland and 8 separate incidents in New South Wales (Table 4.1). This year also saw the southernmost incident, the incident furthest inland, and the first dog naturally infected with the virus (Figure 4.1). In all equine cases, the infection was fatal or the infected animal was euthanased. Horses were infected through spillover of virus from flying foxes or very close contact with infected horses. The infected dog, which was euthanased, had multiple opportunities for contact with an infected horse, and this was the most likely route of infection.

Queensland and New South Wales authorities implemented well-established emergency procedures on each infected property and reinforced biosecurity messages to the public to reduce the risk of infection in horses and people. In no case did infection spread beyond the infected property, and no people were infected. Updated information on precautions against Hendra virus for people who work with horses is available on the website of Biosecurity Queensland.

An Intergovernmental Hendra Virus Taskforce was established in July 2011 to pursue a collaborative, One Health approach to minimise adverse impacts of Hendra virus on human and equine health. The taskforce is chaired by the Managing Director of Biosecurity Queensland. Its membership includes the chief veterinary officers, chief health officers, chief scientists and wildlife leaders from the Queensland and New South Wales governments; the Victorian Chief Veterinary Officer; and representatives from DAFF and CSIRO-AAHL.

The taskforce’s terms of reference include analysing and sharing information; maintaining a consistent approach for managing Hendra virus incidents; identifying and commissioning areas for further research; and identifying strategies to better educate horse owners, veterinarians and the general public about Hendra virus.

---

68 Numbers of incidents and affected animals are as at 25 November 2011.
### Table 4.1 Hendra virus incidents with numbers of animal cases and human cases/deaths, 1994–2011

<table>
<thead>
<tr>
<th>Location</th>
<th>State</th>
<th>Month</th>
<th>Year</th>
<th>Equine cases</th>
<th>Canine cases</th>
<th>Human cases</th>
<th>Human deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mackay</td>
<td>Qld</td>
<td>August</td>
<td>1994</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hendra (Brisbane)</td>
<td>Qld</td>
<td>September</td>
<td>1994</td>
<td>20&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cairns (Trinity Beach)</td>
<td>Qld</td>
<td>January</td>
<td>1999</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cairns (Gordonvale)</td>
<td>Qld</td>
<td>October</td>
<td>2004</td>
<td>1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Townsville</td>
<td>Qld</td>
<td>December</td>
<td>2004</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Peacheater</td>
<td>Qld</td>
<td>June</td>
<td>2006</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Murwillumbah</td>
<td>NSW</td>
<td>October</td>
<td>2006</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Peacheater</td>
<td>Qld</td>
<td>June</td>
<td>2007</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cairns (Clifton Beach)</td>
<td>Qld</td>
<td>July</td>
<td>2007</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Redlands</td>
<td>Qld</td>
<td>June–July</td>
<td>2008</td>
<td>5&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Proserpine</td>
<td>Qld</td>
<td>July</td>
<td>2008</td>
<td>3&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cawarral</td>
<td>Qld</td>
<td>August</td>
<td>2009</td>
<td>4&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bowen</td>
<td>Qld</td>
<td>September</td>
<td>2009</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tewantin</td>
<td>Qld</td>
<td>May</td>
<td>2010</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Logan Reserve</td>
<td>Qld</td>
<td>June</td>
<td>2011</td>
<td>1&lt;sup&gt;f&lt;/sup&gt;</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Beaudesert</td>
<td>Qld</td>
<td>June</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wollongbar</td>
<td>NSW</td>
<td>June–July</td>
<td>2011</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Boonah</td>
<td>Qld</td>
<td>June–July</td>
<td>2011</td>
<td>3</td>
<td>1&lt;sup&gt;g&lt;/sup&gt;</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Park Ridge</td>
<td>Qld</td>
<td>July</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Macksville</td>
<td>NSW</td>
<td>July</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kuranda</td>
<td>Qld</td>
<td>July</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Boondall</td>
<td>Qld</td>
<td>July</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hervey Bay</td>
<td>Qld</td>
<td>July</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lismore</td>
<td>NSW</td>
<td>July</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chinchilla</td>
<td>Qld</td>
<td>July</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mullumbimby</td>
<td>NSW</td>
<td>July</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ballina</td>
<td>NSW</td>
<td>August</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ballina South</td>
<td>NSW</td>
<td>August</td>
<td>2011</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mullumbimby</td>
<td>NSW</td>
<td>August</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gold Coast Hinterland</td>
<td>Qld</td>
<td>August</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ballina North</td>
<td>NSW</td>
<td>August</td>
<td>2011</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Beachmere</td>
<td>Qld</td>
<td>October</td>
<td>2011</td>
<td>2&lt;sup&gt;h&lt;/sup&gt;</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Total**  
|             |       |        |      | 67         | 1          | 7          | 4            |

<sup>a</sup> Figures include 13 horses that were not tested and are presumed to be cases.  
<sup>b</sup> No samples from this horse were available for testing; however, strong epidemiological evidence exists after a veterinarian performed a necropsy and was later confirmed to be infected with Hendra virus.  
<sup>c</sup> A further three horses died at the veterinary clinic in the month before the incident was identified. Testing of limited laboratory samples from these horses was negative. These horses are not included in this figure.  
<sup>d</sup> A further horse died several days before the first case. Samples were not available for testing.  
<sup>e</sup> Strong epidemiological evidence exists for a horse that died 12 days before the first confirmed case, after a veterinarian who performed a respiratory endoscopy on the horse was later confirmed to be infected with Hendra virus.  
<sup>f</sup> Initial test results returned negative PCR results. Subsequent testing of these samples and samples collected two days later were found to have antibodies to Hendra virus and extremely low levels of antigen by PCR.  
<sup>g</sup> Dog reported to be clinically normal. PCR negative on blood and swabs, positive serology (SNT and ELISA).  
<sup>h</sup> A further horse was euthanased, eight days before the first case was euthanased. Samples were not available for testing.
Figure 4.1 Approximate location of Hendra virus incidents in 2011
Also in July 2011, the Australian, Queensland and New South Wales governments announced contributions totalling $12 million for Hendra virus research over a three-year period. The Intergovernmental Hendra Virus Taskforce oversaw the process of identifying and prioritising research to be funded, which includes trying to understand the factors that led to the dramatic increase in Hendra virus incidents.

Five areas of research were directly commissioned:
- challenge studies in dogs
- the risks posed by recovered, antibody-positive animals
- dynamics of transmission from flying foxes to horses
- impact of flying fox colony dispersal on stress and Hendra virus infection levels
- generation of additional data to support registration of a candidate equine vaccine — field trials of this vaccine are expected in 2012, and some vaccine might be available for wider conditional use following the trials.

The Rural Industries Research and Development Corporation, in consultation with the taskforce and on behalf of the Australian Government, is overseeing an open, competitive research program in the areas of temporospatial risk prediction, risk-reduction strategies, and detection and response to equine and human cases. The National Health and Medical Research Council is overseeing a parallel program that focuses on developing management procedures and better treatments for people affected by the virus, and on understanding the biology of the virus.

Further details on individual incidents, responses and education materials are available from the Queensland and New South Wales government websites.

### 4.6.2 Arboviral disease in horses

Widespread activity of the three major Australian mosquito-borne arboviruses — Murray Valley encephalitis virus, Kunjin virus and Ross River virus — occurred during the summer and autumn of 2011. An unprecedented number of horses with neurological signs were reported, predominately across the south-east of Australia in New South Wales, South Australia, Victoria and Queensland, as well as in Western Australia. Summary statistics for the event are provided in Table 4.2, and the geographical distribution of cases across Australia is shown in Figure 4.2. This widespread activity is believed to have largely been driven by heavy rainfall and unusual weather events, which led to extensive flooding and an increase in vector (mosquito) numbers. Increases in human cases of Murray Valley encephalitis virus and Ross River virus were also seen in most affected areas. Interestingly, there was no increase in human cases of Kunjin virus, despite the substantial increases in equine cases.

The Australian, state and territory governments, in conjunction with relevant stakeholders, established an Equine Arboviral Working Group to coordinate investigations, and monitor and report on the outbreak in horses. Further work from the group has included research into the emergence of the viruses and future disease preparedness, including surveillance activities and consideration of vaccine for use in horses.

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**Table 4.2 Summary statistics for equine cases of arboviral disease reported by affected states from March to August 2011**

<table>
<thead>
<tr>
<th>State</th>
<th>Cumulative number of cases</th>
<th>Cumulative number of deaths</th>
<th>Case fatality rate (%) (deaths/total cases)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>295</td>
<td>32</td>
<td>11</td>
<td>27 June 2011</td>
</tr>
<tr>
<td>Queensland</td>
<td>58</td>
<td>10</td>
<td>17</td>
<td>3 July 2011</td>
</tr>
<tr>
<td>South Australia</td>
<td>146</td>
<td>8</td>
<td>5</td>
<td>1 August 2011</td>
</tr>
<tr>
<td>Victoria</td>
<td>497</td>
<td>39</td>
<td>8</td>
<td>17 August 2011</td>
</tr>
<tr>
<td>Western Australia</td>
<td>10</td>
<td>2</td>
<td>20</td>
<td>8 June 2011</td>
</tr>
<tr>
<td>Australia</td>
<td>1006</td>
<td>91</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Note: Figures are correct as at the dates listed.

---

4.6.3 Avian paramyxovirus type 1 in pigeons

Since August 2011, a strain of APMV-1 not previously detected in Australia has led to the death of owned pigeons (*Columba livia*) in Melbourne and the area surrounding Shepparton, in Victoria. No cases were reported in any other state or territory of Australia or in any other avian species during 2011.

APMV-1 was also detected in a small number of feral pigeons in Melbourne. Since these cases were close to known infected owned-pigeon premises, the Victorian Department of Primary Industries concluded that the feral pigeons may have become infected after contact with infected owned pigeons.

In response to the outbreak, the Victorian Department of Primary Industries imposed a temporary ban on pigeon events, such as shows, exhibitions, markets, sales, auctions and racing. Voluntary off-label use of poultry vaccines occurred to a limited extent in Victorian hobby pigeons. New South Wales, South Australia, Tasmania, Queensland and Western Australia also implemented mandatory movement restrictions on pigeons, pigeon eggs and potential fomites.
4.6.4 Asian honey bees

Since the first Asian honey bee (Apis cerana) nest was detected in Cairns (north Queensland) in May 2007, more than 500 nests and swarms have been found. In January 2011, Australian governments and affected industries agreed that eradication was no longer feasible, and eradication efforts ceased at the end of March 2011. Efforts now focus on skills and management techniques to enable beekeepers and pest controllers to manage this pest. These are outlined in the Plan for Transition to Management of the Asian Honey Bee. The infestation remains within the area of Innisfail, Flying Fish Point and Waughs Pocket to the south of Cairns; Kuranda, Mareeba, Malanda and Lake Eacham to the west of Cairns; and Palm Cove to the north of Cairns.

As a result of the ongoing incursion and the large increase in the number of nests and swarms detected, the United States has temporarily suspended imports of Australia’s European honey bees. This decision results from concerns about the potential for viruses to transfer from the Asian honey bees to the European honey bee population in Australia.

CHAPTER 5

AQUATIC ANIMAL HEALTH

The health management of finfish, crustaceans and amphibians is an essential element of maintaining fisheries resources and biodiversity in Australia.

This chapter provides details on the status of aquatic animal health in Australia. It describes the Australian reporting system for aquatic animal diseases, national aquatic animal health policy, aquatic animal disease emergency preparedness, the Australian Aquatic Veterinary Emergency Plan (AQUAVETPLAN), surveillance, disease events in 2011, and regional initiatives on aquatic animal health.
5.1 Status of aquatic animal health in Australia

Australia has a reporting system for aquatic animal diseases of national significance. All the diseases currently reportable to the World Organisation for Animal Health (OIE) and other aquatic animal diseases of national concern are included on Australia’s National List of Reportable Diseases of Aquatic Animals.77

In 2011, nine fish diseases, seven mollusc diseases, eight crustacean diseases and two amphibian diseases were reportable to the OIE. Australia is free from most of these diseases. Australia’s status for each OIE-listed aquatic animal disease in 2011 is shown in Table 5.1. The distribution of OIE-listed diseases that are present in Australia, based on reporting by the states and territories, is shown in Figure 5.1.

The other aquatic animal diseases of national significance to Australia and their status in 2011 are listed in Table 5.2.

<table>
<thead>
<tr>
<th>Disease or agent</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finfish diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Epizootic haematopoietic necrosis</td>
<td>Locally present</td>
</tr>
<tr>
<td>Epizootic ulcerative syndrome (<em>Aphanomyces invadans</em>)</td>
<td>Locally present</td>
</tr>
<tr>
<td>Gyrodactylosis (<em>Gyrodactylus salaris</em>)</td>
<td>Never reported</td>
</tr>
<tr>
<td>Infectious haematopoietic necrosis</td>
<td>Never reported</td>
</tr>
<tr>
<td>Infectious salmon anaemia</td>
<td>Never reported</td>
</tr>
<tr>
<td>Koi herpesvirus disease</td>
<td>Never reported</td>
</tr>
<tr>
<td>Red sea bream iridoviral disease</td>
<td>Never reported</td>
</tr>
<tr>
<td>Spring viræmia of carp</td>
<td>Never reported</td>
</tr>
<tr>
<td>Viral haemorrhagic septicaemia</td>
<td>Never reported</td>
</tr>
<tr>
<td><strong>Mollusc diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Infection with abalone herpes-like virus</td>
<td>Locally present</td>
</tr>
<tr>
<td>Infection with <em>Bonamia exitiosa</em></td>
<td>Never reported</td>
</tr>
<tr>
<td>Infection with <em>Bonamia ostreae</em></td>
<td>Never reported</td>
</tr>
<tr>
<td>Infection with <em>Marteilia refringens</em></td>
<td>Never reported</td>
</tr>
<tr>
<td>Infection with <em>Perkinsus marinus</em></td>
<td>Never reported</td>
</tr>
<tr>
<td>Infection with <em>Perkinsus olseni</em></td>
<td>Locally present</td>
</tr>
<tr>
<td>Infection with <em>Xenohaliotis californiensis</em></td>
<td>Never reported</td>
</tr>
<tr>
<td><strong>Crustacean diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Crayfish plague (<em>Aphanomyces astaci</em>)</td>
<td>Never reported</td>
</tr>
<tr>
<td>Infectious hypodermal and haematopoietic necrosis</td>
<td>Locally present</td>
</tr>
<tr>
<td>Infectious myonecrosis</td>
<td>Never reported</td>
</tr>
<tr>
<td>Necrotising hepatopancreatitis</td>
<td>Never reported</td>
</tr>
<tr>
<td>Taura syndrome</td>
<td>Never reported</td>
</tr>
<tr>
<td>White spot disease</td>
<td>Never reported</td>
</tr>
<tr>
<td>White tail disease</td>
<td>Locally present</td>
</tr>
<tr>
<td>Yellowhead disease</td>
<td>Never reported</td>
</tr>
<tr>
<td><strong>Amphibian diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Infection with <em>Batrachochytrium dendrobatidis</em></td>
<td>Locally present</td>
</tr>
<tr>
<td>Infection with ranavirus</td>
<td>Locally present</td>
</tr>
</tbody>
</table>

OIE = World Organisation for Animal Health

Note: Aquatic animal diseases reported to the OIE in 2011 are those listed in the OIE’s 2010 *Aquatic Animal Health Code*.77

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Figure 5.1 Distribution of OIE-listed aquatic animal diseases in Australia
5.1.1 National aquatic animal health policy

Australia’s Animal Health Committee (AHC) is responsible for public policy and government decision making on aquatic animal health. The Sub-Committee on Aquatic Animal Health supports the AHC in its policy deliberations by providing robust scientific and technical advice on aquatic animal health issues. Subcommittee members represent the Australian Government; the state, Northern Territory and New Zealand governments; the Commonwealth Scientific and Industrial Research Organisation Australian Animal Health Laboratory (CSIRO-AAHL); and Australian universities (one representative).

AQUAPLAN 2005–2010 was Australia’s second national strategic plan for aquatic animal health. The plan aimed to maximise Australia’s ability to control aquatic animal disease outbreaks, maintain market access, support quality assurance, and improve the productivity and sustainability of aquatic animal production industries. A review of AQUAPLAN 2005–2010, which is being overseen by the Sub-Committee on Aquatic Animal Health, is nearing completion. The review will report on the plan’s development and implementation, and future approaches to aquatic animal health, including the possible need for a successor strategy. Information on AQUAPLAN 2005–2010 is available on the website of the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF).

Some projects initiated through AQUAPLAN 2005–2010 are ongoing; they include implementation of the Aquatic Animal Health Training Scheme, proficiency testing for aquatic animal disease laboratories, and an initiative to raise industry awareness about aquatic emergency animal disease (EAD) response arrangements.

The Aquatic Animal Health Training Scheme, which was established in 2010, is a national training scheme for

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Table 5.2 Australia’s status for other significant diseases of aquatic animals, 2011

<table>
<thead>
<tr>
<th>Disease or agent</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finfish diseases</strong></td>
<td></td>
</tr>
<tr>
<td><em>Aeromonas salmonicida</em> — atypical strains</td>
<td>Locally present</td>
</tr>
<tr>
<td>Bacterial kidney disease (<em>Renibacterium salmoninarum</em>)</td>
<td>Never reported</td>
</tr>
<tr>
<td>Channel catfish virus disease</td>
<td>Never reported</td>
</tr>
<tr>
<td>Enteric redmouth disease (<em>Yersinia ruckeri</em> — Hagerman strain)</td>
<td>Never reported</td>
</tr>
<tr>
<td>Enteric septicemia of catfish (<em>Edwardsiella ictaluri</em>)</td>
<td>Reported in 2011 from native fish in one aquarium facility also holding imported exotic fish. Not detected in wild fish.</td>
</tr>
<tr>
<td>Epizootic haematopoietic necrosis — European catfish virus/European sheatfish virus</td>
<td>Never reported</td>
</tr>
<tr>
<td>Furunculosis (<em>Aeromonas salmonicida subsp. salmonicida</em>)</td>
<td>Never reported</td>
</tr>
<tr>
<td>Grouper iridoviral disease</td>
<td>Never reported</td>
</tr>
<tr>
<td>Infectious pancreatic necrosis</td>
<td>Never reported</td>
</tr>
<tr>
<td>Piscirickettsiosis (<em>Piscirickettsia salmonis</em>)</td>
<td>Never reported</td>
</tr>
<tr>
<td>Viral encephalopathy and retinopathy</td>
<td>Locally present</td>
</tr>
<tr>
<td>Whirling disease (<em>Myxobolus cerebralis</em>)</td>
<td>Never reported</td>
</tr>
<tr>
<td><strong>Mollusc diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Akoya oyster disease</td>
<td>Never reported</td>
</tr>
<tr>
<td>Infection with <em>Bonamia</em> species</td>
<td>Never reported</td>
</tr>
<tr>
<td>Infection with <em>Martelia sydneyi</em></td>
<td>Locally present</td>
</tr>
<tr>
<td>Infection with <em>Marteiloides chungmuensis</em></td>
<td>Never reported</td>
</tr>
<tr>
<td>Infection with <em>Mikrocytos mackini</em></td>
<td>Never reported</td>
</tr>
<tr>
<td>Iridoviroses</td>
<td>Never reported</td>
</tr>
<tr>
<td><strong>Crustacean diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Gill-associated virus</td>
<td>Locally present</td>
</tr>
<tr>
<td>Milky haemolymph disease of spiny lobster (<em>Panulirus spp.</em>)</td>
<td>Never reported</td>
</tr>
<tr>
<td><em>Monodon</em> slow growth syndrome</td>
<td>Never reported</td>
</tr>
</tbody>
</table>

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practising aquatic animal health professionals. It aims to improve knowledge and skills in aquatic animal health management to support Australia’s fishing and aquaculture industries, including the aquarium sector. Funding is available on a competitive basis to support Australian aquatic animal health professionals to undertake short, focused training activities, within Australia or overseas. In 2011, activities funded under the scheme included aquatic animal health surveillance training, a workshop on aquatic animal epidemiology and investigation of disease outbreaks, and a forum for aquatic animal health laboratory technicians.

A national program for aquatic animal disease diagnostic proficiency testing was established in 2010 within the Australian National Quality Assurance Program, which previously included diagnostic proficiency testing only for terrestrial animal diseases. The program tests the proficiency of laboratories using molecular (polymerase chain reaction) methods to detect white spot syndrome virus, yellowhead virus and gill-associated virus of prawns; viral encephalopathy and retinopathy, and viral haemorrhagic septicaemia of fish; and abalone viral ganglioneuritis. Nonviable samples are used in the proficiency testing procedures. The program has been accredited by the National Association of Testing Authorities.

An initiative to raise awareness of current aquatic EAD response arrangements began in 2011. Funding has been made available to support individual aquaculture and fisheries sectors (including recreational fishing and ornamental fish) to undertake activities to increase industry understanding of aquatic EAD response arrangements. These activities will provide industry sectors with an opportunity to identify any risks or weaknesses in current arrangements and plan actions to address those risks.

A comprehensive analysis of aquatic animal disease risks associated with translocation of domestic bait was completed in 2011 by a consultant. From more than 80 diseases of concern identified in the hazard analysis, two high-risk and three moderate-risk diseases were identified as requiring risk management. The analysis will provide a scientific basis for considering the need for, and possible nature of, national policy guidelines for translocation of domestic bait and berley.
5.2 Aquatic animal disease emergency preparedness

Australia’s national system for responding to, and preparing for, EADs encompasses all activities relating to disease surveillance, planning, monitoring and response. These activities are carried out by the Australian Government, state and territory governments, industries, universities, CSIRO, private veterinarians and laboratories, and other aquatic animal health workers.

The national response to aquatic animal disease emergencies is coordinated by the Aquatic Consultative Committee on Emergency Animal Diseases (Aquatic CCEAD), which helps to ensure that the most effective technical response is implemented.

The Aquatic CCEAD comprises:

• the Australian Chief Veterinary Officer
• representatives from DAFF Biosecurity (formerly the Australian Quarantine and Inspection Service, Australian Government Department of Agriculture, Fisheries and Forestry)
• the chief veterinary officer (or the director of the fisheries department) in each state and territory
• the director of CSIRO-AAHL.

Technical representatives from industry may also be invited to participate.

The Aquatic CCEAD met twice in 2011, in response to an abalone viral ganglioneuritis disease event and a syndrome of high mortality in a population of Pacific oysters (described in Section 5.3.3). Out of session, the Aquatic CCEAD also considered the occurrence of Edwardsiella ictaluri in ornamental fish, and the detection of abalone viral ganglioneuritis in abalone imported into New South Wales.

As with terrestrial animal disease emergencies, operational responsibility for the response to an aquatic EAD in an Australian state or territory primarily lies with the relevant jurisdiction. Each state and territory government will bring together a broad range of resources to help Fisheries, aquaculture and aquatic animal health authorities address disease incidents. Experts from other jurisdictions may be called in to assist in the response, if required.

5.2.1 AQUAVETPLAN

AQUAVETPLAN is a series of technical response plans that describe the proposed Australian approach to an aquatic EAD event. These manuals provide background information and guidance on how to respond to a disease outbreak in Australia. AQUAVETPLAN is based on the Australian Veterinary Emergency Plan (AUSVETPLAN) for terrestrial animal diseases. Disease strategy manuals relating to specific EADs allow aquatic and terrestrial animal health professionals to respond appropriately to an outbreak of that EAD in Australia. Operational procedures manuals address important procedural issues and complement the disease strategy manuals. Manuals are considered for revision every five years or in the event of significant new developments.

AQUAVETPLAN manuals can be downloaded from the DAFF website.79

5.2.2 Communication

With more than 60 agencies and institutions in Australia’s biosecurity sector, coordination and collaboration is a challenge when agencies are using different information technology systems. The Australian Biosecurity Intelligence Network (ABIN) was established to provide a common platform for Australia’s biosecurity research, surveillance, diagnostic and response capability. It aims to enable researchers, industry and governments to collaborate, share expertise and information, and generate intelligence, using leading-edge tools and technologies that are made available through ABIN’s secure online workspace, which was launched in 2011. One component of ABIN is the Aquatic Animal Health community space (NEPTUNE), a user-friendly information resource for training, storage, sharing and analysis of aquatic animal health biosecurity data.

5.2.3 Surveillance

Each jurisdiction in Australia is responsible for surveillance activities within its borders. Passive surveillance includes regular health monitoring and investigation of fish kills. Active surveillance is conducted for specific purposes — for example, for particular industries for export certification, or for specific diseases of importance to Australia. Active surveillance activities are conducted to OIE standards or using methods required to meet export market requirements. Surveillance highlights in 2011 are described below.

Aquatic animal health

Oyster herpesvirus 1 surveillance program
Immediately after the presence of Ostreid herpesvirus 1 microvariant (OsHV-1 µvar) was confirmed in one estuary in New South Wales (see Section 5.3.3 for details), a survey was conducted to determine the possible distribution of this pathogen in Australia. The survey was designed in accordance with international standards so that it could provide defensible evidence of freedom from OsHV-1; this requires the ability to detect 2% prevalence with 95% confidence. New South Wales, Tasmania and South Australia collected a total of 4323 individual oyster samples from 23 growing regions, none of which tested positive for OsHV-1. The survey indicates that the pathogen is contained to only one Pacific oyster production estuary; there is no evidence of the pathogen in any other production areas in Australia.

Electronic media surveillance of aquatic animal disease events
AquaticHealth.net80 is a free online intelligence system that is dedicated to tracking and forecasting outbreaks of aquatic animal diseases. It is the first of its kind in the world. The network scans the internet on a regular basis for open-source content (such as news articles, journal articles and tweets from Twitter) related to aquatic animal health. It also allows anyone to submit content themselves (content is moderated). The system automatically detects location information in the content so that it can be plotted on a Google Map, and tags it with useful key terms. All users can browse content; generate reports and maps (e.g. by search terms, filtered date ranges, tags, locations); and receive disease alerts, a daily digest of global events, RSS feeds on any topic of interest and email updates. The research and development of AquaticHealth.net was funded by the Australian Centre of Excellence in Risk Analysis for DAFF.

5.3 Disease events in 2011

5.3.1 Infection with Edwardsiella ictaluri
Infection with Edwardsiella ictaluri was confirmed during routine testing and sampling of native Australian Berney’s catfish (Neoarius berneyi), black catfish (Neosilurus ater) and toothless catfish (Anodontiglanis dahli) in an aquarium facility. The facility also held imported aquarium fish. The affected aquaria have been decontaminated, and practices have been put in place to minimise the risks of cross-infection from imported aquarium fish to native fish.

5.3.2 Infection with abalone herpes-like virus
No extension was reported in the range of abalone viral ganglioneuritis (AVG; listed by the OIE as infection with abalone herpes-like virus) in wild abalone populations in Victoria during 2011. AVG was reported from wild abalone in Victoria in early 2010; those cases were a continuation of a disease outbreak initially reported from wild abalone populations in 2006.

AVG was confirmed in two abalone processing facilities and a farm neighbouring one of these facilities in Tasmania in early 2011. All infected facilities were destocked and decontaminated according to Tasmanian state government protocols. In late 2011, AVG was detected in Tasmania in a third separate processing facility, which was also destocked and decontaminated. In both cases, Tasmanian response activities included tracing of stock movements, destocking, decontamination and informing the Aquatic CCEAD. Tasmania has implemented stronger biosecurity arrangements to address risks associated with AVG. In November 2011, new requirements came into force for abalone processors, who must now have an approved discharge plan, which includes treatment of any discharged water to prescribed standards.

Abalone herpes-like virus was detected in live abalone that had been imported into New South Wales for human consumption in late 2011. The abalone were held in contained facilities (aquaria) at wholesale/retail outlets. Potentially exposed abalone were identified through tracing; abalone were tested; and, where necessary, facilities were destocked and decontaminated. AVG has never been reported from wild abalone populations in New South Wales.

5.3.3 Pacific oyster mortality syndrome
High mortalities of Pacific oysters in a single estuary in New South Wales were reported in late November 2010. Controls on movement of oysters and equipment were put in place, and the mortalities were investigated. The mortalities were described as Pacific oyster mortality syndrome. OsHV-1 µvar was confirmed on 6 January 2011 and an immediate notification made to the OIE on 7 January 2011. OsHV-1 µvar was later detected in wild Pacific oysters in an adjacent estuary in which no oyster farming occurs. A national survey has provided no evidence that OsHV-1 µvar is present in Australia outside these two estuaries (see Section 5.2.3). Based on the survey results, the objective of the disease response is to contain the virus to the two affected estuaries, through controls on the movement of oysters and...
oyster farming equipment, and bans on the recreational take of oysters from the affected areas. A range of activities have been undertaken to support preparedness and response, including epidemiological research, an international workshop on OsHV-1 (in Cairns in July 2011), an industry study tour to France to examine the French response to OsHV-1 μvar, and development of a national research and development plan for OsHV-1 μvar. OsHV-1 μvar was confirmed again in the same estuary in November 2011.

Reports on these events were provided to the OIE and the Network of Aquaculture Centres in Asia–Pacific (NACA) through the Asia–Pacific Regional Quarterly Aquatic Animal Disease Reporting Program.

5.4 Regional aquatic animal health initiatives

Australia collaborates with many countries — particularly its neighbours in the Asia–Pacific region — to help improve their aquatic animal health. Cooperation occurs through Australia’s membership of NACA, the Food and Agriculture Organization of the United Nations (FAO), the Secretariat of the Pacific Community, the Association of Southeast Asian Nations, and the Asia–Pacific Economic Cooperation forum. Participation in these forums ensures that Australia is actively engaged in projects that address aquatic animal disease threats to the region.

The Asia Regional Advisory Group (AG) on aquatic animal health was established under the auspices of NACA to provide advice to member countries on aquatic animal health management. Members of the AG include aquatic animal disease experts, the OIE, the FAO and collaborating regional organisations. An Australian Government officer is currently serving as chair of the AG, which held its tenth meeting in Mangalore, India, in November 2011.

Recognising that proficiency testing programs are highly desirable for national diagnostic and service laboratories, the AG has assessed progress in proficiency testing in the region. This assessment showed that, although ad hoc laboratory proficiency testing programs have been run, the region has limited or no access to ongoing programs. A proposal to implement a regional aquatic animal health laboratory proficiency testing program was developed following the 2010 AG meeting. This project has been allocated funding by DAFF and will be implemented by DAFF, NACA, the Australian National Quality Assurance Program and CSIRO-AAHL. It aims to strengthen Asia’s regional capability to diagnose important aquatic animal diseases that affect trade, industry sustainability and/or productivity by providing training to participating laboratory personnel and establishing a laboratory proficiency testing program that meets regional needs. Up to 10 diseases, to be determined by participants, will be included in the program. National diagnostic laboratories from NACA member countries will be invited to participate.

An officer from Aquatic Animal Health Programs in DAFF recently completed a short-term placement with NACA. The placement aimed to build on Australia’s already strong relationship with NACA, particularly with regard to aquatic EAD response capabilities in the region. A project proposal to investigate constraints to effective aquatic EAD responses was drafted during the placement, and accepted by the NACA AG at its annual meeting in November 2011.

The Tahiti Aquaculture 2010 conference was held in Papeete, French Polynesia, in December 2010. The conference included a session on aquatic animal health and a workshop (co-chaired by a DAFF officer) on health management for tropical island aquaculture. Workshop participants discussed challenges associated with aquatic animal health management for tropical island aquaculture, and possible approaches to addressing these challenges. An outcome from the workshop was agreement on a concept paper titled ‘Strengthening aquatic animal health management capabilities in Pacific Island Countries and Territories’. The concept paper proposes that a coordinated regional approach to aquatic animal health is required to support sustainable aquaculture development. The paper was considered at the seventh meeting of the Secretariat of the Pacific Community Heads of Fisheries in February 2011 and received strong support.
CHAPTER 6

IMPORTS AND EXPORTS

Australia’s imports and exports of live animals and animal products are underpinned by a risk-based approach to biosecurity policy and border controls, which are developed and implemented by the Australian Government Department of Agriculture, Fisheries and Forestry.

As outlined in Chapter 1, the Australian Government is implementing reforms to deliver a biosecurity system that is responsive and targeted in a changing global trading environment. Four divisions within the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) are tasked with this work: Biosecurity Policy, Biosecurity Animal, Biosecurity Plant and Quarantine Operations.
Together, the biosecurity divisions manage pest and disease threats associated with imports, using policies and procedures that meet international obligations under the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). The biosecurity divisions also work with DAFF’s Trade and Market Access Division to facilitate technical market access for exporters of agricultural products, including live animals and animal products.

This chapter outlines the import and export-related activities of DAFF’s biosecurity divisions in 2011.

6.1 Imports

The importation of animals and animal products into Australia is regulated by DAFF under the Quarantine Act 1908 and its subordinate legislation, and by the Australian Government Department of Sustainability, Environment, Water, Population and Communities under the Environment Protection and Biodiversity Conservation Act 1999 and its subordinate legislation.

6.1.1 Import risk analyses

Many of Australia’s quarantine requirements are based on the standards, guidelines and recommendations established by international organisations, such as the World Organisation for Animal Health (OIE). However, additional measures are sometimes needed to reduce risk to an acceptable level. Import conditions are only applied to the extent necessary to protect human, animal and plant health.

A regulated import risk analysis (IRA) process came into effect in 2007. Timeframes for the completion of IRAs, which are prescribed through regulations, provide for either a standard or an expanded IRA process, depending on the complexity of the science and the nature of the biosecurity risks. A standard IRA will be completed within 24 months and an expanded IRA within 30 months. IRAs can also be conducted using a nonregulated pathway — for example, for review of an existing policy.

The methods used to conduct IRAs are in line with Australian Government policy, the Quarantine Act 1908 and its subordinate legislation, the requirements of the SPS Agreement, and relevant international animal health standards. The report of the IRA is a key document that assesses the quarantine risks and, where appropriate, recommends risk-management measures. The IRA process provides for a number of public consultations, including consultation on the draft report.

Concurrent IRAs of fresh (chilled or frozen) beef and beef products from Canada, Japan and the United States commenced on 8 April 2010. A ‘stop-the-clock’ provision was applied to the IRA of beef and beef products from the United States, with effect from 4 February 2011, to allow technical information to be provided. The clock can be restarted when the relevant information becomes available for analysis.

A stop-the-clock provision was also applied to the IRAs of beef and beef products from Canada (on 24 November 2010) and Japan (on 10 May 2010), and remained in place throughout 2011. The IRA of beef and beef products from Canada can recommence when the relevant information becomes available for analysis. Two processes are required to restart the clock on the IRA of beef from Japan:

- DAFF will continue its review of Japan’s status for foot-and-mouth disease (FMD), taking into account advice from the OIE that it has reinstated Japan’s FMD-free status, effective from 4 February 2011.
- Japanese authorities will need to provide a comprehensive submission on its controls for bovine spongiform encephalopathy (to Food Standards Australia New Zealand) and on other animal health controls (to DAFF).

The IRA of biosecurity risks associated with gourami iridovirus and related viruses in freshwater ornamental finfish was finalised in 2011.

Implementation of the stop-the-clock provision on the three beef IRAs allowed staff resources to be redirected to a number of high-priority policy reviews.

6.1.2 Policy reviews

Animal Biosecurity branch released four reviews of biosecurity policy to stakeholders:

- A review of published tests to detect pathogens in veterinary vaccines was released on 26 July 2011.81 The review outlined the tests for extraneous pathogens that are considered to be reliable and sensitive for the purpose of complying with Australia’s import policy for veterinary vaccines.

- Revised health certification requirements for goldfish (Carassius auratus) for ornamental purposes were announced on 1 September 2011.82 This was in response to research findings confirming that goldfish haematopoietic necrosis virus is now present in

Imports and exports

Australia. The requirement that exporting countries declare that goldfish intended for Australia are free from this virus has been removed from the relevant import conditions.

- Ruminant genetic material from Europe — a policy review of the bluetongue risks associated with cattle, sheep, goat and deer semen and embryos from the European Union, and cattle semen and embryos from Switzerland and Norway was released on 3 November 2011.83
- Draft guidelines for managing the risk of transmitting transmissible spongiform encephalopathies via veterinary vaccines and other in vivo veterinary products were released on 10 November 2011.84

Animal Biosecurity branch also finalised a review of import policies for personal consignments of low-risk food products.

A review of the IRA of horses from approved countries was announced on 31 October 2011, as foreshadowed in the Australian Government’s response to a recommendation of the equine influenza inquiry that the IRA should be reviewed every two years. The review is taking into account relevant developments in scientific knowledge, including information about testing methods, vaccines, vaccination procedures and biosecurity controls for horses imported into Australia. Stakeholders were invited to provide submissions by January 2012.

6.1.3 Biological products

Biological products include a wide range of goods derived from animals (including humans), plants and microorganisms, such as:

- stock feeds
- pet foods
- foods for human consumption
- human and veterinary therapeutics, including vaccines
- research and analytical tools, including diagnostic kits and biological samples
- fertilisers and bioremediation agents.

Importation of biological products into Australia is regulated by the Quarantine Act 1908. Under the Act, importation of many biological products is prohibited unless an import permit is granted by the Director of Quarantine. Permits are issued following assessment of the risk associated with importation. This assessment takes into account:

- the biological components of the product
- the relevant plant or animal health status of the country of origin
- the manufacturing processes
- the proposed end use of the product.

During the risk assessment, policy advice may be sought from within DAFF (e.g. Animal Biosecurity) and from external agencies (e.g. the Commonwealth Scientific and Industrial Research Organisation’s Australian Animal Health Laboratory), as appropriate.

Import conditions are applied to each permit to mitigate the quarantine risk. Import permits are revoked or amended if there are changes to the quarantine risk — for example, an outbreak of an exotic disease in a country from which biological components are sourced.

During 2011, DAFF Biological Imports Program officers assessed approximately 7600 applications for import permits, provided advice in response to around 9500 email enquiries, and responded to almost 20 000 phone calls through the public helpline.

The program also audits overseas facilities to ensure integrity of biological components and liaises with international veterinary authorities to manage quarantine risk.

In 2011, the Biological Imports Program also focused on several business improvement projects, which have been used to analyse current business strategies, and develop innovative approaches to identifying and mitigating risk. The program is also committed to the risk return model, which focuses resources on areas proportional to the risk level. Recent changes made to the Quarantine Proclamation 1998 (reduced import conditions for low-risk human foods) were promulgated in 2011 to allow quarantine officers to spend more time targeting goods that pose a greater potential risk to Australia’s agricultural industry.

6.1.4 Live animal import program

The live animal import program:

- provides advice to prospective importers on processes and requirements for importation of live animals and reproductive material
- assesses applications to import animals
- issues import permits with appropriate conditions
- audits health certification for compliance with import conditions
- examines imported animals and genetic material on arrival
- liaises with overseas certifying authorities to verify that certification is consistent with import conditions and international standards for the live animal trade

6.1.5 Animal quarantine program

DAFF Biosecurity leases and operates four animal quarantine stations with the capacity to manage imported animals — dogs, cats, horses, ruminants, hatching eggs, live pigeons and bees — that are subject to a period of quarantine. The animal quarantine program ensures that facilities and the care of animals being quarantined meet acceptable standards for biosecurity and for animal health and welfare.

The quarantine stations are situated at Eastern Creek (New South Wales), Spotswood (Victoria), Torrens Island (South Australia) and Byford (Western Australia). Each is approximately one hour’s drive from the international airport, allowing animals to be transferred for examination and quarantine soon after their arrival.

The quarantine stations are located on leased sites. Since these sites will not be available in the medium to long term, DAFF Biosecurity is considering operational, ownership and location requirements for future post-entry quarantine services. Through the 2011–12 Budget, the Australian Government has provided funding for repair and maintenance of the existing facilities. The government has also funded development of future arrangements, including detailed design work, site assessment and related procurement activities.

6.2 Exports

The Australian Government continues its endeavours to improve trade opportunities and access arrangements for Australian agricultural products through the Doha Round of WTO negotiations. In addition to this participation at the multilateral level, Australian producers benefit from free-trade agreements with members of the Association of Southeast Asian Nations, Chile, New Zealand, Singapore, Thailand and the United States. Free-trade agreements are currently being negotiated with China, the Gulf Cooperation Council, Japan, Malaysia, Indonesia and the Republic of Korea. Australia is also participating in the negotiation of a Pacific Agreement on Closer Economic Relations Plus agreement with Pacific island nations, and a Trans Pacific Partnership agreement with Brunei, Chile, Malaysia, New Zealand, Peru, Singapore, the United States and Vietnam.

DAFF works with industry to take advantage of market access opportunities. Major activities include:

- consulting with industry on export priorities and strategies
- identifying impediments in importing country requirements and international standards, and developing arguments to resolve them
- developing relationships with key trading partners and, where appropriate, implementing bilateral formal agreements or memorandums
- maintaining access to foreign markets during disease or pest emergencies by contributing to technical negotiations with overseas authorities
- contributing to the development of international standards.

6.2.1 Export inspection and certification reforms

A new Australian Export Meat Inspection System was announced on 5 September 2011 and implemented on 1 October 2011, as part of a wider initiative to improve service delivery for certification of Australia’s food exports, including meat and live animals, seafood, dairy, horticulture and grains.

The Australian Export Meat Inspection System is a modern export certification system that maintains Australia’s reputation as a producer of high-quality, safe food products. The system increases the efficiency and flexibility of export inspection and includes appropriate arrangements for cost recovery.

In the dairy and fish sectors, DAFF is working with state regulatory authorities to introduce new inspection and...
certification arrangements that will enable audits by one agency to cover the regulatory requirements of another.

Live animal exporters will benefit from a new information technology system that incorporates web-based information exchange between livestock exporters and DAFF.

6.2.2 Legislation

The *Export Control Act 1982* controls the export of goods, including live animals and meat, processed food, animal reproductive material and a range of other animal products. The export of live animals and animal reproductive material is documented more specifically in the *Export Control (Animals) Order 2004*. The export of meat, processed food and some other animal products is covered by other subordinate legislation, including the:

- Export Control (Eggs and Egg Products) Orders 2005
- Export Control (Export of Live-stock to the Republic of Indonesia) Order 2011
- Export Control (Fees) Orders 2001
- Export Control (Fish and Fish Products) Orders 2005
- Export Control (Meat and Meat Products) Orders 2005
- Export Control (Milk and Milk Products) Orders 2005
- Export Control (Organic Produce Certification) Orders 2005
- Export Control (Poultry Meat and Poultry Meat Products) Orders 2010
- Export Control (Rabbit and Ratite) Orders 1985
- Export Control (Wild Game Meat and Wild Game Meat Products) Orders 2010.

These orders operate in conjunction with the Export Control (Prescribed Goods — General) Orders 2005. More detail can be found in Chapter 7.

All exporters of red meat and livestock (cattle, sheep, goats, buffalo, deer and camels) require an export licence under the *Australian Meat and Live-stock Industry Act 1997* and subordinate legislation, including:

- Australian Meat and Live-stock Industry (Standards) Order 2005
- Australian Meat and Live-stock Industry (Live Cattle Exports to Republic of Korea) Order 2002

Commonwealth legislation underpinning export inspection arrangements, and fees and charges, includes:

- *Export Inspection and Meat Charges Collection Act 1985*
  - Export Inspection and Meat Charges Collection Regulations 1985
- *Export Inspection (Establishment Registration Charges) Act 1985*
  - Export Inspection (Establishment Registration Charges) Regulations 1985
- *Export Inspection (Quantity Charge) Act 1985*
  - Export Inspection (Quantity Charge) Regulations 1985
- *Export Inspection (Service Charge) Act 1985*
  - Export Inspection (Service Charge) Regulations
- *Meat Export Charge Act 1984*
  - Meat Export Charge Regulations
- *Meat Export Charge Collection Act 1984*
  - Meat Export Charge Collection Regulations
- *Meat Inspection Act 1983*
  - Meat Inspection (Modification) Regulations
  - Meat Inspection (Orders) Regulations 1984

6.2.3 Technical input for market access

In 2011, the Animal Biosecurity branch assisted with approximately 45 issues involving more than 61 countries, including technical matters in the export of:

- alpacas to China, Croatia and Japan
- bovine genetic material (semen and embryos) to Argentina, Chile, China, India, Mexico, Mongolia, New Zealand, the Republic of Korea and the United States
- camels to Malaysia, Saudi Arabia and the United States
- cattle to China, Kazakhstan, Korea, Israel, Russia, Taiwan, Turkey and the United States
- cockatoos to Cyprus
- redclaw crayfish to Chile
- dog semen to China
- equine semen to Mongolia and Norfolk Island
- sheep and goats to Argentina, Chile, China, Taiwan, Turkey, the United States and Uzbekistan.

Another high priority is achieving acceptance by trading partners of Australia’s bluetongue-free zone, and Australia’s bovine tuberculosis–free status, for exports of ruminants.
6.2.4 Export certification arrangements

The Export Standards branch provides technical input and assists with negotiating access to new markets, as well as maintaining existing markets for Australian meat, processed food, dairy, fish and other animal products. The branch also responds to the challenges associated with changes in importing country requirements, such as variations in food-safety requirements, animal or public health legislation, and other specialised inspection procedures (such as halal slaughter).

In 2011, the Export Standards branch:

- contributed significantly to the development of the Manual of Importing Country Requirements — this involved revising and updating market access requirements for more than 100 trading partners, and entering them into a comprehensive electronic database for use by registered exporters
- facilitated reviews, which are integral to the maintenance of many export markets, of Australia’s production systems for
  - meat and other processed food, including by the United States, the Republic of Korea, Japan, Egypt, Ukraine, Chile, Indonesia and Malaysia
  - pet food by China
- negotiated new or improved market access, and developed certification for a range of commodities and markets, including the finalisation of revised protocols for the export of chilled beef and sheepmeat to China, live abalone and eel to Taiwan, honey to Egypt, and rendered products to New Zealand and French Polynesia
- facilitated market access for meat and meat products to Muslim countries through the Australian Government Authorised Halal Program
- assisted Australian exporters when problems arose in clearing consignments in importing countries.

DAFF’s role in certifying and inspecting meat and other food products for export is covered in detail in Chapter 7.

Export certification and inspection services for live animals

DAFF Biosecurity confirms the fitness of Australian live animals and animal reproductive material for export, and verifies that the requirements of the importing countries have been met. These activities involve:

- assisting with negotiating technical market access for live animals and animal reproductive material
- inspecting live animals and animal reproductive material for export, and assessing documentation
- issuing export permits and health certificates to Australian exporters of live animals and animal reproductive material
- auditing the procedures undertaken by licensed exporters, operators of registered premises and accredited veterinarians
- licensing exporters of livestock
- registering premises for the assembly, isolation and quarantine of livestock intended for export
- accreditting approved veterinarians for the preparation and inspection of livestock for export.

New regulatory framework for Australian livestock exports to Indonesia

In 2011, the Australian Government implemented a new regulatory framework requiring live exporters of feeder and slaughter livestock to Indonesia to comply with international animal welfare standards.

The new framework requires exporters to show that animals will be treated in accordance with the OIE’s animal welfare standards right through to the point of slaughter. This differs from the old framework, under which exporters were only required to track animals to the port of export and report on the outcome of the voyage. Now, before being issued with approval by DAFF to export feeder and/or slaughter livestock to Indonesia, the exporter will need to show that:

- animals will be handled and processed through specified supply chains in accordance with the internationally accepted requirements for animal welfare established by the OIE, right through to the point of slaughter
- they have control of the movement of animals within their supply chain
- they can track or account for animals throughout the supply chain
- they have independent audits of the supply chain, both before and after export, to assess compliance with the new requirements.

In October 2011, the Australian Government announced that the regulatory framework principles would be extended to apply to live export to other livestock markets and for other species. These reforms represent significant and wide-reaching changes to improve the welfare of Australian livestock exported for slaughter. Implementation of the framework for sheep, goats, cattle and buffalo to other markets will begin on 1 March 2012, and the full rollout is due to be completed by the end of 2012.

The reforms are based on the findings and recommendations of the Independent Review of Australia’s
Livestock Export Trade, conducted by Bill Farmer, AO, and two industry-government working group reports. The government has accepted, either in full or in part, all recommendations made by the Farmer Review and the working groups. The reforms will be implemented through changes to subordinate legislation (Orders) under the Export Control Act 1982 and the Australian Meat and Livestock Industry Act 1997.

DAFF will establish an industry-government working group to examine the need for conditions for the export of breeder livestock, and will report to the Minister for Agriculture, Fisheries and Forestry by 31 October 2012.

6.3 International standards

DAFF contributes to the development of international standards through its involvement in multilateral organisations and groups. These include the WTO and its committees, the Food Safety and Animal Health Quadrilateral Forums (comprising Australia, Canada, New Zealand and the United States), the OIE, and the Codex Alimentarius Commission of the Food and Agriculture Organization of the United Nations.

DAFF’s active participation in these groups helps to develop international rules and standards that reflect Australia’s interests and situation. In 2011, DAFF participated in the development of veterinary legislation standards through the OIE ad hoc Group on Veterinary Legislation.

Within DAFF, the Office of the Chief Veterinary Officer contributed to the maintenance of market access and exports, by providing definitive advice on Australia’s animal health status to inform market access negotiations.

During the year, OIE standards assisted Australian negotiators to regain market access for livestock, horse, cat and dog exports to Malaysia and a number of other markets in the wake of evidence of Hendra virus infection in a dog; and prevented widespread market disruption following the detection of avian paramyxovirus type 1 in pigeons in Victoria.
Consumers in Australia and overseas expect that the food they purchase will be safe. The Australian Government, state authorities and industries work together to protect the public and ensure the safety of foods consumed in Australia or exported from Australia.

Programs for consumer protection are administered by the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), Food Standards Australia New Zealand (FSANZ), the Australian Government Department of Health and Ageing (DoHA), state and territory government authorities, and Animal Health Australia.

85 www.daff.gov.au
86 www.foodstandards.gov.au
87 www.health.gov.au
88 www.animalhealthaustralia.com.au
Activities in the many networks and partnerships that help to protect consumers include:

- establishment of international food standards
- identification of outbreaks of foodborne illness
- surveillance, prevention and control of communicable diseases
- monitoring of chemical residues, pathogens and environmental contaminants in products
- development of traceability systems for livestock used in food production
- promotion of sound management systems to deliver safe and hygienic food products to the marketplace.

7.1 Regulations and standards

The following two sections outline the international and national regulations and standards that apply to Australian consumers.

7.1.1 International arrangements

**Codex Alimentarius Commission**

Australia continues to play a strong leadership role in the development of international science-based food standards through the Codex Alimentarius Commission (Codex) and its subsidiary bodies. Australia contributes to the work of Codex committees dealing with food additives and contaminants, residues of veterinary drugs and pesticides, food hygiene, food labelling, food nutrition and food for special dietary uses, as well as the various commodity committees (fish and fishery products, fruits and vegetables, and fats and oils).

In 2011, Australia’s participation continued to ensure that Codex outcomes are consistent with, and support improved outcomes for, domestic food-safety and public health policies. Australia also focused on areas of benefit to the domestic agricultural and food industries, to maintain Australia’s position as an internationally competitive food exporter.

In July 2011, Codex approved the development of proposed draft **Guidelines for Control of Specific Zoonotic Parasites in Meat**: *Trichinella spiralis* and *Cysticercus bovis*. Australia has actively participated in the development of these guidelines to ensure that a risk-based approach is applied to the risks posed to food safety by both *Trichinella* sp. and *Cysticercus bovis* in the context of food safety.

Australia continues to chair the working groups for the Establishment of Priorities in both the Codex Committee on Pesticide Residues and the Codex Committee on Residues of Veterinary Drugs in Foods. Leadership of these working groups enables Codex to pursue the development of maximum residue limits for newer, safer chemicals to ensure positive outcomes for Australian agriculture and consumers.

7.1.2 National arrangements

The Australian domestic food regulatory system covers distinct areas of developing policy; setting food standards; and implementing and enforcing food standards. An intergovernmental agreement ensures an effective and cooperative national approach to food safety and regulation in Australia.

Policy is agreed by the Australia and New Zealand Food Regulation Ministerial Council and is taken into account by FSANZ (a statutory authority) when it develops food standards for the *Australia New Zealand Food Standards Code*. The ministerial council is chaired by the Australian Government Minister for Health and Ageing (or delegate) and consists of representatives from the Australian Government, state and territory governments, and the New Zealand Government.

Food-safety policy focuses on a supply-chain preventive approach, to ensure that risks to public health are managed at the most effective point in the food supply chain. This builds consumer confidence, safeguards international trade in food and, in time, improves levels of food safety for the consumer.

**Food standards**

Primary production and processing standards for seafood, ready-to-eat meat, dairy products, and eggs and egg products have been developed and implemented by all states and territories. A primary production and processing standard for poultry meat has been completed and is scheduled to commence from May 2012. FSANZ is developing a primary production and processing standard for raw meat (including game meat). Other standards under development include seed sprouts, and raw milk and raw milk products. New standards have a two-year phase-in period from the date of approval.
FSANZ is currently assessing a proposal to extend mandatory country-of-origin labelling to all unpackaged beef, sheep and chicken meat; its decision is expected in 2012. Country-of-origin labelling is currently required for all packaged food, and unpackaged fresh or processed fruit, vegetables, seafood and pork sold in Australia.

7.2 Protective measures

Australia has two protective measures in place to ensure consumer safety: communicable disease surveillance by the Communicable Diseases Network Australia (CDNA) and OzFoodNet, and residue monitoring.

7.2.1 Communicable disease surveillance

**Communicable Diseases Network Australia**

CDNA provides national leadership and coordination for the surveillance, prevention and control of communicable human diseases that pose a threat to public health. Its members include the Australian Government, state and territory governments, and key nongovernment organisations concerned with communicable diseases. CDNA offers advice to governments and other bodies on public health strategies to minimise the effect of communicable diseases in Australia and the region. The network oversees the development and implementation of the National Communicable Diseases Surveillance Strategy, which provides effective national surveillance, preparedness and responses for communicable disease risks. CDNA reports to the Australian Health Ministers’ Advisory Council through the National Public Health Partnership.

**OzFoodNet**

In 2002, DoHA, in collaboration with state and territory health agencies, established OzFoodNet to improve surveillance for foodborne disease. This collaborative network of epidemiologists, microbiologists and food-safety specialists conducts applied research into foodborne disease and methods for improving surveillance. Reports from OzFoodNet are published in *Communicable Diseases Intelligence*, a quarterly publication of DoHA.

OzFoodNet provides early warning, or identifies outbreaks, of foodborne illnesses anywhere in Australia. It ensures a consistent national response to such outbreaks (which may include recall of a food product) and reduces the number of incidents and spread of foodborne illness by prompt preventive action.


7.2.2 Residue monitoring

Industries participate in residue-monitoring programs that assess whether existing controls on the use of pesticides and veterinary medicines are appropriate, and determine the levels of these chemicals and environmental contaminants in commodities. The programs are risk based and are designed to identify and monitor chemical inputs into Australian agricultural production systems. Residue and contaminant monitoring results are assessed against relevant Australian standards. If a noncompliance is detected, the relevant state or territory authority conducts a traceback investigation to identify and resolve the source of the noncompliance. The results of monitoring programs provide confidence for Australian consumers and overseas markets that Australian agricultural products meet relevant standards.

The National Residue Survey (NRS) conducts residue-monitoring programs for the cattle, sheep, goat and pig industries, and for camel, deer, horse, kangaroo, poultry, ratite, wild boar, honey, eggs and some aquatic species. The NRS is located within DAFF.

The Australian Milk Residue Analysis Survey provides a national, independent monitoring program for residues of agricultural and veterinary chemicals and environmental contaminants in raw cows’ milk. Dairy Food Safety Victoria coordinates the survey on behalf of the Australian New Zealand Dairy Authorities’ Committee (ANZDAC) for the Australian dairy industry.

The South Australian Research and Development Institute implements national residue-monitoring plans for salmon, trout and prawns; it also implements exporter or producer programs for yellowtail kingfish, mulloway and southern bluefin tuna.
In developing residue-monitoring programs, NRS, ANZDAC, Dairy Food Safety Victoria and the South Australian Research and Development Institute consult with the relevant industry sector and DAFF to ensure that the programs address any specific export market requirements, as well as domestic requirements.

Laboratories involved in residue monitoring are accredited by the National Association of Testing Authorities. For programs managed by the NRS, laboratories undergo proficiency testing before being contracted and throughout the contractual period. The proficiency testing program confirms a laboratory’s capacity to conduct analyses to international standards, which underpins the technical validity of results.

### 7.3 Inspection and monitoring

The Australian Government and state food-safety authorities provide consumer protection through inspection and monitoring. Good hygienic practices and hazard analysis and critical control points (HACCP) quality systems are used to ensure that meat, dairy, seafood, eggs and the products made from these commodities are safe for human consumption.

Premises used for processing and storing meat, dairy, seafood and eggs and their products for export as food must be registered with DAFF and must comply with the structural and operational requirements of the Export Control Act 1982 and its subordinate legislation, the Export Control Orders. These establishments must have an ‘approved arrangement’— a fully documented quality assurance arrangement that includes practices and procedures that demonstrate compliance with legislative requirements. DAFF performs inspection and verification at establishments to ensure compliance with approved arrangements, thus supporting export certification. Noncompliance with legislation may result in the suspension of the approved arrangement or the establishment registration, and the product from the establishment will no longer be eligible for export.

DAFF also facilitates and manages audits of the Australian export systems by major trading partners. Australia has recently hosted a number of countries to demonstrate improvements made to the Australian export systems through a suite of reforms that will deliver more efficient export certification and inspection services. The reforms, which were developed in partnership with Australian industry, will ensure that Australian export industries continue to meet importing country requirements, while facilitating market access to expand Australia’s $32 billion agricultural export industry.

### 7.3.1 Exports of meat

The Australian Government, through DAFF, has primary responsibility for verifying the quality assurance systems at export meat establishments. State and territory governments are responsible for verifying systems at domestic establishments and at some export-registered establishments operating under state and territory oversight. DAFF works closely with state and territory governments and industry to implement control measures for animal health, food safety and chemical residues. Together, these bodies review and update regulations, rules and industry practices in response to national and international developments in food safety.

Since 1985, the Australian export meat industry has progressively adopted quality assurance systems and implemented a culture of continuous improvement. Quality assurance systems are closely aligned with international standards developed by Codex and the International Organization for Standardization. They are designed to ensure that industry assumes responsibility for the quality and safety of its products and the accuracy of its documentation. This is achieved through the development of product and process controls, based on meat hygiene assessment and HACCP, which focus on minimising enteric pathogens on carcases and processed meat.

Australian domestic red meat processors are required to follow HACCP-based procedures under the Australian standard *Hygienic Production and Transportation of Meat and Meat Products for Human Consumption* (AS 4696:2007). Other Australian standards exist for game, ratite and poultry meat. The standards describe the requirements that must be met by all Australian slaughter and meat-processing establishments during inspection (ante-mortem and postmortem), slaughter, processing and transport of meat.

The *Export Control Act 1982* and subordinate regulations require export-registered meat industry establishments to implement approved arrangements that describe all procedures that underpin food safety and supply chain integrity, and are subject to audit by DAFF. The approved arrangements:

- cover each stage of production, from sourcing to consignment, of all meat and meat products in the establishment
- provide for the implementation of good hygienic practices and HACCP plans
- contain controls that ensure that meat and meat products are safe, wholesome, and accurately identified to ensure traceability and supply chain integrity
- contain controls for animal handling and animal welfare at the establishment
7.3.2 Exports of dairy, seafood and eggs

DAFF provides export inspection, audit and certification services to industry in line with the *Export Control Act 1982* and its subordinate regulations and orders. Staff from state and territory regulatory authorities currently perform dairy export inspections on behalf of DAFF, with DAFF staff maintaining a verification role.

In 2010–11, DAFF certified the export of Australian dairy products worth approximately $2.4 billion to more than 100 countries, as well as exports of eggs and egg products of a lower value. Exports of Australian edible and inedible fisheries products in 2010–11 were worth $1.4 billion and were exported to approximately 115 countries.

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- contain controls that ensure that meat and meat products that are not fit for human consumption are removed from the food chain and segregated from safe and wholesome food
- identify surveillance, monitoring and testing programs required by DAFF, including residue and microbiological testing
- identify the applicable importing country requirements for which export certification is required
- require establishments to verify compliance with these and other programs on an ongoing basis.

Establishments that process red meat and game for export have on-site DAFF-employed veterinarians, supported by a regulatory team consisting of DAFF Food Safety Meat Assessors and Authorised Officers, to verify that Australian and export certification requirements are met. Senior DAFF Veterinarians and Food Safety Auditors conduct regular audits of the export meat system.
Primary responsibility for animal welfare legislation and enforcement in Australia rests with individual states and territories. There is no national animal welfare legislation. National standards and guidelines are being developed to improve the consistency of animal welfare laws across Australia.

Each jurisdiction has officers responsible for administering, enforcing and reviewing animal welfare legislation. The responsible agency is within the agriculture portfolio (in five jurisdictions), the environment portfolio (in two jurisdictions) or the local government portfolio (in one jurisdiction).

The Australian Government verifies that requirements for animal welfare are met at exporting abattoirs and for live animal exports; officers of the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) oversee production at these facilities.
Animal welfare legislation in Australia focuses on the ‘duty of care’ held by people responsible for delivering acceptable animal welfare outcomes. In the livestock and nonproduction sectors, standards, guidelines and model codes of practice assist people to understand their responsibilities for, and society’s expectations about, animal welfare. The standards, guidelines and model codes also inform the development of contemporary, evidence-based quality assurance programs.

Australia’s key policy document for national approaches to improve animal welfare outcomes is the Australian Animal Welfare Strategy (AAWS). In accordance with the AAWS, the states and territories, through the Standing Council on Primary Industries, have harmonised the key features of their legislation and are working to improve the consistency of laws, policies and arrangements that apply across Australia.

The defining feature of animal welfare in Australia is the array of mechanisms for engaging key stakeholders — governments, animal industries, animal welfare bodies, the veterinary profession and the research community — in the development of animal welfare policies and standards. These mechanisms include animal ethics committees within individual institutions, state and territory animal welfare advisory committees and, at the national level, the National Consultative Committee on Animal Welfare and the Australian Animal Welfare Strategy Advisory Committee.

Australia works closely with New Zealand on animal welfare matters. New Zealand is a full member of the Animal Welfare Committee of the Primary Industries Standing Committee (PISC).

Further information on Australia’s animal welfare arrangements is available on the DAFF website.91

8.1 Jurisdictional updates

8.1.1 Australian Government

Although the Australian Government has no constitutional responsibility for animal welfare, it provides leadership and coordination for various programs, as well as contributing funding. It views animal welfare issues from a national perspective and represents Australia in international animal welfare forums. A key contribution has been the Australian Government’s initiative in developing the AAWS, an important national blueprint to improve animal welfare in Australia (see Section 8.3).

Conversion of model codes of practice into Australian animal welfare standards and guidelines — land transport of livestock

The current model codes of practice for the welfare of animals are referenced in different ways in the animal welfare legislation of the states and territories. This lack of consistency has been identified by the Standing Council on Primary Industries (SCoPi; previously known as the Primary Industries Ministerial Council), industry and animal welfare groups as a priority issue to be addressed. Clear, contemporary and consistent animal welfare standards and guidelines for livestock industries across all state, territory and local government jurisdictions are now being developed, based on the current model codes of practice, scientific evidence (where it exists), current industry practices and community expectations. Animal Health Australia (AHA) is managing development of the standards and guidelines.

Codes for the land transport of livestock were the first to be reviewed and converted into animal welfare standards and guidelines, under an agreed national process. These standards and guidelines apply to land transport of the major commercial livestock species in Australia: cattle, sheep, goats, horses, pigs, alpacas, poultry (meat chickens, layer hens, turkeys, ducks, geese, pheasants, guinea fowls, partridges, quails and pigeons), emus, ostriches, buffalo, deer and camels.

SCoPi endorsed the livestock transport standards in May 2009, but asked that more work be undertaken on standards for maximum allowable time off feed for bobby calves, use of electric prodders on pigs and transport time for breeder hens that are to be culled.

For maximum allowable time off feed for bobby calves, a recent study92 concluded that ‘Best practice management of transported calves would involve time off feed not longer than around 24 hrs’, although it supported 30 hours as a defensible outer legal limit, provided that good practice is followed in other areas of calf management. The draft standard for the time-off-feed limit and a regulatory impact statement on the draft standard were provided for public consultation in 2011. SCoPi considered the final regulatory impact statement, including a summary of input to the public consultation, and the draft standard at its meeting on 28 October 2011, but was unable to reach agreement on a time-off-feed limit.


Industry partners of the bobby calf supply chain (Australian Dairy Farmers Limited, Australian Meat Industry Council, Australian Livestock and Rural Transporters Association, Australian Livestock and Property Agents, and Australian Livestock Markets Association) subsequently agreed to implement an industry standard of a maximum of 30 hours off feed for bobby calves. The standard will be underpinned by a calf tracking mechanism that has been developed through a supply-chain integrity trial conducted by supply-chain partners and the Victorian Department of Primary Industries. The calf tracking mechanism will monitor welfare measures, including time off feed and condition of the calves on their arrival at abattoirs. Data from the system will be used to identify and manage risks along the supply chain.

The standard for restricted use of electric prodders on pigs during loading and unloading was endorsed by SCoPI in November 2010. Electric prodders must not be used during the loading, transport and unloading of pigs, except where:

- other reasonable actions to cause movement have failed
- individual pigs weigh 60 kg (live weight) or more
- there is reasonable risk to the safety of the driver or the pig(s).

For the maximum transport time for spent hens, any changes to the current standard will be informed by research. The PISC Animal Welfare Committee will consider this research and comments from a broadly based reference group before deciding whether to recommend amendment of the current standard to SCoPI.

**Australian animal welfare standards and guidelines for cattle and sheep**

Development of animal welfare standards and guidelines for sheep and cattle began in late 2008, under the management of AHA. The sheep and cattle writing groups met several times and completed drafts of standards and discussion papers in 2009. However, in late 2010, because of industry concerns about a lack of commitment by jurisdictions to consistently implement standards, the cattle and sheep industries suspended their funding for the development of the respective standards and guidelines.

Following a workshop for governments and stakeholders (including industry and animal welfare groups) in March 2011, PISC endorsed the existing process for developing livestock welfare standards and guidelines, including a national collaborative approach, and a joint government–industry approach to nationally consistent implementation. Industry has now agreed to re-engage in the process of developing standards and guidelines.

PISC agreed that all jurisdictions would participate in a consultation and communication process to develop and implement the standards and guidelines. PISC also noted that jurisdictions might need to implement the agreed standards differently to achieve consistent outcomes.

A joint meeting of the sheep and cattle writing groups was held in October 2011 to restart the standards development process. The standards and guidelines documents are now well advanced, and the development of a consultation regulation impact statement is planned for early 2012. The consultation regulation impact statement and draft standards will be released for public consultation, and a decision regulation impact statement and the draft standards are likely to be considered for endorsement by SCoPI in 2013. Progress will be reported online.

**Australian animal welfare standards and guidelines for exhibited animals (zoos)**

The development of animal welfare standards and guidelines for the zoo industry — the first for a nonproduction animal sector — began in mid-2008. This project is jointly funded by industry, the states and territories, and the Australian Government. It is being led by a writing group involving the Zoo and Aquarium Association; Trade & Investment NSW; the Queensland Department of Employment, Economic Development and Innovation; and DAFF.

Because of the complexity of the operations, situations and animals involved in the zoo industry, the standards and guidelines have been organised into two parts: a general set of standards applying to all facilities keeping animals for display purposes, and a series of taxon-specific standards for the particular welfare requirements of different species. The first of the taxon standards cover koalas, wombats, crocodilians, macropods (kangaroos and wallabies) and ratites (ostriches, emus, cassowaries and rheas). These taxon standards and the general standards were drafted in 2010. A regulatory impact analysis and public consultation will be undertaken in 2012 before the standards are sent to SCoPI for national endorsement. Reference to the standards and guidelines in state and territory legislation is anticipated for 2012.

Taxon standards have also been drafted for anurans (frogs and toads), but these are on hold, pending further work on complex issues, such as spatial requirements. Priorities for further taxon standards include primates, carnivores and ungulates (hoofed mammals).

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93  www.animalwelfarestandards.net.au
Slaughter without prior stunning

Ministers from all Australian governments agreed in November 2009 that the animal welfare risks during slaughter without prior stunning can be managed by applying a risk-management framework of measures that can co-exist with religious belief. Government officials consulted broadly with a range of stakeholders, including religious organisations, meat processors, relevant regulators and animal welfare groups, on the nature of such a framework and provided advice in October 2011 to the ministers involved. Ministers have directed officials to continue discussions with religious groups.

Mulesing

Mulesing was introduced to protect Australia’s Merino flocks from parasitic attack by the Lucilia cuprina blowfly in the breech region (referred to as flystrike). This practice is accepted under the laws of Australia’s states and territories. Until suitable alternatives are implemented, mulesing remains the single most effective procedure for providing Merino sheep with lifelong protection from breech flystrike.

Animal health and welfare is the highest research and development priority of the wool industry-owed research, development and marketing organisation, Australian Wool Innovation Limited. Progress to date by Australian Wool Innovation Limited and other organisations includes:

- addition of breech wrinkle to the Australian Sheep Breeding Values, allowing woolgrowers to select bare-breeched breeding stock and fast track their progress, to reduce breech wrinkle in their flocks
- improved availability of pain relief products where mulesing is still the best form of flystrike prevention
- progressing towards commercial release of intradermal injections that flatten wrinkles in areas susceptible to flystrike
- development of an interactive web-based tool to help farmers select the best flystrike prevention strategy for their sheep.

The National Wool Declaration, administered by the Australian Wool Exchange Limited, allows buyers to source wool that meets their animal welfare requirements with respect to mulesing status. The Australian Government provided nearly $165 000 to the Australian Wool Exchange Limited to develop and implement the National Wool Declaration Integrity Program, providing buyers with confidence in the declared mulesing status of the wool. The Australian Wool Exchange Limited Board reviewed the first year of operation of the program in 2011 and has committed to continue it with industry funding.

8.1.2 Australian Capital Territory

Codes of practice

During 2010–11, the Australian Capital Territory (ACT) accelerated its schedule for reviewing codes of practice to include reviews of three outdated codes: the Code of Practice for the Sale of Animals in the ACT (other than from saleyards), the Code of Practice for the Humane Destruction of Kangaroos in the ACT, and the Code of Practice for the Care of Sick and Injured Native Animals.

Animal Welfare Advisory Committee

The ACT’s Animal Welfare Advisory Committee was formed in 1992, with the introduction of the Animal Welfare Act 1992. The committee’s terms of reference and operation have now been reviewed, and members have been appointed under the new terms of reference.

Policy, regulation and changes to the Animal Welfare Act 1992

Commercial poultry

In 2011, the ACT Government made a number of policy and regulatory changes relating to the welfare of commercial poultry. All government departments and entities now source whole eggs from either barn or free-range suppliers.

New regulations have been introduced for the sale of whole eggs from supermarkets and other retail outlets. Signage explaining which production method has been used must be displayed above retail eggs, and eggs from different production methods must be separated on retail shelving. A red border must outline any retail shelving that displays cage-produced eggs.

A number of regulations concerning commercial poultry have also been introduced, relating to cage specifications, handling procedures and inspection routines.

Enforcement of codes of practice

In line with national agreement, the ACT Government has created three new offences under the Animal Welfare Act 1992: reckless failure to comply with a code of practice (maximum penalty 100 penalty units), failure to comply with a mandatory code of practice (maximum penalty 50 penalty units) and direction to comply with a mandatory code. (A penalty unit is currently $110.)

94 www.flyboss.org.au
Other issues

Lobby groups continue to be concerned about:

- the sale of animals, particularly dogs and cats, from pet shops or over the internet
- inappropriate breeding of companion animals (‘puppy farms’)
- battery-cage egg production
- management of eastern grey kangaroos
- control of dogs (including dangerous dogs) by Domestic Animal Services.

8.1.3 New South Wales

In New South Wales, work has continued on a number of standards and policies. The Prevention of Cruelty to Animals (Land Transport of Livestock) Code, which will mandate the national standards for land transport of livestock, is being developed for implementation in 2012. A policy is also being developed for tethering of animals.

The draft guidelines for the housing of mice in scientific institutions are being revised, based on stakeholder comments.

In the exhibited animals area, policies are being developed on the requirements for keeping big cats, and for dual licensing of animals under the Exhibited Animals Protection Act 1986 and the National Parks and Wildlife Act 1974. New South Wales coordinated the writing group for the development of animal welfare standards and guidelines for the zoo industry.

8.1.4 Northern Territory

The review of the Northern Territory Animal Welfare Act 1999 is continuing.

The Animal Welfare Branch of the Northern Territory Department of Housing, Local Government and Regional Services delivered Animal Awareness Week (27 June – 3 July 2011), promoting animal welfare within schools and the broader community.

Sixteen participants from various Northern Territory agencies successfully completed the Certificate IV in Government (Investigation), a component of training for authorised inspectors and officers under the Animal Welfare Act 1999.

Animal Welfare Fund grants continue to be available to all Northern Territory not-for-profit organisations.

8.1.5 Queensland

In Queensland, a program to monitor the compulsory requirements of the national Model Code of Practice for the Welfare of Animals — Domestic Poultry has been developed. Officers have been trained and appointed as authorised officers, and monitoring commenced in late 2011.

The process of adopting the Australian Animal Welfare Standards and Guidelines — Land Transport of Livestock into the Animal Care and Protection Act 2001 has continued, with implementation planned for July 2012.

During 2011, Queensland standards and guidelines for animal welfare were developed for breeding dogs, and a policy was developed for controlling intensively bred puppies for commercial purposes (puppy farms).

The Rodeo Standards and Guidelines are well under development and are expected to be completed in 2012.

Queensland is introducing a new offence for serious animal cruelty, which will significantly increase penalties for serious offences.

Funding received through the AAWS supported the ‘Smiling Animals in the Dreamtime’ education package for Indigenous communities. This package, which aims to improve animal welfare in Indigenous communities, has been delivered in northern, central and southern Queensland Indigenous communities.
8.1.6 South Australia

The South Australian Animal Welfare Act 1985, which has been amended with most of the agreed legislative provisions required for national consistency, will regulate the Australian Animal Welfare Standards and Guidelines — Land Transport of Livestock as they are developed. The South Australian Animal Welfare Advisory Committee has provided comments to the writing groups developing the animal welfare standards and guidelines.

State issues being addressed include revision of the South Australian Code of Practice for the Welfare of Animals in the Pet Trade, streamlining of administrative processes for use of animals in research and teaching, and review of training options for authorised inspectors. The Livestock Act 1997 has been reviewed to require registration of all properties holding livestock, including horses (but excluding poultry), to efficiently manage animal disease outbreaks or other animal emergencies. The Impounding Act 1920 is currently being reviewed to ensure that it is contemporary, practical and, as much as possible, consistent with similar legislation in other jurisdictions.

8.1.7 Tasmania

The Tasmanian Government has announced that it will adopt most of the standards in the revised Model Code of Practice for the Welfare of Animals — Pigs, but will go further than the code and phase out dry sow stalls. Regulations are currently being developed under the Animal Welfare Act 1993 that will legislate most of the code and restrict the use of dry sow stalls to six weeks per gestation in 2014, and ban their use altogether in 2017.

A program of random inspections of intensive piggery and poultry premises has been implemented, in conjunction with the Royal Society for the Prevention of Cruelty to Animals (RSPCA), to ensure that producers are complying with animal welfare standards. This program will be extended to other livestock industries as animal welfare standards are developed.

8.1.8 Victoria

The Victorian Livestock Management Act 2010, which commenced on 1 January 2011, will regulate the Australian Animal Welfare Standards and Guidelines — Land Transport of Livestock and the Victorian Standards and Guidelines for the Welfare of Pigs (based on the national Model Code of Practice for the Welfare of Animals — Pigs). The Act provides a single, consolidated regulatory framework for livestock management standards as they develop and will enable these standards to be demonstrated by a single industry system. It also provides for a new co-regulatory mechanism that formally recognises commercial and existing industry compliance arrangements, including quality assurance schemes that demonstrate compliance with standards.

8.1.9 Western Australia

On 1 July 2011, responsibility for administration of the Animal Welfare Act 2002 was transferred from the Department of Local Government to the Department of Agriculture and Food Western Australia (DAFWA).

As part of its commitment to animal welfare, the Western Australian Government increased annual funding of animal welfare activities to $1.6 million. This includes the appointment of six additional full-time inspectors in DAFWA and doubling of annual funding to the RSPCA (Western Australia), to $500,000.

DAFWA has made significant contributions to the development of national animal welfare standards and guidelines, and has worked closely with industry to promote awareness of, and implement, agreed standards.

There is a clear separation between DAFWA's animal welfare compliance arm and its education, research and production arms, to ensure that enforcement of the Animal Welfare Act 2002 and continued development of the livestock industries are not in conflict. DAFWA works closely with the RSPCA (Western Australia) in enforcing the Act in Western Australia. Other agencies with a role in enforcing the Act include police officers (all officers are authorised inspectors), some local government authorities and some officers in the Department of Environment and Conservation (wildlife).

8.2 Animal Welfare Committee

The Animal Welfare Committee (AWC), a subcommittee of the Animal Welfare and Product Integrity Task Force (AWPIT), is the peak policy and technical committee on animal welfare matters. It seeks to improve national animal welfare arrangements in line with sustainable practices. In doing so, it considers the interests of government, industry and nongovernment associations, as well as (evidence-based) community expectations.

The committee has the following terms of reference:

- Consider the development and implementation of national animal welfare policy and standards, assessing the requirement for national consistency on a case-by-case basis.
- Advise and recommend policy to AWPIT on animal welfare issues.
• Address animal welfare issues brought to it by AWPIT, including strategic priorities in the AWPIT work plan.
• Identify emerging animal welfare issues of importance for research or policy development, in consultation with industry and other stakeholders.

AWC membership comprises representatives from the Australian Government (DAFF), each state and territory government and the New Zealand Government. It also has a number of permanent observers: representatives of Livestock Industries, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), AHA and the Australian Animal Welfare Advisory Committee (the chair of the committee).

During 2011, the AWC:
• endorsed the AAWS and National Implementation Plan 2010–14 and advised ministers to endorse the new plan
• developed model regulations for the Australian Welfare Standards and Guidelines — Land Transport of Livestock
• convened a national workshop in May 2011, facilitated by the World Society for the Protection of Animals, on national plans for companion animals in natural disasters
• progressed the development of a report on Australia’s animal welfare system and capacity
• reviewed progress on research initiatives to find a viable alternative to mulesing.

8.3 Australian Animal Welfare Strategy
The Australian Government developed the AAWS to raise the standards of animal care and welfare. The AAWS reflects the strong feelings and concerns that Australians have for animal welfare and our need to constantly improve how we treat animals in our care at all levels of society. It focuses attention on key animal welfare issues and coordinated investments to deliver sustainable improvements in animal welfare. The strategy has relevance for the entire community: it unites animal industries, welfare groups, community organisations, and state and territory governments to work together on one agreed program on behalf of the broader community.

This means that there is now general agreement on priority animal welfare issues and a process that supports projects in the areas of research, policy development, standards of care, education and training, and general communication with the public.

The AAWS relies on the commitment of time, resources and funding from all levels of government and from stakeholders, including community and industry groups associated with animals.

As a result of the AAWS, animals will experience better levels of care and management, and a balanced debate of animal welfare issues can take place within the community.

The strategy was endorsed by SCoPI in 2004, and was externally reviewed in 2008–09 to evaluate its implementation and identify opportunities for improvement. In 2010, the Advisory Committee for the AAWS led a process to update the strategy in response to the recommendations from the review and to prepare an implementation plan for 2010–14 (phase 2 of the strategy). The revised AAWS and National Implementation Plan 2010–11 was endorsed by SCoPI ministers in April 2011.

The document outlines four areas of effort in stated goals and objectives:
• animals — the welfare needs of animals are understood and met
• national systems — national systems deliver consistent animal welfare outcomes and give priority to ongoing improvements
• people — people make ethical decisions regarding animal welfare, supported by knowledge and skills
• international — Australia is actively engaged in international partnerships and developments to improve animal welfare.

The Minister for Agriculture, Fisheries and Forestry appointed a new Australian Animal Welfare Advisory Committee in October 2011 to assist DAFF in implementing the new AAWS goals and objectives. The expert members of this committee will also be the chairs of the nine AAWS working groups (see Section 8.3.2), which will report to the committee.

8.3.1 AAWS activities
The revised AAWS has been developed using a combination of an outputs–outcomes–benefits framework and a program logic model. This will clearly identify how the investments and activities will deliver results; the assumptions made about the connections between investments, activities and outcomes; and the resources needed to achieve the identified aims.

A key milestone in 2011 was the launch of a dedicated AAWS website, which will be an online reference point for Australia’s actions on animal welfare.

Implementation of the strategy is a shared responsibility. In particular, the strategy will require the state and territory
governments — which are responsible for developing, implementing and enforcing animal welfare policies and legislation — to ensure that their current and proposed activities are consistent with the strategy and can support its goals and objectives. The Australian Government has committed approximately $4 million to the strategy for phase 2 (July 2010 – June 2014). This funding will be used for specific joint initiatives to address priority issues at industry, sectoral and national levels. Co-contributions to activities under the strategy will be sought from governments and other stakeholders.

Thirteen partner projects were approved through the AAWS in 2011, in addition to the 19 projects approved in 2010. Projects include:

• development of animal welfare codes of practice for wild-capture fishing industries
• development, publication and evaluation of a guide on preparing livestock for transport
• support for a workshop to develop a community of practice for high-school agriculture teachers.

More details about specific projects are provided in Section 8.3.2.

8.3.2 AAWS sectoral working groups

Preparation of the AAWS has involved an impressive array of stakeholders across Australia. As a result, it now provides an agreed framework for improving the welfare of animals in all sectors and at all levels of our society through a range of programs. The membership of the working groups are being reviewed and refreshed for phase 2 of the strategy.

Six sectoral working groups connect the strategy and stakeholder networks through discussion forums, development of action plans, and provision of technical advice on the opportunities, impediments and drivers for each sector. Each working group has representation from government, industry and sector specialist organisations, as well as animal welfare organisations. Three further areas, which cross the boundaries of the animal sectors and require specific attention and investment, also have working groups.

The six sectoral working groups are:

• livestock and production animals
• companion animals
• aquatic animals
• animals used in research and teaching
• animals used for work, recreation, entertainment and display
• native, introduced and feral animals.

The three cross-sectoral working groups (see Sections 8.3.3–8.3.5) are:

• communications
• education and training
• research and development.

Livestock and production animals

The working group on livestock and production animals recently reaffirmed the priority animal welfare issues for future activity as:

• harmonisation across governments to produce consistent regulations for animal welfare
• review and reformating of the model codes of practice for the welfare of animals to convert them to Australian animal welfare standards and guidelines
• implementation of quality assurance programs as a mechanism for applying agreed animal welfare standards
• strategies for communication and extension
• identification of knowledge gaps in the science underpinning animal welfare
• facilitation of science-based research.

The working group resolved to endorse the development of a national communication strategy for the implementation of the Australian Animal Welfare Standards and Guidelines — Land Transport of Livestock. This project will complement a related project being undertaken by Meat & Livestock Australia and the Western Australian Government.

The working group decided that its progress would be greater with increased secretariat resources, and that the secretariat should be transferred to AHA, to increase its resourcing and effectiveness.

Australian animal welfare standards and guidelines for cattle and sheep are now being developed (see Section 8.1.1). Future priorities include horses, goats, saleyards and abattoirs.

Companion animals

The pet care industry contributes around $6.02 billion to the Australian economy, with the Australian community owning 33.3 million pets of various species. The sector covers dogs, cats, birds and other small animal pets, as well as companion horses.

The working group on companion animals has identified the development of national animal welfare standards

and guidelines for dogs and cats as a high priority. These standards and guidelines are being developed cooperatively with the states and territories and animal welfare groups, with funding under the AAWS. A writing group has produced a draft, which will be subject to stakeholder and public consultation in 2012 before being finalised. The final standards and guidelines will provide pet owners with clear information about their responsibilities for the health and wellbeing of their pets.

Other projects that have been progressed include:
• ‘Who’s for cats’ — an educational advertising program aimed at reducing feral cat populations and euthanasia rates for unhomed cats
• ‘It’s cool to be kind’ — a pilot social networking project aimed at young people and promoting responsibilities to look after animals.

Further details about these and other AAWS projects can be found on the AAWS website.98

**Aquatic animals**

The working group on aquatic animals has continued a project to develop welfare codes of practice for the commercial wild-capture fishing industries, consistent with overarching principles for the welfare of vertebrate finfish that were previously developed. Draft codes for a number of fishing methods — purse-seining, beach-seining, mesh netting, trawling, line fishing and pot/trap fishing — were developed and circulated to industry and other stakeholders for feedback. In 2011, the draft codes were finalised and will be published, for adoption by fishing operators.

**Animals used in research and teaching**

A number of initiatives to improve the welfare of animals used in scientific research and education are under way. The overarching framework for use of animals in research and teaching is the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes*,99 which is currently being revised. Several members of the working group have been involved in the revision process.

The National Health and Medical Research Council has convened a series of expert groups to review each of the current code’s sections and advise a reference group on what should be included in a new code. This process will draw on existing best practice in the research and teaching community to cover the ethical expectations of the Australian public for use of animals in research and teaching. The revision is expected to be completed in 2012–13.

98 www.australiananimalwelfare.com.au/content/projects

Timelines for approved projects that are being progressed by members of the working group have been revised to take into account the need for consistency with the new version of the code, since most of these projects aim to underpin the code’s operations by providing better resource materials for animal users and training. Projects include the following:

• An online, web-based training course is being developed to provide students and researchers with a working understanding of the principles, processes and structures of the code that protect the wellbeing of animals. The course will be assessable and consistent with international guidance provided by the International Council for Laboratory Animal Science on training of people responsible for animals in the laboratory setting. It is intended that the course will be finalised, including through a process of international review, and made available during 2011–12.

• A range of audiovisual information is to be developed that covers ethical perspectives on the use of animals for research and teaching, as well as the structures and processes in the revised version of the code that protect the wellbeing of animals. This information will be accessible by the general public, teachers, researchers and students. It is intended that the material will be finalised and made publicly available during 2012–13, following endorsement of a final version of the revised code.
Animals used for work, recreation, entertainment and display

The working group on animals used for work, recreation, entertainment and display continues to divide its activities between three subgroups: dogs, horses and zoos.

Working dogs

In 2009, the Australian Working Dog Survey investigated the husbandry, sourcing, breeding, assessment, training and veterinary care of working dogs in Australia. This was the first time that such information had been collected on a national scale. Key findings of the survey\(^{100}\) included the following:

- Dogs received an average of 14 months (378 hours) of training before reaching a competent working standard.
- The average age of working dogs was just over five years, and the average age of retirement almost eight years, although there were significant variations between sectors.
- The average time at work for dogs in different sectors varied significantly. On average, government dogs (customs, quarantine, police and defence) worked 25 hours per week, dogs in private industry (agricultural and security) and assistance worked 14 hours per week, and sport dogs worked 8 hours per week.
- Most working dog trainers have no formal education in dog behaviour or training (52%) or are trained on the job (42%); only 6% have undertaken formal (certified) training. Working dog handlers generally received on-the-job training (63%).

The results from the survey will feed into a project to develop an action plan to improve welfare outcomes for Australia’s working dogs. This project is expected to be completed in 2012.

Horses

Progression of the draft *Australian Animal Welfare Standards and Guidelines* — Horses has been delayed by difficulties in negotiating suitable funding arrangements for the regulation impact analysis and public consultation.

However, the Australian Horse Industry Council has developed an Australian Horse Welfare Protocol that is being promoted on the AAWS website.\(^{101}\) The AAWS horse subgroup has also developed a 2011–12 Australian Horse Health and Wellbeing Survey.\(^{102}\)

Zoos

The major work for the zoos subgroup has been the ongoing development of general and taxon-specific *Australian Animal Welfare Standards and Guidelines — Exhibited Animals (Zoos)*. Details of this project are provided in Section 8.1.1.

Native, introduced and feral animals

A longstanding objective of the working group on native, introduced and feral animals is to ensure that animal welfare, or humaneness, is an integral part of the decision-making process for vertebrate pest animal management programs. To this end, the group has supported the development of codes of practice and standard operating procedures for humane vertebrate pest control, the development of a model for assessing pest control methods, and the use of this model to assess the humaneness of the most commonly used control methods.

Managing overabundant species — in particular, large, feral herbivores such as camels, donkeys and horses — is a necessary part of effective land management practice. However, this is a highly emotive and contentious issue. In 2010, the working group noted with some concern various proposals regarding the management of horse and camel populations in remote areas. The working group has developed a position statement outlining the animal welfare issues that need to be considered in such situations and the humaneness of a range of interventions.\(^{103}\)

The working group supports the following eight implementation principles\(^{104}\) as the general basis for humane management of vertebrate pest animals:

- The aims or benefits and the harms of each control program must be clear.

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• Control should be undertaken only if there is a likelihood that the aims can be achieved.
• The most humane methods that will achieve the aims of the control program must be used.
• The methods that most effectively and feasibly achieve the aims of the control program must be used.
• The methods must be applied in the best possible way.
• Whether or not each control program achieved its aim must be assessed.
• Once the desired aims or benefits have been achieved, steps must be taken to maintain the beneficial state.
• When there is a choice of methods, the method used should achieve a balance between humaneness, community perception, feasibility, emergency needs and efficacy.

8.3.3 Communications

Detailed analysis undertaken for phase 1 of the AAWS identified more than 400 stakeholder organisations, including governments; advisory bodies; education, research and training organisations; Indigenous communities; industry and business organisations; nongovernment organisations; and the veterinary and animal health sectors.

A national workshop of approximately 120 stakeholders was held in July 2010 as part of the consultation process for the development of phase 2 of the AAWS. Aims of the workshop were to provide an update on activities and progress at the sectoral level, and to assist sectoral groups to develop action plans and priority projects.

The strategy’s overall communication program provides a basis for stakeholder management and supports reporting, accountability, transparency, engagement and promotional aims. Many of the sectoral working groups have identified communication projects among their top priorities for action during phase 2.

The communication program has two primary objectives:
• to increase awareness and understanding of the importance of sound practices in managing and ensuring the welfare of animals
• to increase awareness of roles and responsibilities in delivering a duty of care for the welfare of animals.

The strategy also provides funding for communication projects (to be delivered by partner organisations) that address industry or sectoral priorities. Projects funded included:
• publication and evaluated application of a Stock Preparation Guide for Livestock Transport
• development of a range of audiovisual information on ethical perspectives on the use of animals for research and teaching.

AAWS communications will be driven by a new communication strategy and communications working group in phase 2. A key platform will be the new website and regular e-newsletters and case studies that can also be accessed from the website.

8.3.4 Education and training

A study into secondary school agricultural students’ attitudes to working with sheep and the impact of these attitudes on stock handling was also completed during the year. Work will continue to develop national resources for training students and others in low-stress stock handling.

Education and training projects funded by the AAWS included:
• Caring for Dogs, Community and Country Education Resource Evaluation, which aims to evaluate the effectiveness of an educational DVD, ‘Caring for dogs, community and country’ funded through the AAWS
• online publication of material generated through the Community of Practice project; this project will develop online teaching resources about the welfare of animals in schools for early career teachers of agriculture and primary industries.

8.3.5 Research and development

Australia’s three major identified providers of animal welfare research and development (R&D) are the Animal Welfare Science Centre, the Centre for Animal Welfare and Ethics, and CSIRO. These institutions have agreed to cooperate on animal welfare research programs under a non-exclusive relationship agreement that establishes an AAWS animal welfare R&D consortium. The three institutions are also part of the newly expanded New Zealand – Australia Collaborating Centre for Animal Welfare Science and Bioethical Analysis, which was recognised as a World Organisation for Animal Health (OIE) collaborating centre in May 2009.

The AAWS working group on animal welfare R&D established a consultancy project to develop a funded animal welfare R&D program within the AAWS. Members of the AAWS working groups are identifying projects that address research needs in their sector. Funding is to be arranged as part of this task, and the members of the AAWS consortium will be invited to run the projects when complete.
The working group also provided significant input to the development of a national mechanism to deliver animal welfare research, development and extension (RD&E) activities for livestock under the National Framework for Agricultural Research, Development and Extension initiative of PISC.

The national Animal Welfare RD&E Strategy will facilitate collaboration and partnerships between agriculture sector RD&E investors and providers with an interest in animal welfare, underpinned by defined funding arrangements. It draws on previous work under the AAWS that defined key areas for investment in such work, as well as the collaborative arrangements established for the AAWS animal welfare R&D consortium. The strategy aims to ensure that Australia's RD&E capability in animal welfare is backed by appropriate funding agreements, and that animal welfare RD&E capacity is maintained. The Animal Welfare RD&E Strategy was endorsed by SCoPI in November 2010.

8.4 Livestock exports

8.4.1 Australian Standards for the Export of Livestock

Version 2.3 of the Australian Standards for the Export of Livestock came into force on 1 April 2011. Exporters must comply with the standards to be permitted to export livestock by DAFF Biosecurity (formerly the Australian Quarantine and Inspection Service).

8.4.2 Independent Review of Australia’s Livestock Export Trade (the Farmer Review)

The Australian Broadcasting Corporation’s *Four Corners* program aired footage on 30 May 2011 of serious mistreatment of cattle in Indonesian abattoirs. In response, on 7 June 2011, the Minister for Agriculture, Fisheries and Forestry ordered the suspension of the export of livestock to Indonesia. Exports were suspended while the Australian Government and industry established sufficient safeguards to provide verifiable and transparent supply-chain assurance up to, and including, the point of slaughter for every consignment that leaves Australia.

On 6 July 2011, the minister lifted the suspension of the trade and put strict new conditions in place. Under the new requirements, exporters must trace cattle from properties, onto vessels, into feedlots and into abattoirs that meet agreed OIE standards (see Chapter 6).

The minister appointed Mr Bill Farmer, AO, to independently investigate the complete supply chain for all live exports that leave Australia, up to and including the point of slaughter. Mr Farmer provided his report to the minister on 31 August 2011.

8.4.3 Australian Government response to the Farmer Review

In response to the problems identified in Indonesia, the Australian Government introduced a strict new framework for livestock exports to Indonesia that ensures that animals will be treated in a way that meets or exceeds international animal welfare standards.

On 21 October 2011, the Australian Government announced that it would extend the Indonesian framework to all other markets for Australian feeder and slaughter livestock. The new framework will be phased in for all livestock export markets by the end of 2012. The decision was informed by the Farmer Review, as well as reports from two industry–government working groups on live cattle exports, and live sheep and goat exports.

These changes fundamentally reform the way the live export trade works. Before, there were no rules to cover what happened after an animal arrived in an export market.

Reports of the Farmer Review and the industry–government working groups on live cattle exports, the government response to these reports, and more information about government action on live exports, including details of assistance available for people affected by the suspension of trade to Indonesia, are available online.\(^{105}\)

8.5 International animal welfare

8.5.1 World Organisation for Animal Health

Australia supports the OIE’s development of scientifically based international animal welfare guidelines, which are not intended to strengthen nontariff barriers to international trade through prescriptive animal welfare requirements. The Australian Government consults closely with the livestock industries in developing an Australian position on issues being discussed in this forum.

Australian experts participated in OIE ad hoc working groups that are developing animal welfare guidelines for broilers and beef cattle, and Australia provides comment to the OIE on draft standards.

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\(^{105}\) www.liveexports.gov.au
8.5.2 Regional Animal Welfare Strategy for Asia, the Far East and Oceania

Australia is assisting the OIE to develop and implement regional and subregional strategies in Asia, the Far East and Oceania. An inaugural animal welfare workshop for the Asia, Far East and Oceania region was held in Bangkok, Thailand, in 2007. The Regional Animal Welfare Strategy for Asia, the Far East and Oceania (RAWS) was endorsed in May 2008 by the Regional Commission for Asia, the Far East and Oceania and the OIE International Committee.

In November 2008, participants at a workshop in Bangkok hosted by DAFF and the OIE agreed on an implementation framework for the RAWS and drafted an implementation plan. The plan was endorsed by the Regional Commission for Asia, the Far East and Oceania in November 2009 and by the OIE International Committee in May 2010. A training course for OIE animal welfare focal points was held in March 2010, and a workshop to consider issues arising from the implementation plan was held in Bangkok in April 2010.

DAFF, in conjunction with the OIE, hosted the first meeting of the RAWS Coordination Group in Bangkok in April 2011. The outcomes from this meeting were consolidated at the second meeting of the RAWS Coordination Group, held in Tokyo on 29 November 2011. The second meeting was held back-to-back with the National Animal Welfare Focal Points Seminar, to allow a joint session on the RAWS during the seminar and increased interaction between RAWS Coordination Group members and the focal points.

Further activities are planned for the first half of 2012. A practical and applied implementation process is vital for the success of the RAWS, as is the ongoing support of governments, welfare organisations, practitioners, scientists and industry.

8.5.3 Welfare activities with Middle Eastern trading partners

In May 2009, the Australian Government announced a three-year, $3.2 million Live Trade Animal Welfare Partnership program, jointly funded by government and industry. The program built on previous investments to support a range of improvements, including better infrastructure to reduce livestock stress or injury, and training for feedlot and transport staff in overseas markets. As a result of changes in the approach to improving international animal welfare, unspent funds from this program were transferred to other programs in late 2011.

The government has made $5 million available under the Approved Supply Chain Improvements Program over the next two financial years (2011–12 and 2012–13) to support Australian exporters to deliver improved supply chains. The program will support a range of improvements in export supply chains, including infrastructure upgrades, the installation of stunning equipment, and training for feedlot and abattoir staff in overseas markets.

Under the program, up to 25% of industry investment in eligible activities undertaken to improve animal welfare in approved export supply chains will be eligible for reimbursement (i.e. the government will provide $1 for each $3 provided by industry). At least 20% of program funds ($1 million) are to be used to encourage and promote the use of stunning in the slaughter of Australian livestock exports. The government has also allocated $10 million over the next four years from the Official Development Assistance contingency reserve to enable eligible countries that import livestock from Australia to improve animal welfare outcomes.

8.5.4 Quadrilateral Animal Welfare Working Group

In 2011, Australia participated in the Animal Welfare Working Group of the Animal Health Quadrilateral Group of countries — Australia, Canada, New Zealand and the United States. The working group held regular teleconferences in 2011 to update member countries on developments of interest.

8.5.5 European Commission – Australia Animal Welfare Cooperation Forum

In September 2008, the European Commission and DAFF agreed to terms of reference establishing the Animal Welfare Cooperation Forum of the European Commission and the Australian Government.

The aim of the forum is to provide a regular opportunity for information exchange and cooperation on animal welfare issues of operational and strategic importance to both participants. The forum promotes dialogue on current animal welfare systems, activities and priorities. It will further develop a science-based approach to animal welfare and strengthen the bilateral relationship on animal welfare issues, including advancing OIE work in this area.

Australia collaborates with many countries to improve the health of their livestock, thereby improving livelihoods. Concerns expressed by international public health agencies about the potential impact of zoonotic diseases have led to increased public and official attention being given to animal disease control.
Australia is involved in regional animal health initiatives through aid and research activities. Aid activities are primarily resourced through the Australian Agency for International Development (AusAID107), and research activities are primarily resourced through the Australian Centre for International Agricultural Research (ACIAR108). In addition, Australia liaises directly with government agencies, veterinary associations and private organisations in collaborating countries. For example, Australia assists its near neighbours, including Papua New Guinea (PNG) and Timor-Leste, with field surveillance and monitoring for significant animal diseases. These activities, which are conducted under memoranda of understanding, are valuable in strengthening the limited surveillance capacity of these countries, providing training, identifying new or re-emerging risks, and strengthening relationships within the region.

Australia also provides technical and financial assistance at global and regional levels by supporting the World Health Organization (WHO), the World Bank, the World Organisation for Animal Health (OIE), the Food and Agriculture Organization of the United Nations (FAO), the Secretariat of the Pacific Community and the Network of Aquaculture Centres in Asia–Pacific. Supporting international collaborators ensures that regional projects address animal health issues and requirements that are important for Australia as well as for the collaborating countries.

This chapter summarises Australia’s main areas of international engagement in terrestrial animal health through AusAID and ACIAR in the Asia–Pacific and African regions. Information on regional aquatic animal health initiatives is provided in Chapter 5.

9.1 Overseas aid

Australia works with the governments and people of developing countries to deliver aid where it is most needed and most effective, and where Australia can make a difference. By helping people in developing countries to overcome poverty, Australia’s overseas aid program also serves Australia’s national interests by promoting stability and prosperity in the region and beyond.

Under the Australian Government’s new aid policy, ‘An Effective Aid Program for Australia’, a key strategic goal for the aid program is to save lives, including through supporting large-scale disease prevention, vaccination and treatment. An important component of this policy is helping partner governments to prepare for and respond to pandemics and other potential international public health threats. Helping our neighbours to detect and contain infectious disease threats at their source also contributes strongly to protecting Australia’s own national biosecurity.

Australia’s international development assistance for pandemics and emerging infectious diseases (EIDs) is guided by the Pandemics and Emerging Infectious Diseases Framework 2010–2015. Under this framework, Australia will assist partner countries in the Asia–Pacific region to translate gains in preventing, detecting and controlling diseases such as H5N1 (avian) influenza and severe acute respiratory syndrome into stronger systems for responding to EIDs. The framework aims to support a longer term, systemic approach that strengthens the capacity of partner governments to deal with EIDs more broadly, rather than dealing with a single disease in isolation.

The framework has four objectives:

• promoting adherence to international standards of animal and human health
• strengthening systems for preventing, detecting and controlling EIDs, particularly at the community level
• responding to outbreaks of EIDs when they occur
• building an evidence base for the response to EIDs.

In line with the framework, AusAID supports partner governments to build their surveillance systems and improve their ability to respond to emerging disease threats, including through better coordination between the human and animal health sectors. Animal health initiatives are highly relevant in the EID context because many devastating human diseases originate in animals. Animal disease control and capacity building, including strengthening veterinary services, can have major benefits for health security, as well as productivity at the farm level.

9.1.1 Previous contributions to pandemics and EIDs

Since 2003, Australia has played a leading role in the response to pandemics and EIDs in the region, by providing more than $200 million to assist countries to strengthen prevention, detection and response capabilities. This includes the Pandemics and Emerging Infectious Diseases Initiative (2006–10), under which Australia contributed $100 million to partner governments, nongovernment organisations, and regional and multilateral institutions to strengthen EID capacity and response. Assistance provided under this initiative significantly improved countries’ capacity to respond to pandemics and EIDs, including through the development of national pandemic preparedness plans; strengthening of systems for early

107 www.ausaid.gov.au
108 www.aciar.gov.au
detection, surveillance, prevention and control of avian and human influenza; and stockpiling of antiviral medication and personal protection equipment.

Activities that Australia has contributed to include:

- the World Bank Multi-Donor Avian and Human Influenza Trust Fund, to assist the east Asia, Pacific and Africa regions
- an OIE project to strengthen veterinary services to combat avian influenza and other priority diseases in Southeast Asia, including regional veterinary laboratory networking
- a program to strengthen community capacities in prevention, surveillance and response to highly pathogenic avian influenza in Cambodia, Laos, Burma and Vietnam
- the Secretariat of the Pacific Community Regional Influenza Pandemic Preparedness Project, to help build the capacity of Pacific island countries and territories to prepare for, and respond to, pandemics
- a biosecurity strengthening project in Timor-Leste, implemented by the Timor-Leste Ministry of Agriculture and Fisheries and the FAO, to improve preparedness, prevention and response to avian influenza
- research on EIDs — Australia is partnering with Canada’s International Development Research Centre to increase local capacity to conduct research on EIDs in Southeast Asia using an ecohealth approach, which encourages positive environmental action that will improve both health and welfare at the community level.109

9.1.2 Current commitments to pandemics and EIDs

In October 2010, the Prime Minister announced that Australia would provide $32 million to help combat pandemics and EIDs in the Asia–Pacific region. This commitment is guided by the Pandemics and Emerging Infectious Diseases Framework 2010–2015, and includes:

- $12 million to WHO to assist countries in the Asia–Pacific region to build better laboratories, develop national pandemic preparedness plans and implement innovative surveillance systems, under the WHO Asia Pacific Strategy for Emerging Diseases (2010)
- $12.7 million to the OIE to strengthen veterinary services and to better manage animal-borne diseases in the region, under the Stop Transboundary Animal Diseases and Zoonoses initiative.

Current AusAID projects that include animal health activities are described below.

**Stop Transboundary Animal Diseases and Zoonoses**

The AusAID-funded Stop Transboundary Animal Diseases and Zoonoses (STANDZ) initiative in Southeast Asia (2011–15) was launched in September 2011 and is being implemented by the OIE. Its overarching goal is to reduce the impact of EIDs on food security, public health and livelihoods in Southeast Asia. This will be achieved by strengthening the capacity of animal health sectors in Southeast Asian countries to prevent, control and eradicate priority transboundary animal diseases and zoonoses.

The four objectives of STANDZ are to:

- support regional and international coordination on animal health in Southeast Asia
- strengthen the capacity of national veterinary services, consistent with OIE tools and standards
- develop, better resource and implement priority animal disease management strategies; this includes providing more intensive in-country support to the Southeast Asia and China Foot-and-Mouth Disease program (SEACFMD), consistent with the revised 2020 roadmap for the program
- strengthen the capacity of the OIE Sub-Regional Representation in Southeast Asia in priority areas of gender/social mainstreaming, monitoring and evaluation, operations research and communications.

This ambitious program of work has been designed to build a more robust animal health capacity in the region. For example, the previous Project on Strengthening Veterinary Services, which terminated in June 2010, will be replaced by the Strengthening Initiatives on Veterinary Services project. This project will continue to provide targeted support to the OIE Performance of Veterinary Services pathway in Southeast Asian countries, a staged process for strengthening national veterinary services. The pathway involves evaluation (‘diagnosis’); gap analysis (‘prescription’); a suite of ‘treatment’ options, including strategic planning, donor/agency projects, and technical support (for legislation, education, laboratories); and ‘follow-up’ evaluation (several years later) to measure progress. The process can then be started again, creating a cycle of continuous improvement.

SEACFMD activities, as set out in the revised SEACFMD 2020 roadmap, have been reframed to take into account improvements in the understanding of livestock movements, ‘hotspots’ and disease patterns in Southeast Asia, which have informed disease management options.

109 www.publicwebsite.idrc.ca/EN/Resources/Publications/Pages/ArticleDetails.aspx?PublicationID=538
Although SEACFMD has succeeded in improving regional coordination; standard setting; and political, resource and cooperation agreements between countries, efforts to improve country-level outcomes will require country-specific interventions that are consistent with agreed regional or global protocols. Given the changing socioeconomic dynamics and trade patterns in the region, there is a clear need for regular review of the evolving risk situations, with adjustments to animal health programs as necessary.

The Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) will continue to provide technical and governance support to AusAID for the STANDZ initiative.

Australia Indonesia Partnership for Emerging Infectious Diseases, Animal Health, 2010–14

In December 2010, AusAID committed an additional $22 million for the Australia Indonesia Partnership for Emerging Infectious Diseases, Animal Health, 2010–14. This four-year program builds on previous work relating to avian influenza. It focuses on strengthening the Indonesian animal health systems to meet the challenges presented by EIDs. In this context, EIDs are new diseases originating in animals with the potential to infect and spread between humans, with serious consequences for human populations — avian influenza is an example.

Program activities include disease planning and management, subnational field activities (South Sulawesi and West Sulawesi), quarantine, information management and animal health laboratories.

Improving the management of animal health in Indonesia will benefit both Indonesia and Australia by protecting animal and human health, increasing agricultural production, supporting economic development and international trade, helping to alleviate poverty and promoting regional stability.

The program will be delivered by Australian technical advisers from DAFF who are based in Jakarta and Makassar (South Sulawesi), in partnership with their animal health counterparts in the Indonesian Government.

Public Sector Linkages Program

Throughout 2011, AusAID provided funding for several projects in the Asia–Pacific region through the Public Sector Linkages Program. This flexible, short-term funding is designed to transfer needed capacity-building skills and expertise to public-sector counterpart institutions in partner countries, and strengthen public-sector bilateral and regional linkages that focus on sustainable development.
Projects included:

- a project to guide the implementation of multidisciplinary, cross-sectoral One Health approaches for dealing with emerging and zoonotic diseases in member economies of the Asia–Pacific Economic Cooperation (APEC), including
  - improving strategic planning in APEC economies through the use of foresighting and disease scanning techniques
  - finalising, in August 2011, an APEC One Health Action Plan, which provides a framework of practical measures that APEC economies can apply at community, provincial, economic, regional and global levels to improve preparedness, prevention and response capabilities

- a project in PNG to strengthen capacity to respond to significant animal disease events through development of emergency response plans

- a project in PNG to strengthen the animal surveillance and reporting network throughout provincial PNG through a series of training workshops, and systematic reporting using mobile phone technology

- a project in Timor-Leste to assist in building animal health laboratory capacity, following on from training provided by the FAO under the biosecurity strengthening project (see Section 9.1.1); a well-functioning and sustainable animal health laboratory is a key component of Timor-Leste’s progress towards a functional animal health system.

9.2 International animal health research

Australia funds international animal health research through several agencies, including ACIAR and AusAID. Since 1982, ACIAR has supported research on livestock and created partnerships in many countries in Asia, the Pacific and Africa. Research is developed, commissioned and evaluated through two programs: Animal Health and Livestock Production Systems. Research projects of between three and five years are funded to meet the research priorities of partner countries and Australia, and to have the widest possible impact. Animal health projects are linked with ongoing AusAID and DAFF programs.

9.2.1 ACIAR Animal Health program

The Animal Health program supports research organisations in Australia and partner countries to use a multidisciplinary approach to solve problems in animal production and health. The program focuses on Indonesia, Cambodia, Laos and PNG, but has increasing emphasis on regional cooperation in the Mekong countries on livestock movement and transboundary disease control. New projects are developed on the basis of disease risks to animal and human health along existing and potential market value chains. Project progress and final reports are published on the ACIAR website and other media. The program has five current subprograms, comprising the following projects, which are either in progress or under development.

Avian influenza in Indonesia

Avian influenza continues to be a major concern for poultry and human health. A cluster of projects provides some of the research required to assess risks to livestock and human health and to implement effective control programs. These include:

- epidemiology and control of avian influenza in ducks (completed in 2011)
- appropriate methods of disease surveillance for major transboundary diseases
- biosecurity in nonindustrial commercial poultry production
- surveillance of highly pathogenic avian influenza under future control or eradication scenarios.

Policies and systems for better management of animal disease in Indonesia

Important animal diseases in Indonesia include anthrax, brucellosis and rabies (which all affect humans); and avian influenza, classical swine fever and foot-and-mouth disease (which can all be spread by livestock movements). A cluster of projects is undertaking research on surveillance systems, control programs and risk analysis to support decentralised strategies to manage these diseases, including:

- improving veterinary service delivery in a decentralised Indonesia
- livestock movement and managing disease in eastern Indonesia and eastern Australia
- improving, and increasing sustainability of, sweet potato – pig production systems to support livelihoods in highland Papua and West Papua.
Improving health and production of village pigs and cattle in Lao People’s Democratic Republic

Diseases of livestock have a major impact on household income in upland Laos, and rapidly spreading viral diseases are important, given the position of Laos as a major livestock transit route. A cluster of projects is assessing the risks of livestock movement, improving diagnosis and developing control strategies in the northern provinces, including:

- understanding livestock movement and the risk of spread of transboundary animal diseases
- best-practice health and husbandry of cattle and buffalo
- improving livelihoods by developing pig-based enterprises in upland Laos (including consideration of health, production and zoonoses)
- improving resource management and marketing systems for rural livelihoods in rain-fed southern Laos (including cattle health, production and marketing).

Income generation and better nutrition through agricultural diversification in Cambodia

Domestic and regional trade in cattle is emerging as important for Cambodian agriculture. An integrated program of cattle health and production projects is focused on the constraints of disease, poor reproductive management and inadequate nutrition, including:

- best-practice cattle health and husbandry
- domestic and international market development for high-value cattle and beef in south-east Cambodia
- understanding livestock movement and the risk of spread of transboundary animal diseases
- soil fingerprinting approaches for improving biosecurity and the livestock sector in the Mekong region.

Strengthening surveillance systems to monitor and respond to livestock diseases in Papua New Guinea

Livestock and plant biosecurity is high among the agreed priorities for PNG. Veterinary services in PNG are seeking new approaches to animal health control, with few qualified personnel and poor infrastructure. Syndromic surveillance offers some opportunities to provide national data of disease outbreaks and local opportunities for disease control, leading to increased production. A single project, which also has a research component in the Torres Strait Islands, is developing animal health surveillance systems in PNG.
Regional animal health initiatives

Animal Health Australia
CHAPTER 10

RESEARCH AND DEVELOPMENT

The Commonwealth Scientific and Industrial Research Organisation, the cooperative research centres, Australia’s veterinary schools and industry-based research and development corporations participate in an active research program in livestock health.

This chapter summarises Australian research in livestock health during 2011. Individual research projects are listed in Appendix 4.
10.1 Australian Animal Health Laboratory

Research at the Australian Animal Health Laboratory (AAHL) of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) includes terrestrial and aquatic animal health, and diseases that affect both humans and animals. The research is conducted on behalf of Australia to manage the risks of exotic, emerging and new diseases. It underpins Australia’s diagnostic activities and informs decision makers on the most effective ways to manage the biosecurity risks facing Australia, including both preventive activities and responding to incursions. Lessons learnt from AAHL’s research activities are provided through published scientific papers and participation in numerous biosecurity technical committees. Projects are directed mainly towards:

- evaluating new diagnostic technologies, including developing and validating new diagnostic tests
- studying the pathogenesis of new and emerging diseases that affect animals and humans
- identifying novel markers of infection and critical control points for reducing disease transmission
- developing novel strategies for disease control, including animals with innate resistance to infectious diseases
- developing a predictive framework for infectious disease threats
- studying vector-borne disease, including characterisation of arboviruses and their vectors, insect innate immunity, vaccines and episystems.

Research activity is supported by funding from CSIRO, the Australian Government Department of Agriculture, Fisheries and Forestry, and external funding bodies. A small selection of projects undertaken during 2011 is presented in Table A4.1.

Contact: Martyn Jeggo
Director
Email: martyn.jeggo@csiro.au

10.2 Cooperative research centres

10.2.1 Cooperative Research Centre for Beef Genetic Technologies

The Cooperative Research Centre for Beef Genetic Technologies (Beef CRC) is Australia’s largest beef research initiative. It is a third-term CRC that began in July 2005 between industry and research partners from Australia, New Zealand, the United States, Canada, the Republic of Korea and Brazil. The CRC’s research focuses on beef quality, feed efficiency, adaptation, cattle welfare and reproductive performance. It uses world-class genetics and genomics research to improve the profitability, productivity, animal welfare and responsible resource use of Australian beef businesses.

The Beef CRC’s animal health research includes studies of resistance of cattle to ectoparasites and endoparasites (ticks, buffalo flies and worms), development of a vaccine to control cattle ticks, objective measurement of cattle welfare, improving female reproductive rates, and development of technologies to reduce methane emissions and improve feed use in cattle.

In 2011, Beef CRC researchers continued to collaborate with researchers from the United States and Canada to undertake genome-wide association studies. During the year, the collaborators have made good progress using Illumina’s new high-density single nucleotide polymorphism panel, which was released in late 2010. Using this technology, the CRC has developed prediction equations for target productive and adaptive traits and tested them in independent cattle populations. The predictions will be refined over coming months to improve their accuracy before they are incorporated into BREEDPLAN estimated breeding values for delivery to the Australian beef industry by April 2012. They will also be offered to genomics companies operating in Australia. Delivery of the genomic prediction equations in 2012 is expected to yield an economic benefit to the Australian beef industry over the next 25 years of $924 million – $1.48 billion, depending on the final accuracies achieved (i.e. an annual benefit, discounted at 7%, of $82–137 million).

Good progress was also made during 2011 in identifying candidate antigens that could be included in a new cattle tick vaccine for the beef and dairy cattle industries. Animal trials of the CRC’s tick vaccine candidates have identified vaccine constructs that provide strong protection against cattle tick challenge. Current animal trials are testing each of the candidates separately, in anticipation of lodging a provisional patent application in early 2012. However, even if the animal trials are successful, several more years of research and registration trials will be required to achieve a commercial tick vaccine product.

Current projects are listed in Table A4.2.

Contact: Dr Heather Burrow
Chief Executive Officer
Email: Heather.Burrow@une.edu.au
10.2.2 Cooperative Research Centre for High Integrity Australian Pork

The overall objective of the health program of the Cooperative Research Centre (CRC) for an Internationally Competitive Pork Industry was to reduce the impact of disease on the efficiency of pork production. It aimed to achieve this by improving pig survival and growth performance through other strategies and less reliance on antibiotics, and to reduce medication and veterinary costs.

The CRC for an Internationally Competitive Pork Industry finished operation in July 2011 and has been replaced by the CRC for High Integrity Australian Pork (Pork CRC). The new Pork CRC also has a program directed at improving animal health and reducing antibiotic use in the industry.

The Australian pork industry does not suffer from the more devastating diseases — such as porcine reproductive and respiratory syndrome, and postweaning multisystemic wasting syndrome — that affect Asia, North and South America, and most of Europe. Despite these advantages, disease is a major factor constraining the productivity and profitability of the Australian pork industry.

The Pork CRC has invested in projects across Australia to develop cost-effective diagnostics and control strategies for the major diseases affecting the Australian pork industry. These include swine dysentery, Glasser’s disease (*Haemophilus parasuis*), ileitis (*Lawsonia intracellularis*), *Actinobacillus pleuropneumoniae* and *Escherichia coli*—related diarrhea.

In 2011, Pork CRC researchers from Trade & Investment NSW developed a quantitative polymerase chain reaction (PCR) test for *L. intracellularis* (which causes ileitis) and are in the final stages of developing a pen-side test for the same organism (Project 2C 109). The quantitative PCR test is 97% specific and 99% sensitive; it is capable of detecting subclinical infection in one infected pig in a pool of 10. Future research will concentrate on determining the critical threshold of *L. intracellularis* that leads to productivity losses and quantifying these losses. Other researchers from the same organisation have developed probiotics against *E. coli* and investigated two new products under field conditions (Project 2C 105). Researchers from the University of South Australia are investigating the use of bacteriophages and related technologies to control *E. coli* (Project 2C 110).

Pork CRC research projects are listed in Table A4.3. Research summaries and full research reports are available on the Pork CRC website.110

Contact: CRC for High Integrity Australian Pork
Email: roger.campbell@porkcrc.com.au

110 www.porkcrc.com.au

10.2.3 Cooperative Research Centre for Sheep Industry Innovation

The parasite project of the Cooperative Research Centre for Sheep Industry Innovation (Sheep CRC) focuses on developing and communicating efficient and sustainable management recommendations for internal and external parasites.

Field trials in several states are being used to develop recommendations that will be communicated through a variety of channels. Researchers at the University of New England (New South Wales) have developed an integrated parasite management program, chiefly for control of *Haemonchus contortus*, based on pasture preparation to minimise worm larval intake by sheep, and a ‘drench decision aid’ to indicate whether some flocks could be left untreated when others are treated (by drenching). This has been successfully used in a series of ‘WormBoss’ workshops for sheep producers.

In Western Australia and South Australia, investigations by the Department of Agriculture and Food WA and the South Australian Research and Development Institute have centred on the ‘targeted treatment’ concept, which involves not treating some animals in a flock while others identified as likely to benefit from parasite removal are treated, thereby reducing both development of anthelmintic resistance and treatment costs. This concept, which is still being confirmed, will underpin worm-control workshops for producers.

A second research area concerns better genetic solutions to parasite management, including genetic correlations with resistance to worm infection, and breeding values for breech wrinkle and cover, using the CRC’s Information Nucleus Flocks at locations in a range of environments.

The Sheep CRC has a strong focus on communication for parasite management, which will be integrated into a national management program (‘ParaBoss’). This program will provide technical management and promotion for the ‘Boss’ websites for parasite-specific control information (WormBoss, FlyBoss and LiceBoss), and coordinate active extension efforts. Extension activities include an ongoing series of flystrike control workshops (‘Managing Flystrike’), which have been conducted in all states over the past two years.

The parasite project includes a number of CRC-funded postgraduate students who are attached to various research activities.

Current projects are listed in Table A4.4.

Contact: CRC for Sheep Industry Innovation
Email: sheepcrc@sheepcrc.org.au
10.2.4 Dairy Futures Cooperative Research Centre

The Dairy Futures Cooperative Research Centre is an extension of existing investments in pasture and animal-based biotechnology applications. It takes the best opportunities from the past 7–10 years of investment and seeks to develop the core elements of each to provide benefits for the dairy industry. Two programs — Designer Forages and Animal Improvement — are developing new on-farm innovations, with the following aims:

- **Program 1: Designer Forages**
  - Deliver a range of plant-breeding technology — both genetic manipulation and nongenetic manipulation — for ryegrass and white clover, to provide benefits in nutritive quality, disease resistance, drought tolerance and the use of novel endophytes.
  - Construct commercial models of cultivar development that can smoothly integrate the new technology.
  - Expand the range of target plant species to include species that are capable of thriving in warmer and drier conditions. Ryegrass technology will be extended into warm-season grasses, and white clover technology will be extended into lucerne.

- **Program 2: Animal Improvement**
  - Complete the commercialisation process for the use of genomic selection in animal breeding. The initial product is expected to be a significant improvement in the selection of young sires, although the technology has not yet been proven under Australian conditions.
  - Construct an ambitious and collaborative program of work to increase the reliability of genomic products, for both elite sires and commercial cows.
  - Use genomic selection to drive progress with difficult traits such as fertility and longevity, and to assess new traits such as feed-conversion efficiency.
  - Expand the value of animal breeding through the production of sex-selected semen. A range of new approaches will be considered, including stem cell technology.

Contact: Dairy Futures Cooperative Research Centre
Email: enquiries@dairyfuturescrc.com.au

10.2.5 Poultry Cooperative Research Centre

The key challenge for the Poultry Cooperative Research Centre (Poultry CRC) is to achieve sustainable, ethical poultry production using fewer resources with reduced environmental impacts. In late 2009, the Poultry CRC secured an extension of funding from the Australian Government, including a $27 million cash grant, giving it resources totalling nearly $87 million to 2017.

The Poultry CRC, a joint venture between seven ‘essential participants’, has its headquarters at the University of New England in Armidale, New South Wales. The CRC has an extensive collaborative network comprising researchers, educators and support staff from 33 participating organisations.

Three programs, with integrated research, development and education components, address the major challenge of meeting increasing demand for ‘clean and green’ poultry products while maintaining food security in the face of climate change and a growing population:

- **Program 1, Health & Welfare**, uses frontier science to deliver poultry health products and evidence-based welfare methodology to industry.
- **Program 2, Nutrition & Environment**, will undertake research to link the fundamental aspects of feeding to environmental outcomes.
- **Program 3, Safe & Quality Food Production**, aims to control foodborne illness associated with poultry products.

Twenty-four research projects progressed during 2011, in collaboration with 10 participating research organisations in New South Wales, Queensland, Victoria, South Australia and Ohio (United States). Most of these research projects have two or more collaborators, including many industry participants, with a clear focus on delivering frontier science that has practical applications. These projects have started to address approximately 80% of the milestones agreed between the CRC and the Australian Government.
The Poultry CRC’s education program is progressing well. In October of each year, the CRC’s postgraduate students and postdoctoral researchers attend a workshop, followed by industry visits to breeding farms and a hatchery. These events are vital to forming strong links between current and future researchers and industry, to keep research relevant and end-user focused.

Strong demand for the CRC’s teaching materials for schools has continued, and new information is now accessible from the website to help schools with keeping poultry. In addition, the CRC’s internship program has been very successful, with some of the first round of interns finding employment in the industry.

Information about the CRC’s progress is available from the website and by subscribing to the ‘eChook’ newsletter. Current projects are listed in Table A4.5.

Contact: Poultry CRC
Email: info@poultrycrc.com.au

10.3 University research programs

10.3.1 Charles Sturt University

Charles Sturt University has an ongoing commitment to rural Australia and its livestock industries. The first students in the new veterinary degree program and the new program in animal science graduated in 2010. Student numbers in Masters and PhD degrees continue to increase.

To support these programs, the School of Animal and Veterinary Sciences has attracted academic staff with research interests in animal health across a range of species and disciplines. Since many of the staff are in the early stages of their careers, the school offers research training, with a focus on large-production animal research, especially within sustainable production systems. The school is developing novel approaches to curriculum delivery to ensure that graduates benefit from leading-edge pedagogy, informed by research.

The School of Animal and Veterinary Sciences has a deliberate international focus, with collaborations in many countries, including Pakistan, India and China. These linkages allow Charles Sturt University to offer exciting PhD training opportunities to international students from diverse countries.

The major research groupings are animal physiology, reproduction and genetics; parasitology, infectious diseases and animal health; animal welfare, nutrition and production; clinical sciences; and research in teaching.

Table A4.6 lists the animal health research projects at Charles Sturt University.

Contact: Professor Peter Wynn
School of Animal and Veterinary Sciences
Email: pwynn@csu.edu.au

10.3.2 James Cook University

The School of Veterinary and Biomedical Sciences at James Cook University has a long and proud history of active research and international project management, first as a graduate veterinary school and, in the past 10 years, as an undergraduate biomedical and veterinary science teaching facility.

With a growing academic cohort, the school has an evolving research profile, including both human and animal health, as well as a keen focus on zoonotic disease and biosecurity.

The school’s research strengths are currently concentrated in tropical animal diseases, tropical cattle production, tropical infectious disease and immunopathogenesis, aquatic pathobiology, environmental and public health microbiology, reproductive physiology, comparative cardiorespiratory physiology, neuropathology, and emerging infectious diseases of wildlife.

The School of Veterinary and Biomedical Sciences has a close association with the School of Medicine and Dentistry, and the School of Public Health and Tropical Medicine and Rehabilitation Sciences, facilitating a One Health approach to research activities.

Table A4.7 lists the livestock and wildlife health research projects of the School of Veterinary and Biomedical Sciences.

Contact: Dr Graham Burgess
Reader, Veterinary Microbiology and Immunology
Email: graham.burgess@jcu.edu.au

10.3.3 Murdoch University

The School of Veterinary and Biomedical Sciences at Murdoch University gives research a high priority, to complement its programs in veterinary, biomedical and animal sciences. Research covers the full spectrum of animal health, animal production and public health, and involves more than 160 postgraduate and honours students.

Research areas of particular strength include:

- animal production and animal health
- animal biosecurity and public health
- biomolecular control of disease
• aquatic animal health
• wildlife and conservation medicine
• companion animal health.

Researchers are active in projects to improve production, health and welfare in the sheep, cattle, pig and poultry industries. Areas of research include meat quality, efficiency of production, biomolecular approaches to the control of disease, practical approaches to developing indicators for animal welfare, and the live export industry (see Table A4.8). Of particular interest are the growing areas of animal biosecurity, public health and animal welfare.

More information can be found on the website of the School of Veterinary and Biomedical Sciences. Contact: Professor David Hampson Email: d.hampson@murdoch.edu.au

10.3.4 University of Adelaide

The School of Animal and Veterinary Sciences at the University of Adelaide began taking veterinary students in early 2008. The school provides an outstanding environment for research, with high-quality infrastructure and access to a variety of industry and research facilities. Staff members are internationally recognised for their contributions to scientific and veterinary research.

The school is involved in a number of cooperative research centres and also has well-established links with partner organisations that add considerably to the research opportunities available. These organisations include the South Australian Research and Development Institute, the Department of Primary Industries and Resources South Australia, the Pig and Poultry Production Institute, and Martindale Holdings. In addition, the school is building partnerships with ZooSA, TAFE SA, and the Institute of Medical and Veterinary Science.

The research interests of the school include animal production and genetics, nutrition, wildlife ecology, laboratory animal science, animal welfare, musculoskeletal biology, epidemiology, physiology and anatomy. The research profile has expanded over the past two years, with key appointments in veterinary microbiology, virology, parasitology, toxicology, immunology and pharmacology, as well as the clinical disciplines.

Table A4.9 lists the current research projects of the School of Animal and Veterinary Sciences.

Contact: Professor Michael Reichel Email: michael.reichel@adelaide.edu.au

10.3.5 University of Melbourne

The Faculty of Veterinary Science at the University of Melbourne has research strengths in the diagnosis, prevention and control of infectious disease; morphology and cell biology; animal biotechnology; animal production systems and reproduction; and clinical studies. The faculty has a particular interest in:
• developing new vaccines, approaches to control and diagnostic methods for infectious diseases
• understanding the genomics and genetics of viruses, prokaryotes, protists and parasitic worms
• understanding the roles of the extracellular matrix in bone and joint pathology, and the role of protease-activated receptors in musculoskeletal development and inflammatory disease
• developing new approaches to DNA (deoxyribonucleic acid) vaccination
• developing animal models of asthma
• understanding the effects of biomaterials on wound healing and how biomaterials are affected by the body
• improving sheep farm profitability and reducing production risk
• assessing and improving production animal welfare
• understanding the epidemiology of mastitis in sheep and cattle
• understanding the pharmacology of vasoactive agents and the pathophysiology of laminitis
• wildlife disease surveillance.

Table A4.10 lists the faculty’s research projects relating to animal health.

Contact: Professor Glenn F Browning Associate Dean for Research and Research Training Email: glenfb@unimelb.edu.au

10.3.6 University of Sydney

The Faculty of Veterinary Science, University of Sydney, has an international research profile and continues to have outstanding success in attracting competitive research grants. It has strong links to veterinary and animal health professional bodies, public health authorities, prestigious national cooperative research centres, and industry-based research and development corporations. The faculty’s research strengths are concentrated in the following areas:
• animal production systems
• infectious diseases
• veterinary public health and epidemiology
• veterinary pathology
• comparative genomics
• reproduction and genetics
• companion animal health and behaviour
• animal welfare science
• wildlife health and conservation biology
• equine medicine and performance sciences.

Table A4.11 lists the faculty’s animal health research projects that were active in 2011.

Contact: Associate Professor Peter Williamson
Associate Dean Research
Email: p.williamson@sydney.edu.au

10.4 Research and development corporations

10.4.1 Australian Egg Corporation Limited

The Australian Egg Corporation Limited (AECL) is a public, nonlisted company limited by guarantee and established under the Egg Industry Service Provision Act 2002. The company provides on-farm, through-chain and market services for its stakeholders, including egg producers. AECL is funded mainly through statutory promotional and research and development (R&D) levies received from all egg producers, which are collected under the Act, and through Australian Government funds for R&D activities in agreed program areas, including animal health.

The egg industry has experienced incursions of exotic or emergency animal diseases, with devastating consequences for egg producers through a loss in egg production and a decline in consumer confidence. Minimising disease outbreaks and managing adverse public opinion are both essential to the ongoing sustainability of Australia’s egg industry. This includes ensuring effective levels of on-farm biosecurity, developing industry’s understanding of disease characteristics, and developing vaccines that are readily available.

AECL invests in a number of projects and activities that have a direct impact on the health of the laying flock, including:
• ensuring effective levels of quarantine and biosecurity on-farm
• preventing and mitigating outbreaks of diseases such as Newcastle disease, infectious bursal disease, egg drop syndrome and avian influenza
• ensuring the availability of effective vaccines and medicines
• managing rapid diagnosis of hen health problems
• ensuring that disease research, which acts as an industry ‘insurance policy’, is conducted.

This has been achieved through AECL’s direct investment with research institutions, including as a major contributor and core participant in the Poultry CRC (see Section 10.2.5).

Current projects are listed in Table A4.12.

Contact: James Kellaway
Managing Director
Email: James@aecl.org

10.4.2 Australian Wool Innovation Limited

The mission of Australian Wool Innovation Limited is to invest in research, development, marketing and promotion to:
• improve the profitability, international competitiveness and sustainability of the Australian wool industry
• increase demand and market access for Australian wool.

Australian Wool Innovation Limited’s vision is to be a significant contributor to a vibrant, stable and profitable wool industry, providing the world with the best natural fibre.

The 2011 calendar year was covered by two operational plans (2010–11 and 2011–12), which focus on:
• fostering sustainable, profitable and ethical animal care and wool production through
  – reduced impacts of illness, infestation and predation on productivity and/or welfare
  – productivity gains through improved sheep resilience, reproduction and/or fleece production
  – provenance and welfare credentials to protect market access and increase demand for wool
  – improved industry reputation for ethical, sustainable and responsible animal care
  – labour and production efficiencies in clip harvesting and preparation
  – reduced incidence and impacts of clip contamination
  – improved industry reputation for wool clip quality
• fostering sustainable, profitable and ethical land and resource management through
  – productivity gains through optimal land and resource management
  – increased resilience and adaptability to climate change
  – productivity gains through advances in carbon sequestration and global greenhouse gas mitigation
– provenance and ecological credentials to protect market access, support participation in carbon trading markets and increase demand for wool
– improved industry reputation for ethical, responsible and sustainable land and resource management
• fostering industry resilience, confidence and growth through
  – increased participation, use, adoption and retention rates
  – increased wool grower resilience, pride and confidence
  – integrated communication strategy with stakeholders and the marketplace
  – improved industry reputation for productivity, profitability, and responsible land and animal custodianship.

Table A4.13 lists current research projects.

Contact: Jane Littlejohn
On Farm RDE Team Lead
Email: jane.littlejohn@wool.com

10.4.3 Dairy Australia

Dairy Australia is the dairy industry’s service company. It is committed to supporting the current high levels of animal health and welfare on Australian dairy farms. Australia is fortunate in having few diseases of importance affecting its dairy herds; most diseases that do occur are relatively well understood.

Animal health and welfare is essential for the efficient and productive operations of dairy farms, and good outcomes help to maintain the excellent reputation of the industry and dairy products. Industry investment in research, development and extension has focused on projects for prevention and control of cattle diseases, genetic improvement, improved nutrition, and improved animal handling and husbandry practices. Priorities for the dairy industry are the integration of biosecurity measures into whole-farm management, and improved calf management.

Research projects — both national and regionally based — provide information for dairy farmers and their advisers to prevent disease, achieve good animal welfare outcomes, and establish appropriate animal management systems and practices. Countdown Downunder is Australia’s national extension program for prevention, diagnosis and treatment of mastitis; the InCalf project focuses on improving reproductive performance; and BJD Aware promotes strategies to manage and control bovine Johne’s disease. CowTime, which has a focus on milk harvesting, delivers extension on ways to reduce stress for cows at milking, including principles of stock handling, dairy design and cow behaviour.

Building on the successful control of enzootic bovine leucosis (EBL) in dairy cattle, the Australian Dairy Industry Council and animal health authorities implemented a national program to eradicate EBL from the Australian dairy herd. Provisional freedom from EBL was achieved in December 2009, and the second annual monitoring was completed in 2011, with negative results.

To improve the skills of dairy farmers and their employees, Dairy Australia has established the National Centre of Dairy Education Australia to develop and deliver vocational education and training for the dairy industry. The animal health and welfare content of the training is regularly revised and updated.

Dairy industry research projects are listed in Table A4.14.

Contact: Dr Robin Condron
Email: RCondron@dairyaustralia.com.au

10.4.4 Fisheries Research and Development Corporation — Aquatic Animal Health Subprogram

The Fisheries Research and Development Corporation invests in areas of R&D that aim to benefit all sectors of Australian fisheries — the commercial sector (wild catch, aquaculture and post-harvest), the recreational sector and the Indigenous sector. The Fisheries Research and Development Corporation’s Aquatic Animal Health Subprogram was established specifically to develop, support and manage a portfolio of aquatic animal health research projects, in consultation with the fisheries and aquaculture industry. The focus of the Aquatic Animal Health Subprogram is infectious (viral, bacterial, fungal and parasitic) diseases of finfish, crustaceans and molluscs.

Australian aquaculture continues to grow and currently contributes close to 40% ($870 million) of Australian fisheries’ gross value of production ($2179 million). Although aquaculture is an important industry sector, R&D for aquatic animal health is required for all aquatic animal sectors, including the wild-catch, recreational and ornamental sectors, as well as noncommercial finfish, mollusc and crustacean (wildlife) stocks. The requirement for expert health services and advice, and therefore R&D activities, continues to increase. These are essential for the profitability, productivity and sustainability of Australia’s aquatic animal industries, and to protect Australia’s natural resources.
The Aquatic Animal Health Subprogram R&D Plan underwent a major review in 2011. Six key research areas remain:

- nature of disease and host–pathogen interaction
- aquatic animal health management
- diagnostics for endemic and exotic aquatic animal disease
- surveillance and monitoring
- aquatic animal disease therapy and prophylaxis
- training and capacity building.

More information can be found on the subprogram website, and the revised Aquatic Animal Health Subprogram R&D Plan can be obtained by contacting the subprogram leader. Table A4.15 lists current research projects.

Contact: Dr Mark Crane
Subprogram Leader
Email: mark.crane@csiro.au

10.4.5 Meat & Livestock Australia

Meat & Livestock Australia (MLA) invests in animal health research to improve the profitability and sustainability of the beef cattle, sheep and goat industries in Australia. MLA has invested in research into:

- Johne’s disease (ovine and bovine)
- gastrointestinal nematodes of sheep
- respiratory disease in feedlot cattle
- infectious causes of reproductive wastage in cattle
- bovine ephemeral fever
- toxic plants
- internal and external parasites in cattle
- emerging diseases such as Theileria orientalis
- wild dog, feral pig and rabbit control
- control of scouring in sheep and young calves.

MLA also invests in research that will improve disease surveillance to demonstrate freedom from disease and improve biosecurity. This includes better tools for screw-worm fly diagnosis, bluetongue diagnosis and vector distribution, response to foot-and-mouth disease, and capripox diagnosis.

Table A4.16 lists MLA’s livestock health research projects.

Contact: Scott Hansen
Managing Director
Email: shansen@mla.com.au

10.4.6 Rural Industries Research and Development Corporation

The Rural Industries Research and Development Corporation (RIRDC) works with industry and government to deliver knowledge that fosters sustainable, productive and profitable new and existing rural industries, and increases understanding of national rural issues through research, development and extension activities.

Most projects relating to animal health fall within RIRDC’s Chicken Meat, Honeybee, Horse, and New Animal Products programs.

In 2011, a substantial number of reports from completed projects relating to animal health were published. These can be accessed on the RIRDC website, together with detailed reports of projects in progress.

RIRDC animal health–related projects in 2011 are listed in Table A4.17.

Contact: Anwen Lovett
Executive Manager
Email: Anwen.Lovett@rirdc.gov.au
Livestock industries in Australia

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Livestock industries in Australia

Australia is a major producer and exporter of livestock, livestock products and genetic material. Animal production in Australia is based largely on extensive grazing and is dominated by the beef, dairy, wool and sheepmeat industries. Australia also has smaller intensive pig and poultry industries. Trends in livestock numbers are shown in Table A1.1.

Livestock industries, in one form or another, are located across most agricultural and pastoral areas of Australia.

In 2010–11, the gross value of Australian livestock and livestock products was estimated to be $21.1 billion. Exports of livestock and livestock products were estimated to be worth $14.8 billion.

Meat and other products

Australia has a highly developed meat industry and is a major producer of meat and meat products. In 2010–11, the value of Australian livestock slaughtering was estimated to be $12.7 billion.

Australia is the world’s second largest exporter of beef, veal and sheepmeat. In 2010–11, Australian meat exports (not including live animals) were estimated to be worth $5.9 billion. Selected production statistics are shown in Table A1.2.

112 All figures provided in the tables in this appendix are based on Australian financial years, which run from 1 July to 30 June.
Table A1.2 Volume of Australian meat exports (kilotones shipped weight), 2007–11

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<tr>
<td>Beef and veal</td>
<td>930</td>
<td>968</td>
<td>899</td>
<td>937</td>
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<tr>
<td>Mutton</td>
<td>158</td>
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<td>111</td>
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<td>Lamb</td>
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Australia also produces and exports smaller quantities of meat from goats, kangaroos, emus, ostriches, deer, wild boars, possums, crocodiles and camels. It exports substantial quantities of animal products, such as wool, hides, skins, rendered meals and animal food.

Sheepmeat and wool

Sheep are used to produce meat and wool over a wide range of environments in Australia, from the arid and semi-arid inland to the higher rainfall areas of south-eastern Australia (Figure A1.1). Most Australian sheep are produced as part of mixed-farming enterprises, frequently along with cropping and beef production.

In 2010–11, sheep numbers increased by 10% to 74.3 million, reversing a long-term downward trend. Favourable seasonal conditions in early 2010–11, combined with improved returns for wool production and strong lamb prices, resulted in strong restocking activity.

Over the past decade, there has been a decreasing emphasis on wool production. A long-term decline in the demand for raw wool and competition from other fibres, coupled with growing demand for Australian lamb exports by the United States, Europe and Asia, led to a greater emphasis on prime lamb production. This resulted in a steady decline in flock numbers, as significant numbers of wethers (nonbreeding adult sheep), previously used in wool production, were turned off. Farming of specialty meat breeds, such as Dorper and Damara (which do not produce any harvestable wool) is a small but growing sector.

Total wool production increased by 2% in 2010–11 to approximately 429 100 tonnes, the first turnaround in production since 2005–06. Wool cut per head is estimated to have increased in 2010–11, reflecting improved seasonal conditions in the sheep-growing areas of eastern Australia. Total wool exports increased by 4% to 443 500 tonnes in greasy equivalents. Production figures for the wool and sheepmeat industries are shown in Table A1.3.

Figure A1.1 Sheep distribution by state and territory, 30 June 2011


Livestock industries in Australia

Beef cattle

Cattle are raised over much of Australia (see Figure A1.2). Across northern Australia, cattle are produced on large cattle holdings, where they graze native pastures at low stocking rates. **Bos indicus** breeds dominate because they are better adapted to the tropical conditions in the north. The main outputs are beef, animals for lot feeding and live cattle exports.

In southern Australia, cattle are produced on smaller holdings and graze largely on improved pastures. Breeds derived from **Bos taurus** dominate, and smaller, younger animals are produced than in the north, principally for the domestic market.

Improved seasonal conditions in south-eastern and northern Australia during most of 2010 reduced cattle turnover. The improved conditions contributed to an increase of 1,200,000 animals (beef and dairy cattle) in the national herd in 2010–11, to 28.8 million.

Australian beef exports increased by 4% in 2010–11 to 937,300 tonnes. The value of these exports increased by more than 9% to approximately $4.3 billion. Live cattle exports (for slaughter) decreased by 16% in 2010–11 to 728,232 animals (Table A1.4).

Pigs

The number of pigs slaughtered increased by 2% in 2010–11 from 4.56 to 4.6 million. Pigmeat production increased by 3% to 342 kilotonnes, while export volumes of Australian pigmeat also increased by 3%, to 31 kilotonnes (shipped weight). Annual export volumes now account for approximately 15% of total Australian pigmeat production (Table A1.5).

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**Table A1.3 Australian sheep production, 2009–11**

<table>
<thead>
<tr>
<th>Sheep production</th>
<th>2009–10</th>
<th>2010–11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep numbers (millions)</td>
<td>68.1</td>
<td>74.3</td>
</tr>
<tr>
<td>Sheep slaughterings (millions)</td>
<td>7.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Lamb slaughterings (millions)</td>
<td>19.5</td>
<td>17.9</td>
</tr>
<tr>
<td>Total wool production (kilotonnes)</td>
<td>422.5</td>
<td>429.1</td>
</tr>
<tr>
<td>Mutton production (kilotonnes, cw)</td>
<td>161.8</td>
<td>123.2</td>
</tr>
<tr>
<td>Lamb production (kilotonnes, cw)</td>
<td>412.5</td>
<td>391.3</td>
</tr>
<tr>
<td>Sheepmeat exports (kilotonnes, sw)</td>
<td>267.9</td>
<td>243.7</td>
</tr>
<tr>
<td>Value of sheepmeat exports ($ million)</td>
<td>1348.4</td>
<td>1429.4</td>
</tr>
<tr>
<td>Live sheep exports (millions)</td>
<td>3.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Value of wool exports ($ million)</td>
<td>2306.0</td>
<td>3047.9</td>
</tr>
</tbody>
</table>

* cw = carcase weight; sw = shipped weight


**Figure A1.2 Beef cattle distribution by state and territory, 30 June 2011**

**Poultry meat and eggs**

Poultry farming in Australia is an intensive industry, producing birds for meat and egg production. The poultry industry has grown over recent years, resulting in lower retail poultry prices. Meat chickens comprise approximately 79% of the flock, followed by layer hens at 13%. The chicken meat industry is dominated by two large companies and several medium-sized operators. Most operations are located within 50 kilometres of capital cities.
In 2009–10, there were approximately 3600 businesses, producing more than 254 million dozen eggs for human consumption. Approximately 95% of eggs are produced under intensive production systems, with the balance from free-range and other systems.

The value of egg production increased by 30% in 2010–11 to $554.7 million (Table A1.6).

**Goats**

Australia is the world’s largest exporter of goat meat, despite the small size of the Australian goat meat industry. The industry is steadily growing, based on exports of live goats and goat meat. The domestic market for goat meat is small but growing, due to an influx of migrants who are familiar with the product. In 2010–11, 1.82 million goats were slaughtered, supporting meat exports of 26 686 tonnes, valued at $124.5 million. The two largest markets were the United States and Chinese Taipei, accounting for 57% and 15%, respectively, of total Australian goat meat exports in 2010–11. In addition, 68 300 live goats, with an estimated value of $9.7 million, were exported to markets in Malaysia (85% of total exports), Singapore (13%) and Brunei (0.8%).

Australia also has niche goat industries producing goat milk, angora, cashmere and mohair. The total value of these industries was estimated to be approximately $2 million in 2010–11.
Game and other livestock industries

Australia is renowned for producing high-quality game meats from animals grazed on the country’s extensive native grasslands. Game products include venison, kangaroo and buffalo.

Venison

In 2008–09, there were 440 deer farms in Australia, carrying a total of 47,077 animals. Deer farms are located throughout Australia, but production is concentrated in Victoria, South Australia, New South Wales and Tasmania. In 2010–11, the industry had an estimated gross value of production of $1.84 million, including the value of production of meat and antler velvet. The number of deer processed in 2010–11 was 6,888, down from almost 51,000 in the early 2000s. The price paid to farmers for venison in 2010–11 averaged approximately $3.80 per kilogram (hot carcase weight). Venison prices have been increasing in recent years in response to lower production in Australia and also in New Zealand, the world’s largest producer of venison.

Kangaroo

The gross value of production of the kangaroo industry in 2010–11 was $18.3 million, down from a peak of $55 million in 2005–06. The decline is due to an extended period of drought and recent market access problems with the Russian Federation. In 2010–11, approximately 1.24 million kangaroos were harvested, yielding more than 11,000 tonnes of meat for human consumption and pet food.

The value of kangaroo meat exports in 2010–11 was $12.5 million, down from a peak of nearly $48 million in 2006–07. In the past, more than 70% of kangaroo meat exports were shipped to the Russian Federation, but market access issues have reduced this share to almost zero since 2008–09. The major export destinations for kangaroo meat in 2010–11 were South Africa (26% of total exports), Germany (24%), Papua New Guinea (18%), Belgium (10%) and the Netherlands (7%).

Buffalo

In 2008–09, there were 64 buffalo farms in Australia, carrying 8,551 buffalo. In addition, there was a feral population of about 60,000 animals. The gross value of production of the buffalo industry in 2010–11 was just under $2 million, mainly from live exports from the Northern Territory. Live exports decreased to 2,166 animals in 2010–11, down from 3,741 in 2009–10 and a peak of 6,564 in 2006–07. The price received by farmers was $728 per animal, compared with an average of $760 per animal over the previous four years. The main markets in the past five years have been Indonesia and Malaysia.

In 2010–11, 236 buffalo were slaughtered, compared with the peak of 1,896 in 2002–03. Exports of buffalo meat are close to zero, as the Northern Territory now has no export abattoirs.

Australia has three commercial dairy buffalo herds. Production from one farm is increasing, with buffalo cheeses now widely distributed in Australia.

Dairy

The dairy industry is the third largest rural industry in Australia by value of production. Victoria has 64% of the national dairy cattle herd, followed by New South Wales (13%) and Queensland (6%). Most dairy farms are family owned and operated.

The Australian dairy herd has declined by approximately one-quarter since 2000, reaching 1.60 million animals in 2011 (Table A1.7). Although dairy cow numbers have decreased in all states, the largest fall has occurred in Victoria, mainly due to the effects of the continuing drought in the irrigation-dependent dairying areas of northern Victoria. With a significant improvement in seasonal conditions and increased availability of irrigation water in 2010–11, production prospects have improved.

Australian milk production increased from approximately 9023 million litres in 2009–10 to approximately 9102 million litres in 2010–11. With an improvement in farm-gate prices for milk, the gross value of milk production increased by 17% to $3932 million in 2010–11.

In 2010–11, Australia exported dairy products worth $2.35 billion to 122 countries (Table A1.8).
Fisheries and aquaculture

Australia has diverse wild-catch and aquaculture fisheries that produce both native and introduced species. In 2009–10, the estimated gross value of fisheries production was approximately $2.2 billion. The value and volume of fisheries production for 2009–11 are shown in Table A1.9.

Farmed Australia-wide aquaculture production includes many major species, such as tuna, salmon, barramundi, abalone and oysters. It is an important component of Australian fisheries production. Between 1996–97 and 2009–10, aquaculture’s share of the total value of Australian fisheries production grew from 21% to 40%. The volume of aquaculture production in Australia rose by 4.9% in 2009–10, to approximately 73 542 tonnes. In contrast, the value of production experienced only a sluggish increase of 0.4%, to $870 million.

Fisheries for the volume of production and gross value of aquaculture harvests in 2009–10 are shown in Table A1.10.

Exports of Australian edible fisheries products, shown in Table A1.11, were worth $1 billion in 2010–11.

Bees

Australia has approximately 9000 registered beekeepers, but most honey is produced by a relatively small number of businesses. According to industry estimates, approximately 60% of total honey production is by businesses operating more than 500 hives. Only 16% of Australian honey production is by businesses with fewer than 250 hives.

Most honey bee operators are small, family owned and operated businesses. Many smaller operations, particularly those with fewer than 250 hives, derive most of their...
Livestock industries in Australia

income from other enterprises, investments or government sources. Larger operations (those with more than 500 hives) tend to specialise in honey production, and depend on their honey bee businesses as the sole source of income.

In 2010–11, honey production was estimated at 19 174 tonnes. The gross value of the whole industry was $65.9 million, of which $58.2 million was honey production and the remainder was beeswax, pollination services, package bees and queens. Before 2011, a small but growing sector of the industry was the export of package bees to the United States for the pollination industry. This export trade was valued at approximately $2.5 million in 2009–10. However, the United States banned imports of packaged bees from Australia in December 2010.

Further information

Further information on each of the industries may be found at the relevant industry websites (see Appendix 5 for web addresses).

Other Australian agricultural statistics and forecasts are available from the website of the Australian Bureau of Agricultural and Resource Economics and Sciences.114

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114 www.daff.gov.au/abares
APPENDIX 2

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Table A3.1 lists investigations during 2011 of suspect emergency animal diseases listed on Australia’s National List of Notifiable Diseases. This table excludes disease investigations recorded elsewhere in individual programs, such as equine infectious anaemia.
<table>
<thead>
<tr>
<th>Disease</th>
<th>Species</th>
<th>State</th>
<th>Month</th>
<th>Highest response level&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Finding</th>
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</thead>
<tbody>
<tr>
<td>American foulbrood (<em>Paenibacillus larvae</em>)</td>
<td>Honey bee</td>
<td>NSW</td>
<td>Sep</td>
<td>2</td>
<td>Positive</td>
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<tr>
<td></td>
<td>Honey bee</td>
<td>Qld</td>
<td>Oct</td>
<td>2</td>
<td>Negative (2 related investigations)</td>
</tr>
<tr>
<td></td>
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<td>Qld</td>
<td>Oct</td>
<td>2</td>
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<td>Qld</td>
<td>Nov</td>
<td>2</td>
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<td>Nov</td>
<td>2</td>
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</tr>
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<td></td>
<td>Honey bee</td>
<td>Qld</td>
<td>Dec</td>
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<td>Qld</td>
<td>Dec</td>
<td>2</td>
<td>Positive (7 unrelated investigations)</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Porcine</td>
<td>WA</td>
<td>Feb</td>
<td>3</td>
<td>Negative (2 unrelated investigations)</td>
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<tr>
<td></td>
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<td>Australian bat lyssavirus</td>
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<td>3</td>
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<td>Babesiosis in tick-free areas</td>
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<td>NSW</td>
<td>Apr</td>
<td>2</td>
<td>Positive</td>
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<td></td>
<td>Bovine</td>
<td>NSW</td>
<td>May</td>
<td>2</td>
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<td></td>
<td>Bovine</td>
<td>NSW</td>
<td>Jun</td>
<td>2</td>
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<tr>
<td></td>
<td>Bovine</td>
<td>NSW</td>
<td>Jun</td>
<td>2</td>
<td>Positive</td>
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<tr>
<td></td>
<td>Equine</td>
<td>NSW</td>
<td>Apr</td>
<td>2</td>
<td>Negative</td>
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<tr>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Bluetongue — clinical disease&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Bovine</td>
<td>NSW</td>
<td>Jul</td>
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<tr>
<td></td>
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<td></td>
<td>Ovine</td>
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<tr>
<td></td>
<td>Ovine</td>
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<td>Jul</td>
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<tr>
<td></td>
<td>Ovine</td>
<td>NSW</td>
<td>Oct</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Ovine</td>
<td>NSW</td>
<td>Nov</td>
<td>3</td>
<td>Negative</td>
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<tr>
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<td>WA</td>
<td>Aug</td>
<td>3</td>
<td>Negative</td>
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<td>Brucellosis (<em>B. abortus, B. suis, B. canis and B. melitensis</em>)</td>
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<td>Dec</td>
<td>2</td>
<td>Positive&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Caprine</td>
<td>SA</td>
<td>Aug</td>
<td>2</td>
<td>Negative</td>
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<tr>
<td></td>
<td>Equine</td>
<td>Qld</td>
<td>Nov</td>
<td>2</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Ovine</td>
<td>Vic</td>
<td>Feb</td>
<td>2</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Porcine</td>
<td>SA</td>
<td>Aug</td>
<td>2</td>
<td>Negative</td>
</tr>
<tr>
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<td>Classical swine fever</td>
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<td>Oct</td>
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<td>NT</td>
<td>Oct</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Bovine</td>
<td>Vic</td>
<td>Feb</td>
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<tr>
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<td>Aug</td>
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Table A3.1 Investigations of suspect emergency animal diseases listed on Australia’s National List of Notifiable Diseases, 2011 (continued)

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Table A3.1 Investigations of suspect emergency animal diseases listed on Australia’s National List of Notifiable Diseases, 2011 (continued)

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<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>Vic</td>
<td>Oct</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>Vic</td>
<td>Dec</td>
<td>3</td>
<td>Negative (4 unrelated investigations)</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>Apr</td>
<td>3</td>
<td>Negative (3 unrelated investigations)</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>May</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>Jun</td>
<td>3</td>
<td>Negative (5 unrelated investigations)</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>Jul</td>
<td>3</td>
<td>Negative (3 unrelated investigations)</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>Aug</td>
<td>3</td>
<td>Negative (8 unrelated investigations)</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>Sep</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>Oct</td>
<td>3</td>
<td>Negative (3 unrelated investigations)</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>Nov</td>
<td>3</td>
<td>Negative (2 unrelated investigations)</td>
</tr>
<tr>
<td>Disease</td>
<td>Species</td>
<td>State</td>
<td>Month</td>
<td>Highest response level&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Finding</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td>-------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Hendra virus infection (continued)</td>
<td>Equine</td>
<td>WA</td>
<td>Dec</td>
<td>3</td>
<td>Negative (4 unrelated investigations)</td>
</tr>
<tr>
<td>Feline</td>
<td>NSW</td>
<td>Jul</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Feline</td>
<td>NSW</td>
<td>Aug</td>
<td>2</td>
<td>Negative (2 unrelated investigations)</td>
<td></td>
</tr>
<tr>
<td>Feline</td>
<td>QLD</td>
<td>Jul</td>
<td>5</td>
<td>Negative (4 investigations)</td>
<td></td>
</tr>
<tr>
<td>Leishmaniasis of any species</td>
<td>Canine</td>
<td>NSW</td>
<td>Feb</td>
<td>3</td>
<td>Positive&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Lumpy skin disease</td>
<td>Bovine</td>
<td>Vic</td>
<td>Feb</td>
<td>2</td>
<td>Negative</td>
</tr>
<tr>
<td>Maedi-visna</td>
<td>Caprine</td>
<td>SA</td>
<td>Mar</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td>Caprine</td>
<td>SA</td>
<td>May</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Ovine</td>
<td>WA</td>
<td>May</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Malignant catarrhal fever — wildebeest associated</td>
<td>Bovine</td>
<td>Vic</td>
<td>Mar</td>
<td>2</td>
<td>Negative (2 unrelated investigations)</td>
</tr>
<tr>
<td>Bovine</td>
<td>Vic</td>
<td>Mar</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Sheep pox and goat pox</td>
<td>Ovine</td>
<td>NSW</td>
<td>Feb</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td>Swine influenza</td>
<td>Porcine</td>
<td>NSW</td>
<td>Oct</td>
<td>2</td>
<td>Negative (2 unrelated investigations)</td>
</tr>
<tr>
<td>Porcine</td>
<td>WA</td>
<td>Jul</td>
<td>2</td>
<td>Positive&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Tuberculosis (Mycobacterium bovis)</td>
<td>Bovine</td>
<td>Tas</td>
<td>May</td>
<td>2</td>
<td>Negative</td>
</tr>
<tr>
<td>Varroosis (Varroa destructor)</td>
<td>Honey bee</td>
<td>Vic</td>
<td>Jan</td>
<td>2</td>
<td>Negative</td>
</tr>
<tr>
<td>Honey bee</td>
<td>Vic</td>
<td>Mar</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Honey bee</td>
<td>Vic</td>
<td>Sep</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Honey bee</td>
<td>Vic</td>
<td>Oct</td>
<td>2</td>
<td>Negative (2 unrelated investigations)</td>
<td></td>
</tr>
<tr>
<td>West Nile virus infection — clinical</td>
<td>Avian</td>
<td>NSW</td>
<td>Apr</td>
<td>2</td>
<td>Negative (4 unrelated investigations)</td>
</tr>
<tr>
<td>Avian</td>
<td>NSW</td>
<td>May</td>
<td>2</td>
<td>Negative (4 unrelated investigations)</td>
<td></td>
</tr>
<tr>
<td>Avian</td>
<td>NSW</td>
<td>Jun</td>
<td>2</td>
<td>Negative (2 unrelated investigations)</td>
<td></td>
</tr>
<tr>
<td>Avian</td>
<td>SA</td>
<td>Feb</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Avian</td>
<td>SA</td>
<td>Jul</td>
<td>3</td>
<td>Negative (2 unrelated investigations)</td>
<td></td>
</tr>
<tr>
<td>Avian</td>
<td>SA</td>
<td>Sep</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Bovine</td>
<td>NSW</td>
<td>Sep</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Camel</td>
<td>NSW</td>
<td>Apr</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Canine</td>
<td>NSW</td>
<td>Apr</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Canine</td>
<td>NSW</td>
<td>May</td>
<td>2</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td>SA</td>
<td>Sep</td>
<td>3</td>
<td>Negative (3 unrelated investigations)</td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td>SA</td>
<td>Nov</td>
<td>3</td>
<td>Negative (2 unrelated investigations)</td>
<td></td>
</tr>
<tr>
<td>Emu</td>
<td>SA</td>
<td>Sep</td>
<td>3</td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Equine</td>
<td>NSW</td>
<td>Apr</td>
<td>2</td>
<td>Negative (187 unrelated investigations)</td>
<td></td>
</tr>
<tr>
<td>Disease</td>
<td>Species</td>
<td>State</td>
<td>Month</td>
<td>Highest response level(a)</td>
<td>Finding</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td>-----------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>West Nile virus infection — clinical (continued)</td>
<td>Equine</td>
<td>NSW</td>
<td>May</td>
<td>2</td>
<td>Negative (70 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>NSW</td>
<td>Jun</td>
<td>2</td>
<td>Negative (29 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>NSW</td>
<td>Jul</td>
<td>2</td>
<td>Negative (17 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>Qld</td>
<td>Apr</td>
<td>2</td>
<td>Negative (3 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>Qld</td>
<td>Apr</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>Qld</td>
<td>May</td>
<td>2</td>
<td>Negative (12 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>Qld</td>
<td>May</td>
<td>3</td>
<td>Negative (11 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>Qld</td>
<td>Jun</td>
<td>2</td>
<td>Negative (3 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>Qld</td>
<td>Jun</td>
<td>3</td>
<td>Negative (18 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>Qld</td>
<td>Oct</td>
<td>3</td>
<td>Negative (2 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>SA</td>
<td>Feb</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>Vic</td>
<td>Apr</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>WA</td>
<td>Apr</td>
<td>3</td>
<td>Negative (8 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>WA</td>
<td>May</td>
<td>3</td>
<td>Negative (3 unrelated investigations)</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>WA</td>
<td>Jun</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Equine</td>
<td>WA</td>
<td>Aug</td>
<td>3</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>Rock (feral) pigeon</td>
<td>SA</td>
<td>Nov</td>
<td>3</td>
<td>Negative</td>
</tr>
</tbody>
</table>

ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; Qld = Queensland; SA = South Australia; Tas = Tasmania; Vic = Victoria; WA = Western Australia

\(a\) Key to highest level of response:

1. Field investigation by government officer
2. Investigation by state or territory government veterinary laboratory
3. Specimens sent to the CSIRO 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

\(b\) For additional negative monitoring data see the National Arbovirus Monitoring Program: www.animalhealthaustralia.com.au/programs/adsp/namp/namp_home.cfm

\(c\) Serological finding. No clinical signs occurred. Reported by investigating veterinarian as *B. suis*.

\(d\) Dog was imported.

\(e\) Positive for pandemic (H1N1) 2009 influenza virus.
Investigations of emergency diseases

Australian Government Department of Agriculture, Fisheries and Forestry
APPENDIX 4

RESEARCH PROJECTS IN LIVESTOCK HEALTH

Tables A4.1–A4.17 list some of the research projects in livestock health undertaken during 2011 by the Commonwealth Scientific and Industrial Research Organisation, the cooperative research centres, six of Australia’s seven veterinary schools, and industry-based research and development corporations. Further information on research and development activities by these organisations is provided in Chapter 10.
<table>
<thead>
<tr>
<th>Project</th>
<th>Granting body/collaborator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development of necrotic enteritis vaccines</td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>Development of peptides to control <em>C. jejuni</em></td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>Campylobacter vaccine</td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>Gut microbes in poultry</td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>Diagnostics for <em>Campylobacter</em></td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Recombinant viruses</td>
<td>Deakin University</td>
</tr>
<tr>
<td>Infectious bursal disease virus vaccines and surveillance</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Development of a vaccine for bovine ephemeral fever</td>
<td>Pfizer</td>
</tr>
<tr>
<td>Development of a vaccine for Hendra virus</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>Emerging infectious diseases: development of novel antiviral treatments for henipavirus infections</td>
<td>National Institutes of Health (United States)</td>
</tr>
<tr>
<td>Emerging infectious diseases: optimisation of novel henipavirus vaccines</td>
<td>National Institutes of Health (United States)</td>
</tr>
<tr>
<td>Control of sex determination in poultry</td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>Development of avian influenza–resistant poultry</td>
<td>Malta Advanced Technologies</td>
</tr>
<tr>
<td>Development and production of immunological reagents and tests for emerging infectious diseases using recombinant antibody technology</td>
<td>Commonwealth Scientific and Industrial Research Organisation, Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease</td>
</tr>
<tr>
<td>Improving diagnostic capability for henipavirus infections</td>
<td>Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease, National Institutes of Health (United States), Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>Development of molecular diagnostic test for rapid identification and differentiation of important poultry viruses (infectious bursal disease virus, Newcastle disease virus, avian influenza)</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Evaluation of rapid molecular detection and characterisation systems for risk evaluation of unknown viruses isolated in Australia</td>
<td>Defence Science and Technology Organisation, Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease</td>
</tr>
<tr>
<td>Evaluation of pathogenesis of Ebola Reston virus</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Emerging infectious diseases: severe acute respiratory syndrome (SARS)</td>
<td>Commonwealth Scientific and Industrial Research Organisation, Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease</td>
</tr>
<tr>
<td>Australian influenza viruses</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry; Food and Agriculture Organization of the United Nations; Australian Agency for International Development; National Health and Medical Research Council</td>
</tr>
<tr>
<td>Emerging bat viruses</td>
<td>Commonwealth Scientific and Industrial Research Organisation, National Health and Medical Research Council, Australian Research Council</td>
</tr>
<tr>
<td>Project</td>
<td>Granting body/collaborator</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Highly pathogenic avian influenza in ducks in Indonesia and Vietnam</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Koi herpesvirus as a potential biological control agent</td>
<td>Invasive Animals Cooperative Research Centre</td>
</tr>
<tr>
<td>Characterisation of Hendra virus infection in the horse</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Pathogenesis of highly pathogenic avian influenza</td>
<td>National Institutes of Health (United States)</td>
</tr>
<tr>
<td><em>Mycobacterium paratuberculosis</em> as potential zoonotic pathogen with food safety concerns</td>
<td>Commonwealth Scientific and Industrial Research Organisation (Office of Chief Executive), Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>Development of quality assured bioreagents for molecular diagnosis of viral and bacterial pathogens, and for research purposes</td>
<td>Commonwealth Scientific and Industrial Research Organisation; Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>Novel, based on protein-array, diagnostic test for capripox</td>
<td>Commonwealth Scientific and Industrial Research Organisation, Meat &amp; Livestock Australia</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetic improvement of parasite resistance and thermoregulation</td>
<td>Cooperative Research Centre for Beef Genetic Technologies through Commonwealth Scientific and Industrial Research Organisation; Animal Genetics and Breeding Unit (a joint venture between the University of New England and Industry &amp; Investment NSW); Victorian Department of Primary Industries; United States Department of Agriculture — Agricultural Research Services</td>
</tr>
<tr>
<td>Novel solutions to improve tick resistance of cattle (development of a vaccine to control cattle ticks)</td>
<td>Cooperative Research Centre for Beef Genetic Technologies through Queensland Department of Employment, Economic Development and Innovation; Murdoch University; University of Queensland; United States Department of Agriculture — Agricultural Research Services; EMBRAPA Brazil</td>
</tr>
<tr>
<td>Objective measures of cattle welfare</td>
<td>Cooperative Research Centre for Beef Genetic Technologies through Commonwealth Scientific and Industrial Research Organisation; Queensland Department of Employment, Economic Development and Innovation; Victorian Department of Primary Industries; Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Gene discovery for postpartum reconception and age at puberty</td>
<td>Cooperative Research Centre for Beef Genetic Technologies through Commonwealth Scientific and Industrial Research Organisation; Animal Genetics and Breeding Unit (a joint venture between the University of New England and Industry &amp; Investment NSW); Queensland Department of Employment, Economic Development and Innovation; Victorian Department of Primary Industries; United States Department of Agriculture — Agricultural Research Services; New Mexico State University; Meat &amp; Livestock Australia</td>
</tr>
</tbody>
</table>
Table A4.2 Cooperative Research Centre for Beef Genetic Technologies animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male indicator traits to improve female reproductive performance</td>
<td>Cooperative Research Centre for Beef Genetic Technologies through Queensland Department of Employment, Economic Development and Innovation; Commonwealth Scientific and Industrial Research Organisation; Animal Genetics and Breeding Unit (a joint venture between the University of New England and Industry &amp; Investment NSW); University of Queensland; Meat &amp; Livestock Australia; New Mexico State University</td>
</tr>
<tr>
<td>Feeding and management strategies to increase dietary energy captured and reduce methane emissions from cattle</td>
<td>Cooperative Research Centre for Beef Genetic Technologies through Commonwealth Scientific and Industrial Research Organisation; Queensland Department of Employment, Economic Development and Innovation; Industry &amp; Investment NSW; Ohio State University; Beef + Lamb New Zealand through its Pastoral Greenhouse Gas Consortium; Meat &amp; Livestock Australia</td>
</tr>
</tbody>
</table>

Table A4.3 Cooperative Research Centre for High Integrity Australian Pork animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Collaborating partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probiosis — a novel strategy for improved gut health and feed-conversion efficiency in pigs without over-reliance on antibiotic growth promotants (2006–10)</td>
<td>Industry &amp; Investment NSW</td>
</tr>
<tr>
<td>Manipulating the environment in the porcine large intestine to help control swine dysentery (2008–10)</td>
<td>Murdoch University, Department of Agriculture and Food WA, CHM Alliance Pty Ltd</td>
</tr>
<tr>
<td>Development of a semi-quantitative real-time diagnostic assay for ileitis (2008–10)</td>
<td>Industry &amp; Investment NSW</td>
</tr>
<tr>
<td>Improving health of neonatal piglets and weaners by injecting immunoglobulins (2009–12)</td>
<td>QAF Meat Industries, Australian Pork Farms Group, University of South Australia, Charles Sturt University, Australian Pork Limited</td>
</tr>
<tr>
<td>Bacteriophage to control enterotoxigenic E. coli (2008–12)</td>
<td>QAF Meat Industries, Australian Pork Farms Group, University of South Australia, Australian Pork Limited</td>
</tr>
<tr>
<td>Evaluating the replacement of zinc oxide with an encapsulated zinc oxide product as a means of controlling postweaning diarrhoea in piglets (2008–10)</td>
<td>Zamira Pty Ltd</td>
</tr>
</tbody>
</table>

Table A4.4 Cooperative Research Centre for Sheep Industry Innovation animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercialisation of the worm-control program and supporting products for the summer rainfall region of eastern Australia</td>
<td>University of New England; Industry &amp; Investment NSW; Queensland Department of Employment, Economic Development and Innovation</td>
</tr>
<tr>
<td>Targeted treatment strategies for efficient sheep worm management</td>
<td>Department of Agriculture and Food WA, South Australian Research and Development Institute</td>
</tr>
<tr>
<td>Parasite genetics — Information Nucleus Flocks</td>
<td>Commonwealth Scientific and Industrial Research Organisation, Industry &amp; Investment NSW, Victorian Department of Primary Industries, Department of Agriculture and Food WA, South Australian Research and Development Institute, University of New England</td>
</tr>
<tr>
<td>WormBoss website</td>
<td>Department of Agriculture and Food WA; Industry &amp; Investment NSW; Queensland Department of Employment, Economic Development and Innovation; University of New England; South Australian Research and Development Institute; University of Tasmania</td>
</tr>
<tr>
<td>FlyBoss website</td>
<td>Department of Agriculture and Food WA, Industry &amp; Investment NSW, Victorian Department of Primary Industries, University of Tasmania</td>
</tr>
</tbody>
</table>
### Table A4.4 Cooperative Research Centre for Sheep Industry Innovation animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Managing Flystrike’ workshops for sheep producers</td>
<td>Industry &amp; Investment NSW, Victorian Department of Primary Industries, University of Tasmania, Department of Agriculture and Food WA</td>
</tr>
</tbody>
</table>

### Table A4.5 Poultry Cooperative Research Centre animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Lead research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Towards commercialisation of a next-generation infectious laryngotracheitis virus vaccine and differential enzyme-linked immunosorbent assay (ELISA)</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Vaccine against <em>Clostridium perfringens</em> to protect birds from necrotic enteritis</td>
<td>Commonwealth Scientific and Industrial Research Organisation, Monash University</td>
</tr>
<tr>
<td>Vaccine strategies and interactions of attenuated coccidial vaccines</td>
<td>Bioproperties Pty Ltd</td>
</tr>
<tr>
<td>Rapid multiplex polymerase chain reaction (PCR) assay for differentiating <em>Pasteurella multocida</em> serovars</td>
<td>Monash University</td>
</tr>
<tr>
<td>Evaluation of high-resolution melt-curve analysis for detecting multiple strains in a single specimen (completed September 2011)</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Characterising population structure and diversity of Australian <em>Eimeria</em></td>
<td>Queensland Department of Employment, Economic Development and Innovation — Primary Industries and Fisheries</td>
</tr>
<tr>
<td>Sex determination in poultry</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Application of herpes viral vectors for in ovo delivery</td>
<td>Queensland Department of Employment, Economic Development and Innovation — Primary Industries and Fisheries</td>
</tr>
<tr>
<td>New approaches to assess welfare in free-range layers</td>
<td>University of New England</td>
</tr>
<tr>
<td>Influence of betaine on embryo survival, hatchability and progeny performance</td>
<td>Feedworks</td>
</tr>
<tr>
<td>In ovo therapeutics to improve gut efficiency and health in the broiler chicken</td>
<td>University of Adelaide</td>
</tr>
<tr>
<td>Post-hatch feed restriction effects on broiler muscle growth</td>
<td>Ohio State University</td>
</tr>
<tr>
<td>Validation of quantitative PCR assays targeting broiler performance (completed September 2011)</td>
<td>South Australian Research and Development Institute</td>
</tr>
<tr>
<td>Identification of microbial and gut-related factors driving bird performance</td>
<td>South Australian Research and Development Institute, University of New England, Commonwealth Scientific and Industrial Research Organisation, Ohio State University</td>
</tr>
<tr>
<td>Net energy system for the Australian chicken meat industry</td>
<td>University of New England</td>
</tr>
<tr>
<td>Maximising spent litter fertiliser returns through nutrient and carbon management</td>
<td>Queensland Department of Employment, Economic Development and Innovation — Primary Industries and Fisheries</td>
</tr>
<tr>
<td>Identification of odorous compounds and waste stream mitigation</td>
<td>University of New South Wales</td>
</tr>
<tr>
<td>Methods to quantify and inactivate viruses in poultry litter</td>
<td>University of New England</td>
</tr>
<tr>
<td>Phage-displayed peptides for controlling <em>Campylobacter jejuni</em> in poultry</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Small molecule inhibitors as anti-<em>Campylobacter jejuni</em> agents</td>
<td>Ohio State University</td>
</tr>
<tr>
<td>Vaccine to reduce <em>Campylobacter</em> colonisation in meat chickens</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Improving the efficacy and safety of egg washing</td>
<td>South Australian Research and Development Institute</td>
</tr>
<tr>
<td>Eggshell quality and risks of foodborne pathogens</td>
<td>University of New England</td>
</tr>
<tr>
<td>Project</td>
<td>Granting body</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Using faecal deoxyribonucleic acid (DNA) as a diagnostic tool for plant poisoning in livestock</td>
<td>Charles Sturt University competitive grant</td>
</tr>
<tr>
<td>Diagnosis and control of small strongyle parasites of horses</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Developing nanobody reagents to virulence factors from liver flukes</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Biomarkers, a diagnostic tool for <em>Staphylococcus aureus</em> mastitis in dairy cattle</td>
<td>Charles Sturt University competitive grant</td>
</tr>
<tr>
<td>The use of antibiotics in beef cattle</td>
<td>Graham Centre for Agricultural Innovation</td>
</tr>
<tr>
<td>Epidemiological skills of veterinarians in the field (survey)</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Equine therapeutics and welfare</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Genetic basis for magnetic sensitivity in birds</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Improving dairy production in Pakistan through improved extension services</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Mapping the distribution of <em>Echinococcus granulosus</em> infection in rural and semirural domestic dogs in south-eastern Australia</td>
<td>Private funding</td>
</tr>
<tr>
<td>A fungal disease is killing Tasmanian platypuses and mainland frogs. Is there a connection?</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Improving feed-conversion efficiency and carcase composition in barrows</td>
<td>Cooperative Research Centre for an Internationally Competitive Pork Industry</td>
</tr>
<tr>
<td>Male factors and early pregnancy loss</td>
<td>Cooperative Research Centre for an Internationally Competitive Pork Industry</td>
</tr>
<tr>
<td>EverGraze</td>
<td>Cooperative Research Centre for Future Farm Industries</td>
</tr>
<tr>
<td>Oestrous synchronisation in mares</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>The role of parasites in the reproductive success of a long-lived colonial seabird, the crested tern</td>
<td>Morris Animal Foundation, Holsworth Wildlife Research Endowment</td>
</tr>
<tr>
<td>Defining an in vitro model system to investigate the pathogenesis of rye grass staggers in sheep</td>
<td>Charles Sturt University competitive grant</td>
</tr>
<tr>
<td>Liver fluke: improving disease control through understanding of parasite diversity, drug resistance and better diagnosis</td>
<td>Australian Research Council Linkage (partner Virbac Australia)</td>
</tr>
<tr>
<td>Occurrence, prevalence and abundance of emerging zoonotic parasites in different species of flathead fish in New South Wales</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Risk assessment for parasites of endemic freshwater fish in Murray River Basin</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>The role of kisspeptins during the transition period in mares</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>The development of a remote calf-alert device for use in northern Australia</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Eggshell quality and risks of foodborne pathogens</td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>Identification and molecular characterisation of <em>Staphylococcus</em> strains in bovine mastitic milk in Australia</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td><em>Ureaplasma diversum</em> in bull semen; detection and potential effects</td>
<td>Graham Centre for Agricultural Innovation</td>
</tr>
<tr>
<td>Characterising <em>Ureaplasma diversum</em>, a potential pathogen of Australian cattle</td>
<td>Graham Centre for Agricultural Innovation</td>
</tr>
<tr>
<td>Pathogenesis of avian circovirus</td>
<td>Australian Research Council Discovery</td>
</tr>
<tr>
<td>Pathogens in migrating pigeons</td>
<td>Wildlife Exotic Disease Preparedness Program (Australian Government Department of Agriculture, Fisheries and Forestry)</td>
</tr>
</tbody>
</table>
### Table A4.6 Charles Sturt University — School of Animal and Veterinary Sciences animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Granting body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parasites in terns</td>
<td>Holsworthy Trust</td>
</tr>
<tr>
<td>Strengthening dairy value chains in Pakistan through improved farm management</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Q fever in a veterinary practice (being written)</td>
<td>None</td>
</tr>
<tr>
<td>Feedbase management study of inland New South Wales dairy</td>
<td>Dairy NSW</td>
</tr>
<tr>
<td>Novel drug delivery mechanisms — continuous infusion of antimicrobial agents and buccal delivery methods</td>
<td>Charles Sturt University, industry</td>
</tr>
<tr>
<td>Multiplex tandem real-time polymerase chain reaction (RT-PCR) platform for diagnosing respiratory pathogens in horses</td>
<td>Charles Sturt University, industry</td>
</tr>
<tr>
<td>Flow cytometry, cytology and gene expression in bronchoalveolar lavage samples from horses</td>
<td>Charles Sturt University, industry</td>
</tr>
<tr>
<td>Pulmonary function testing in horses</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Proteomics of bronchoalveolar lavage fluid from horses</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Continuous positive airway pressure for ventilatory support of neonatal foals and calves</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Pelvic external fixation frame configuration in cats</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Identification of Angus sires in an Australian commercial seedstock enterprise that produce calves phenotypically resistant to gastrointestinal parasitism</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Anthelmintic resistance in cattle nematode parasites</td>
<td>Private funding</td>
</tr>
<tr>
<td>Occurrence of malignant neoplasia in adult cattle at slaughter</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td><em>E. coli</em> O157 colonisation and shedding in cattle</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Aetiology of calf scours</td>
<td>Private funding</td>
</tr>
</tbody>
</table>

### Table A4.7 James Cook University — School of Veterinary and Biomedical Sciences animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Funding body</th>
</tr>
</thead>
<tbody>
<tr>
<td>True prevalence of feline immunodeficiency virus in cats living in a Townsville suburb</td>
<td>IDEXX Laboratories</td>
</tr>
<tr>
<td>Epidemiology of Q fever in north Queensland</td>
<td>Pathology Queensland</td>
</tr>
<tr>
<td>Zoonotic pathogens carried by domestic dogs in northern Australia</td>
<td>Far North Queensland Hospital Foundation</td>
</tr>
<tr>
<td>Systematic disease surveillance in the Pacific islands</td>
<td>Australian Centre for International Agricultural Research, Australian Agency for International Development</td>
</tr>
<tr>
<td>Leptospirosis in horses</td>
<td>James Cook University</td>
</tr>
<tr>
<td>Combining forces to understand disease in gungu (sea turtles)</td>
<td>World Wildlife Fund</td>
</tr>
<tr>
<td>Ruminant immunology</td>
<td>James Cook University</td>
</tr>
<tr>
<td>Local immune response against <em>Ancylostoma caninum</em> in dingoes</td>
<td>James Cook University</td>
</tr>
<tr>
<td>Monitoring of influenza virus in samples collected from aquatic bird species in north Queensland</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>Canine and feline parvovirus infection in north Queensland</td>
<td>James Cook University</td>
</tr>
<tr>
<td>Molecular epidemiology of feline retroviruses</td>
<td>James Cook University</td>
</tr>
<tr>
<td>Zoonotic pathogens carried by domestic dogs in northern Australia</td>
<td>James Cook University</td>
</tr>
</tbody>
</table>
Table A4.7 James Cook University — School of Veterinary and Biomedical Sciences animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Funding body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation of <em>Macrobrachium rosenbergii</em> nodavirus (white tail disease) Australian isolate</td>
<td>James Cook University</td>
</tr>
<tr>
<td>Suppression subtractive hybridisation for genes expressed in redclaw crayfish <em>Cherax quadricarinatus</em> with an idiopathic lesion</td>
<td>James Cook University</td>
</tr>
<tr>
<td>Investigation of hepatopancreatic parovirus in <em>Penaeus esculentus</em> and <em>Penaeus merguiensis/indicus</em></td>
<td>Indo-Australian Biotechnology Fund</td>
</tr>
<tr>
<td>The <em>Vibrio harveyi</em> clade of bacteria in marine lobsters, <em>Panulirus ornatus</em></td>
<td>James Cook University</td>
</tr>
<tr>
<td>Investigations into <em>Coxiella cheraxi</em> as a vaccine candidate against Q fever</td>
<td>James Cook University</td>
</tr>
<tr>
<td>The potential of <em>Asparagopsis taxiformis</em> as a green treatment for streptococcosis in fish mariculture</td>
<td>James Cook University</td>
</tr>
<tr>
<td>Characterisation of BacL49, a lactococcal bacteriocin with activity against the fish pathogen <em>Streptococcus iniae</em></td>
<td>James Cook University</td>
</tr>
</tbody>
</table>

Table A4.8 Murdoch University — School of Veterinary and Biomedical Sciences animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Granting body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing qualitative behavioural assessment as an objective measure of pig welfare</td>
<td>Australian Pork Limited</td>
</tr>
<tr>
<td>Pink-eye in feedlot sheep</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Beef CRC programs 1–6</td>
<td>Cooperative Research Centre for Beef Genetic Technologies</td>
</tr>
<tr>
<td>Development of a national surveillance system for classical swine fever, avian influenza and foot-and-mouth disease</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Determining the impact of protozoan pathogens and strongyle worms on prime lamb production</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Development of a rapid diagnostic test for avian influenza viruses in poultry outbreaks</td>
<td>Bill and Melinda Gates Foundation</td>
</tr>
<tr>
<td>Development of high-throughput diagnostic and genotyping techniques for understanding the impact of enteric bacterial infections on scouring in sheep</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Enhancing the iron content of pork to promote human health benefits</td>
<td>Cooperative Research Centre for an Internationally Competitive Pork Industry</td>
</tr>
<tr>
<td>Working towards a more accurate diagnosis of inflammatory airway disease in the horse</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Goat nutrient composition</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Harmonising protocols for molecular and epidemiological surveillance of influenza viruses</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>Improving the biological efficiency and cost effectiveness of ractopamine</td>
<td>Cooperative Research Centre for an Internationally Competitive Pork Industry</td>
</tr>
<tr>
<td>Interaction of <em>Cryptosporidium</em> lifecycle stages with aquatic biofilm communities</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Management of pig-associated zoonoses in Lao People’s Democratic Republic</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Mortality in live cattle exports</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>New technology for avian influenza surveillance</td>
<td>Bill and Melinda Gates Foundation</td>
</tr>
<tr>
<td>Quantifying feral pig abundance and efficacy of control strategies in south-west Western Australia</td>
<td>Water Corporation — Western Australia</td>
</tr>
<tr>
<td>Selection of feed wheat and/or barley varieties for the Australian pig industry</td>
<td>Cooperative Research Centre for an Internationally Competitive Pork Industry</td>
</tr>
</tbody>
</table>
Table A4.8 Murdoch University — School of Veterinary and Biomedical Sciences animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Granting body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies to reduce inanition in sheep: backgrounding and feedlotting</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>strategies to address inanition in sheep</td>
<td></td>
</tr>
<tr>
<td>Subprograms: (3) Next-generation meat quality, (3.3.1) Improvement of</td>
<td>Cooperative Research Centre for Sheep Industry</td>
</tr>
<tr>
<td>lean meat yield technical project, (3.8) Completion of meat science</td>
<td>Innovation</td>
</tr>
<tr>
<td>program</td>
<td></td>
</tr>
<tr>
<td>Understanding factors affecting the iron content of pork</td>
<td>Australian Pork Limited</td>
</tr>
<tr>
<td>Immunonutrition: a novel concept to overcome gastrointestinal tract</td>
<td>Australian Research Council Linkage</td>
</tr>
<tr>
<td>mucosal damage after weaning in pigs</td>
<td></td>
</tr>
<tr>
<td>Development of novel vaccines and diagnostic tests for swine</td>
<td>Spirogene Pty Ltd</td>
</tr>
<tr>
<td>dysentery</td>
<td></td>
</tr>
</tbody>
</table>

Table A4.9 University of Adelaide — School of Animal and Veterinary Sciences animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Granting body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novel nutraceuticals to treat chemotherapy-induced mucositis and</td>
<td>Cancer Council Australia</td>
</tr>
<tr>
<td>inflammatory bowel disease</td>
<td></td>
</tr>
<tr>
<td>Emu oil and protection from intestinal disease</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>BVD — economic impact, diagnosis and control</td>
<td>Department of Primary Industries and Resources</td>
</tr>
<tr>
<td>Neospora caninum in South Australian cattle</td>
<td>South Australia, IDE, Gribbles Veterinary Pathology</td>
</tr>
<tr>
<td>Besnoitia besnoiti in South Australian cattle populations</td>
<td>Department of Primary Industries and Resources</td>
</tr>
<tr>
<td>Besnoitia spp. in wildlife population</td>
<td>South Australia, AgriQuality</td>
</tr>
<tr>
<td>Neospora caninum in dairy buffalo in Pakistan</td>
<td>Higher Education Commission of Pakistan</td>
</tr>
<tr>
<td>In ovo therapeutics to improve gut health and efficiency in broiler</td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>chickens</td>
<td></td>
</tr>
<tr>
<td>Rumen health initiative based around subacute ruminal acidosis</td>
<td>School of Animal and Veterinary Sciences (University of Adelaide)</td>
</tr>
<tr>
<td>Development of a slow-release intraruminal capsule for protection</td>
<td>School of Animal and Veterinary Sciences (University of Adelaide)</td>
</tr>
<tr>
<td>against mucosal hypersensitivity to helminths</td>
<td></td>
</tr>
<tr>
<td>Surveillance tools and strategies for improved control, monitoring</td>
<td>University of Melbourne, Australian Centre for</td>
</tr>
<tr>
<td>and eradication of avian influenza in Indonesia</td>
<td>International Agricultural Research</td>
</tr>
<tr>
<td>(collaboration with University of Melbourne)</td>
<td></td>
</tr>
<tr>
<td>The extent of competition between the native and introduced</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>herbivores of Kangaroo Island</td>
<td></td>
</tr>
<tr>
<td>Precision beef cattle production through an alternative genetic</td>
<td>Queensland Department of Primary Industries and</td>
</tr>
<tr>
<td>approach</td>
<td>Fisheries</td>
</tr>
<tr>
<td>Functional and evolutionary physiology of paracellular absorption in</td>
<td>National Science Foundation</td>
</tr>
<tr>
<td>flying and nonflying eutherian mammals</td>
<td></td>
</tr>
<tr>
<td>Mammary cancer and activation of transportable elements</td>
<td>United States Army Medical Research &amp; Material</td>
</tr>
<tr>
<td>— Breast Cancer Idea Award</td>
<td>Command</td>
</tr>
<tr>
<td>Phase II microbiological studies on DP8129</td>
<td>Advanced Veterinary Therapeutics Pty Ltd</td>
</tr>
<tr>
<td>Convenia MIC study — Porphyromonas and Prevotella isolates from</td>
<td>Pfizer Australia Limited</td>
</tr>
<tr>
<td>cases of periodontal disease in dogs and cats</td>
<td></td>
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<tr>
<td>Antimicrobial activity of new pharmacological agents against</td>
<td>Pharmagold</td>
</tr>
<tr>
<td>staphylococci</td>
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<tr>
<td>Characterisation of a new class of antimicrobial agent for</td>
<td>Australian Research Council (partner Neoculi Pty Ltd)</td>
</tr>
<tr>
<td>Project</td>
<td>Sponsor</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------</td>
</tr>
<tr>
<td>Epidemiology and pathology of chronic fluoride exposure in native Australian wildlife surrounding fluoride emitting industry in Victoria</td>
<td>ANZ Charitable Trusts</td>
</tr>
<tr>
<td>Surveillance tools and strategies for improved control, monitoring and eradication of avian influenza in Indonesia</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Avoiding the immune response — lessons from ‘simple’ bacteria</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Catchment sources of microorganisms — developing an integrated strategy for the sustained prevention of waterborne disease outbreaks in humans in Melbourne</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Development of an attenuated vaccine to control the emerging bovine respiratory pathogen <em>Mycoplasma bovis</em></td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Elucidating a key developmental switch in <em>Haemonchus contortus</em> using a massively parallel picolitre reactor sequencing-coupled genomic and bioinformatic platform</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Elucidating structure and function of activation-associated secreted proteins (ASPs) in blood-feeding hookworms — toward new methods of control</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Evaluating host–parasite interplay in individual tissues</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Harnessing the genomics revolution — toward radically new approaches to control neglected parasites of paramount global importance</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Investigation of the resilience of immune memory to manipulation by pathogens</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Mitogenomics using a massively parallel reactor platform — from barcoding to diagnostic tools for pathogens of major socioeconomic importance</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Pathophysiological mechanisms in equine dyschondroplasia (osteoochondrosis)</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Relationships between insulin resistance, diet and obesity in ponies and horses</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Structural and functional investigations into a novel chemokine binding protein encoded by evolutionarily diverse alphaherpesviruses</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Understanding heat shock protein complex vaccines</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Understanding immune mechanisms induced by pulmonary vaccination</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Using molecular tools to understand and control the transmission of <em>Cryptosporidium</em></td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Comparison of programs for the control of blowfly strike in Merino sheep in south-eastern Australia</td>
<td>Australian Wool Innovation Limited</td>
</tr>
<tr>
<td>Role of toxigenic <em>Pasteurella multocida</em> in the development of atrophic rhinitis</td>
<td>Canine Research Foundation</td>
</tr>
<tr>
<td>The performance and survival of cows in Australian dairy herds</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Evaluating the drug carprofen for short and long-term pain management in adult and juvenile sheep</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>Identification of an infectious bronchitis virus (IBV) quasispecies in the commercial IBV vaccine Vics — its effect on laying hens</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>Insulin-like growth factor-1 in the plasma and semen of Holstein bulls and its relationship with breeding values</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
</tbody>
</table>
Table A4.10 University of Melbourne — Faculty of Veterinary Science animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Sponsor</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-farm experiential learning for veterinary students</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>Investigation into the presence and prevalence of Chlamydiaceae spp. in northern and southern populations of koalas (Phascolarctus cinereus) and identification of risk factors associated with infection</td>
<td>Queensland Department of Environment and Resource Management</td>
</tr>
<tr>
<td>A rural training scheme — upscaling veterinary capability through dairy practice–based research, knowledge transfer, and graduate training</td>
<td>Geoffrey Gardiner Dairy Fund</td>
</tr>
<tr>
<td>Adding value to cattle hides through improved control strategies that reduce damage from demodex (follicular mange mite) infestations</td>
<td>Hermon Slade Foundation</td>
</tr>
<tr>
<td>Feed choices: cattle preference for feedlot or pasture environments</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Impact of bacteria and coccidia on scouring and productivity in sheep</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Lifting the limits imposed by worms on sheep meat production</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Management of premature lactation in dairy heifers</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Catchment sources of waterborne pathogens: ensuring safe drinking water</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Contribution of cortical porosity to bone fragility</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Development of a new method to prevent hydatid disease being transmitted by animals</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Development of practical vaccines to break the lifecycles of the parasites causing cysticercosis and hydatid disease</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Genomic insights into the biology of the carcinogenic blood fluke, Schistosoma haematobium: a first response to the wake-up call</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Insertional mutations to identify intervention targets</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Investigating a new factor which protects against bacterial disease in the gastrointestinal tract</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Mucins in infection and inflammation</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Performance and safety testing of the BioQ Cardiac Assist System in a chronic ovine heart failure animal model</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Preventing transmission of the parasites causing neurocysticercosis and hydatid disease</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Targeting Bcl-2 pathways in parasites</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>The impact of virulence gene polymorphisms on Helicobacter pylori pathogenesis</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>The relationship between blood vessel remodelling and inflammatory cells in chronic asthma</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>The role of a protease-activated receptor system in prostate cancer bone metastasis</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>Evaluation of high-resolution melt curve analysis for detection of multiple strains in a single specimen</td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>New approaches to assess welfare in free-range laying hens</td>
<td>Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>Towards commercialisation of a next-generation (infectious laryngotracheitis virus) ILTV vaccine and differential ELISA</td>
<td>Poultry Cooperative Research Centre</td>
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</tbody>
</table>
Table A4.10 University of Melbourne — Faculty of Veterinary Science animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Sponsor</th>
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<tbody>
<tr>
<td>Characterisation of avian nephritis virus (ANV) in commercial poultry</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Improving control of infectious laryngotracheitis virus in Australian broiler flocks</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Investigation into the aetiology of Australian stringhalt</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Poultry litter — an alternative fertiliser and method of increasing soil organic carbon</td>
<td>Rural Industries Research and Development Corporation</td>
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<tr>
<td>Virus and horse specific risk factors for EHV1 neurological disease</td>
<td>Rural Industries Research and Development Corporation</td>
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<tr>
<td>What role does rotavirus play in equine diarrhoea in Australian horses?</td>
<td>Rural Industries Research and Development Corporation</td>
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<tr>
<td>Harnessing viral glycoproteins to improve vaccines</td>
<td>Cass Foundation Limited</td>
</tr>
<tr>
<td>Structural characterisation of a novel and potent anti-inflammatory protein</td>
<td>Cass Foundation Limited</td>
</tr>
<tr>
<td>New and emerging herpesviruses in Australian marsupials</td>
<td>Ian Potter Foundation</td>
</tr>
<tr>
<td>Predisposition to pasture-associated laminitis: is exercise the answer?</td>
<td>The Laminitis Trust</td>
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<tr>
<td>Mt-PCR — a rapid, reliable and effective tool for assessing toxic ‘algal’ blooms</td>
<td>Water Quality Research Australia Limited</td>
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<tr>
<td>in Victorian water supplies: aiding protection and preservation</td>
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Table A4.11 University of Sydney — Faculty of Veterinary Science animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Granting body</th>
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<tbody>
<tr>
<td>Veterinary public health and food safety at the University of Sydney</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Advancing artificial insemination in camelids, particularly the alpaca</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>An immunological and immunogenetic approach to understand and to protect Tasmanian devils against devil facial tumour disease</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Antimicrobial susceptibility patterns of bacterial isolates from horses</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Surveys of ornamental fish for pathogens of quarantine significance</td>
<td>Fisheries Research and Development Corporation</td>
</tr>
<tr>
<td>Tools for investigation of the nodavirus (NNV) carrier state in marine, euryhaline and freshwater fish and control of NNV through integrated management</td>
<td>Fisheries Research and Development Corporation</td>
</tr>
<tr>
<td>Arc Centre for Structural and Functional Microbial Genomics — the role of <em>Dichelobacter nodosus</em> genes in pathogenesis of footrot in sheep</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Assessment of the risks to animal biosecurity associated with small landholders</td>
<td>Australian Biosecurity Cooperative Research Centre</td>
</tr>
<tr>
<td>Best-practice health and husbandry of cattle and buffalo in Lao People’s Democratic Republic</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Best practice health and husbandry of cattle, Cambodia</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Bovine Johne’s disease — basic and applied research for improved diagnosis and prevention</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td><em>Campylobacter jejuni</em> through the food chain: from range through processing</td>
<td>United States Department of Agriculture</td>
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<tr>
<td>Project</td>
<td>Granting body</td>
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<tr>
<td>------------------------------------------------------------------------</td>
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<tr>
<td>Can short interfering RNAs (siRNAs) be a new treatment for controlling feline coronavirus infections such as feline infectious peritonitis?</td>
<td>Australian Companion Animal Health Foundation</td>
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<tr>
<td>Canine atopic dermatitis — genomic studies in Australian dogs</td>
<td>Australian Companion Animal Health Foundation</td>
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<tr>
<td>Canine superficial pyoderma: should we be concerned about multidrug-resistant <em>Staphylococcus</em> species?</td>
<td>Canine Research Foundation</td>
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<tr>
<td>Characterisation of canine adipose derived mesenchymal stem cells for treatment of diseases and disorders in dogs</td>
<td>Canine Research Foundation</td>
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<tr>
<td>Collagenous matrix remodelling and strength of fatigued canine bone</td>
<td>AO Foundation</td>
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<tr>
<td>Completing the sheep genome project; Australia’s contribution to a global collaboration</td>
<td>Department of Employment, Science and Technology</td>
</tr>
<tr>
<td>A study to confirm the lactation performance and animal safety of dairy cows treated with a lactation enhancer</td>
<td>Eli Lilly Australia Pty Ltd</td>
</tr>
<tr>
<td>Control of nodaviral disease in tropical marine finfish hatcheries: enhanced biosecurity through the application of contemporary biotechnology, epidemiology and pathobiology</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Determinants for white spot disease outbreaks in Indonesian smallholder shrimp ponds — a pilot study of locality factors, white spot syndrome virus genotype distributions and pond factors</td>
<td>Australian Centre for International Agricultural Research</td>
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<tr>
<td>Determining genetic correlates of feline infectious peritonitis susceptibility</td>
<td>Winn Feline Foundation (USA)</td>
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<tr>
<td>Development of genomic tools to predict the occurrence of osteochondrosis</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Development of <em>Mycoplasma bovis</em> molecular diagnostic tests and investigation of the incidence of <em>Mycoplasma</em> in eastern Australia dairy herds</td>
<td>Geoffrey Gardiner Dairy Foundation</td>
</tr>
<tr>
<td>Development of <em>Salmonella</em> inanition treatment strategies for the livestock export industry</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Deoxyribonucleic acid (DNA) adenine methylase mutants of <em>Salmonella</em> Typhimurium as modified live vaccines in calves</td>
<td>United States Department of Agriculture</td>
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<tr>
<td>Epidemiological investigations into the 2007 equine influenza outbreak</td>
<td>Rural Industries Research and Development Corporation</td>
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<tr>
<td>Epizootiology of a myxozoan parasite in the endangered green and golden bell frog</td>
<td>Australian Academy of Science</td>
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<tr>
<td>Establishment of a <em>Moraxella bovis</em> and <em>Moraxella bovoculi</em> DNA diagnostic test to monitor species and strain prevalence in response to vaccination</td>
<td>Schering-Plough Pty Ltd</td>
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<tr>
<td>Evaluation of a new diagnostic test and therapeutic monitoring tool for invasive aspergillosis in cats — serum galactomannan detection</td>
<td>Feline Health Research Fund</td>
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<tr>
<td>Evaluation of the effectiveness of Gudair™ vaccination for the control of ovine Johne’s disease in flocks vaccinating for at least five years</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Evolution, disease and extinction — using ancient and modern DNA to investigate molecular evolution in the Tasmanian devil</td>
<td>Australian Research Council</td>
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</table>
Table A4.11 University of Sydney — Faculty of Veterinary Science animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Granting body</th>
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<tbody>
<tr>
<td>Extended examination of changes in within-flock prevalence of <em>Mycobacterium paratuberculosis</em> shedding following vaccination with Gudair™ for ovine Johne’s disease in flocks with high, medium and low initial prevalence</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Fertility management of koalas, kangaroos and wallabies</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Genomic studies into canine mast cell tumours</td>
<td>Morris Animal Foundation (USA)</td>
</tr>
<tr>
<td>Healthy dogs, healthy communities: evaluating the impact of new interdisciplinary interventions to enhance dog health and welfare in remote Indigenous communities</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Host–parasite–environment interaction for cryptococcosis caused by <em>Cryptococcus gatti</em> in Australia</td>
<td>Hermon Slade Foundation</td>
</tr>
<tr>
<td>Identification of the gene for the IL-2 cytokine in the brushtail possum</td>
<td>Landcare Research New Zealand Limited</td>
</tr>
<tr>
<td>Improving the production efficiency, welfare and processing of commercial ducks</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Investigation into gastrointestinal absorption of xenobiotics by the koala</td>
<td>Hermon Slade Foundation</td>
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<tr>
<td>Investigation of the development of the immune system of brushtail possum pouch young</td>
<td>Winifred Scott Foundation</td>
</tr>
<tr>
<td>Investigations into the role of feline herpesvirus in the development of eosinophilic granuloma complex (EGC) in cats</td>
<td>Australian Companion Animal Health Foundation</td>
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<tr>
<td>Investigations into the immunological memory of dogs vaccinated with commercial vaccines against canine parvovirus and canine distemper in Australia</td>
<td>Canine Research Foundation</td>
</tr>
<tr>
<td>Linking habitat fragmentation and disease: the major histocompatibility complex class II and its role in disease of the koala (<em>Phascolarctos cinereus</em>)</td>
<td>Hermon Slade Foundation</td>
</tr>
<tr>
<td>Livestock movement and managing disease in eastern Indonesia and eastern Australia</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Magnetic resonance imaging as a predictor of stifle pathology in naturally occurring cruciate ligament disease in dogs</td>
<td>Canine Research Foundation</td>
</tr>
<tr>
<td>Major histocompatibility complex (MHC) disease associations in the cat: the next leap forward</td>
<td>Australian Companion Animal Health Foundation</td>
</tr>
<tr>
<td>Molecular methods for detection of calf scour pathogens</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Noninvasive assessment of stress in commercial housing systems</td>
<td>Australian Egg Corporation Ltd</td>
</tr>
<tr>
<td>Oncotic and haemostatic effects of a modified fluid gelatin in normal horses</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Oxidative stress, ageing and cognitive dysfunction in dogs as ecological animal model in Alzheimer disease research</td>
<td>Australian Companion Animal Health Foundation</td>
</tr>
<tr>
<td>Parasitology network</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Physiological and nutritional approaches to alleviate heat stress in broiler chickens</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Prevalence and impact of hookworm infection on Australian sea lion populations</td>
<td>Australian Marine Mammal Centre</td>
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<tr>
<td>Project</td>
<td>Granting body</td>
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<tr>
<td>----------------------------------------------------------------------</td>
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<tr>
<td>Progression of changes in renal function in dogs recovering from acquired Fanconi-like syndrome</td>
<td>Provet NSW Pty Ltd</td>
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<tr>
<td>Protection against photoimmune suppression and skin cancer via oestrogen receptor signalling</td>
<td>Cancer Council New South Wales</td>
</tr>
<tr>
<td>Reducing antibiotic usage in pig herds: controlling <em>Lawsonia intracellularis</em> by vaccination, housing and hygiene</td>
<td>New South Wales Department of Primary Industries</td>
</tr>
<tr>
<td>Respiratory disease and biomarkers in the foal</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Retroviral invasion of the koala genome: prevalence, transmission and role in immunosuppressive disease</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Revisiting the mulesing operation on sheep</td>
<td>Australian Wool Innovation Limited</td>
</tr>
<tr>
<td>Risk assessment: animal diseases as they relate to food safety</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td><em>Salmonella</em> control in commercial layer flocks</td>
<td>Australian Egg Corporation Ltd</td>
</tr>
<tr>
<td>Should Australian cats be vaccinated against feline leukaemia virus (FeLV)? A pilot study of FeLV prevalence using a new methodology</td>
<td>Feline Health Research Fund</td>
</tr>
<tr>
<td>Strategies for low-cost molecular screening of contagious mastitis pathogens</td>
<td>Geoffrey Gardiner Dairy Foundation</td>
</tr>
<tr>
<td>Studies of the epidemiology and risk factors involved in the pathogenesis of acorn calf disease in Australia</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Susceptibility of previously untested Basin fish species to epizootic haematopoietic necrosis (EHN) virus, and the epidemiology of EHN virus in the wild</td>
<td>Australian Government</td>
</tr>
<tr>
<td>The Canine Biobank Project: an integrated genomics resource for the health and wellbeing of dogs in Australia</td>
<td>Canine Research Foundation</td>
</tr>
<tr>
<td>The genetics of resistance to devil facial tumour disease</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>The role of MHC in immune evasion: insights from a contagious cancer</td>
<td>National Health and Medical Research Council</td>
</tr>
<tr>
<td>The role of pulpitis in the development of type II feline odontoclastic resorptive lesions</td>
<td>Morris Animal Foundation (USA)</td>
</tr>
<tr>
<td>The welfare of laying hens in cages</td>
<td>Australian Egg Corporation Ltd</td>
</tr>
<tr>
<td>Topical and cryoanaesthesia for livestock husbandry</td>
<td>Australian Research Council</td>
</tr>
<tr>
<td>Understanding and mitigation of domestic pig and pest animal interactions</td>
<td>Australian Pork Ltd</td>
</tr>
<tr>
<td>Viral and endogenous retroviral detection and characterisation in crocodiles</td>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>Vitamin D in Australian lean red meat</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>What causes upper respiratory aspergillosis in cats? Identification of <em>Neosartorya</em> species implicated in an emerging clinical syndrome</td>
<td>Australian Companion Animal Health Foundation</td>
</tr>
<tr>
<td>What role does wildlife play in emergency disease? The case of the feral pig</td>
<td>Australian Research Council</td>
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</table>
### Table A4.12 Australian Egg Corporation Limited animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
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<tbody>
<tr>
<td>Dietary available phosphorus requirements of laying hens</td>
<td>University of Queensland</td>
</tr>
<tr>
<td><em>Salmonella</em> control in commercial layer flocks</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Determining the cause and methods of control for spotty liver syndrome</td>
<td>Scolexia Pty Ltd</td>
</tr>
<tr>
<td>Noninvasive assessment of stress in commercial housing systems</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Field application of Rispens-specific quantitative polymerase chain reaction (PCR) test</td>
<td>University of New England</td>
</tr>
<tr>
<td>Effects of rearing on inappropriate conflict behaviours that predispose cannibalism</td>
<td>University of Sydney, University of Melbourne</td>
</tr>
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</table>

### Table A4.13 Australian Wool Innovation Limited animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial baiting for wild dogs</td>
<td>Industry &amp; Investment NSW</td>
</tr>
<tr>
<td>Bestwool/Bestlamb 2008–11 (Victorian extension program)</td>
<td>Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>Breeding for breech strike resistance</td>
<td>Department of Agriculture and Food WA, Commonwealth Scientific and Industrial Research Organisation Livestock Industries</td>
</tr>
<tr>
<td>Cobbett Intradermal, phase 2</td>
<td>Cobbett Pty Ltd</td>
</tr>
<tr>
<td>Cobbett Technologies — SkinTraction, phase 3</td>
<td>Cobbett Pty Ltd</td>
</tr>
<tr>
<td>Communication and extension of practical management strategies arising from the SA Livestock Adaptation to Climate Change Program</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Comparison of programs for the control of blowfly strike in Merino sheep in south-eastern Australia</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Enhanced breeding for breech flystrike resistance</td>
<td>Commonwealth Scientific and Industrial Research Organisation Livestock Industries, Department of Agriculture and Food WA</td>
</tr>
<tr>
<td>Facilitating the strategic management of wild dogs in Australia</td>
<td>Invasive Animals Cooperative Research Centre</td>
</tr>
<tr>
<td>FFI CRC commercialisation of lotus cultivars and development of accompanying knowledge for their on-farm use and management</td>
<td>Future Farm Industries Cooperative Research Centre</td>
</tr>
<tr>
<td>FFI CRC Evergraze</td>
<td>Future Farm Industries Cooperative Research Centre</td>
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<tr>
<td>It’s Ewe Time forums 2011</td>
<td>Meat &amp; Livestock Australia, Rural Directions Pty Ltd</td>
</tr>
<tr>
<td>Leading Sheep 2008–11 (Queensland extension program)</td>
<td>Queensland Primary Industries and Fisheries</td>
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<tr>
<td>Lifetime ewe management training</td>
<td>Rural Industries Skill Training</td>
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<tr>
<td>Methane Mitigation</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>National Bestprac Program 2011–2013 (pastoral extension program)</td>
<td>Rural Directions Pty Ltd</td>
</tr>
<tr>
<td>National Wool Residue Survey</td>
<td>AWTA Product Testing</td>
</tr>
<tr>
<td>Environmentally Friendly Insecticides, phase 2</td>
<td>Commonwealth Scientific and Industrial Research Organisation Food and Nutritional Sciences</td>
</tr>
<tr>
<td>RHD Boost — rabbit biocontrol</td>
<td>Invasive Animals Cooperative Research Centre</td>
</tr>
<tr>
<td>Shearer &amp; Wool Handler Training — New South Wales training delivery 2010/2011</td>
<td>TAFE NSW, Western Institute, The Ringer</td>
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<tr>
<td>Shearer &amp; Wool Handler Training — South Australia training delivery 2010/2011</td>
<td>TAFE SA</td>
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</table>
Table A4.13 Australian Wool Innovation Limited animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
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</thead>
<tbody>
<tr>
<td>Shearer &amp; Wool Handler Training — Victoria training delivery 2010/2011</td>
<td>Primary Skills Victoria, SCAA Shearer Woolhandler Training Inc</td>
</tr>
<tr>
<td>Shearer &amp; Wool Handler Training — Western Australia training delivery 2010/2011</td>
<td>C Y O’Connor College of TAFE, Great Southern Regional TAFE</td>
</tr>
<tr>
<td>Sheep Connect 2008–2011 (NSW extension program)</td>
<td>New South Wales Department of Primary Industries</td>
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<tr>
<td>Sheep Connect Tasmania 2009–2012</td>
<td>University of Tasmania</td>
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<tr>
<td>Sheep CRC 2 — postgraduate training</td>
<td>Cooperative Research Centre for Sheep Industry Innovation</td>
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<tr>
<td>Sheep CRC 2 — Project 4 1 1, Information – Nucleus – Design and Analysis</td>
<td>Cooperative Research Centre for Sheep Industry Innovation</td>
</tr>
<tr>
<td>Sheep CRC 2 — Project 4 2 1, Information – Nucleus – Operations</td>
<td>Cooperative Research Centre for Sheep Industry Innovation</td>
</tr>
<tr>
<td>Sheep Connect SA 2008–2011 (SA extension program)</td>
<td>Primary Industries and Resources SA</td>
</tr>
<tr>
<td>Sheep — Genetics — MERINOSELECT</td>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>Strategic approach to integrated wild canid management for agricultural benefit</td>
<td>Invasive Animals Cooperative Research Centre</td>
</tr>
<tr>
<td>The Sheep’s Back 2007–2010 (WA extension program)</td>
<td>JRL Hall &amp; Co</td>
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Table A4.14 Dairy Australia animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
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</thead>
<tbody>
<tr>
<td>InCalf, a national extension program for herd reproductive performance</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>An investigation into methods of predicting ovulation in cattle</td>
<td>University of Queensland</td>
</tr>
<tr>
<td>Countdown Downunder: making it happen on farm</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>BJD Aware, a Johne’s disease communications program</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Application of herd tests for Johne’s disease</td>
<td>Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>Assessment of calf-rearing strategies for Johne’s disease control</td>
<td>Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>Calf health and diseases</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>National program to eradicate enzootic bovine leucosis from the Australian dairy herd</td>
<td>Australian Dairy Industry Council; Dairy Processors; Australian Dairy Farmers; Australian Government Department of Agriculture, Fisheries and Forestry; state animal health authorities; Dairy Australia</td>
</tr>
<tr>
<td>Response to emergency animal diseases</td>
<td>Dairy Australia, NE Tweddle</td>
</tr>
<tr>
<td>Biosecurity management on dairy farms</td>
<td>Dairy Australia, JA Craven</td>
</tr>
<tr>
<td>Animal health, lameness and calf-rearing extension days</td>
<td>Regional dairy programs (several)</td>
</tr>
<tr>
<td>Facial eczema monitoring</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td><strong>Genetic improvement</strong></td>
<td></td>
</tr>
<tr>
<td>Australian Dairy Herd Improvement Scheme</td>
<td>Australian Dairy Herd Improvement Scheme</td>
</tr>
</tbody>
</table>
### Table A4.14 Dairy Australia animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer decision making for the selection of genetics in Australian dairy herds</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Dairy Futures Cooperative Research Centre</td>
<td>Dairy Futures Cooperative Research Centre, Victorian Department of Primary Industries, LaTrobe University, University of Sydney, Monash University, University of Melbourne, Commonwealth Scientific and Industrial Research Organisation, Australian Dairy Herd Improvement Scheme</td>
</tr>
<tr>
<td><strong>Dairy nutrition</strong></td>
<td></td>
</tr>
<tr>
<td>Future Forages</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>30:30 Feedbase Project</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>20:12 Feedbase Project</td>
<td>Tasmanian Institute of Agricultural Research</td>
</tr>
<tr>
<td>Forage Plu$</td>
<td>Queensland Department of Primary Industries and Fisheries</td>
</tr>
<tr>
<td>Pasture Plu$</td>
<td>Tasmanian Department of Primary Industries and Water</td>
</tr>
<tr>
<td>Greener Pastures</td>
<td>Department of Agriculture and Food WA</td>
</tr>
<tr>
<td>South East Forage Innovation</td>
<td>Dairy South Australia (regional dairy program)</td>
</tr>
<tr>
<td>Future Dairy, addressing future resource limitations through innovation in forages and automation</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Flexible Intensive Feeding Systems</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>The Cool Cows Project</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Feed2Milk: managing the risks associated with grain/ concentrate and fodder purchases</td>
<td>Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>TASMILK 60 Grains2Milk Project</td>
<td>Tasmanian Institute of Agricultural Research</td>
</tr>
<tr>
<td>Focus Farms — improving environment and enterprise management</td>
<td>Gipps Dairy, West Vic Dairy, Dairy South Australia (regional dairy programs)</td>
</tr>
<tr>
<td>Feed budgeting and grain-buying workshops</td>
<td>Western Dairy (regional dairy program)</td>
</tr>
<tr>
<td><strong>Animal handling and husbandry practices</strong></td>
<td></td>
</tr>
<tr>
<td>Dairy Welfare We Care, an animal welfare communications program</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Flood response coordination</td>
<td>Dairy Australia, regional dairy programs</td>
</tr>
<tr>
<td>Disbudding extension</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Lameness training and prevention</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Alternatives to tail docking</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Dairy calf supply chain trial</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Improved calf-management systems</td>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Competencies for calf husbandry</td>
<td>J McNeil</td>
</tr>
<tr>
<td>Calf transport and time-off-feed trial</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>National Centre of Dairy Education Australia</td>
<td>National Centre of Dairy Education Australia</td>
</tr>
<tr>
<td>Management of downer cows</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Victorian Dairy Extension Centre</td>
<td>Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>Dairy Pathways — NSW Extension Service</td>
<td>New South Wales Department of Primary Industries</td>
</tr>
</tbody>
</table>

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Table A4.15 Fisheries Research and Development Corporation — Aquatic Animal Health Subprogram — animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Research provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metazoan parasite survey of selected macro-inshore fish of south-eastern Australia, including species of commercial interest</td>
<td>University of Adelaide, James Cook University</td>
</tr>
<tr>
<td>Development of a deoxyribonucleic acid (DNA) microarray to identify markers of disease in pearl oysters (Pinctada maxima) and to assess overall oyster health</td>
<td>Department of Fisheries, Western Australia; Macquarie University</td>
</tr>
<tr>
<td>Investigation of Chlamydiales-like organisms in pearl oysters, Pinctada maxima</td>
<td>Department of Fisheries, Western Australia</td>
</tr>
<tr>
<td>Strategic planning, project management and adoption</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Tools for investigation of the nodavirus (NNV) carrier state in marine, euryhaline and freshwater fish and control of NNV through integrated management</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Intensive pathology training workshop for laboratory diagnosticians</td>
<td>Elizabeth Macarthur Agricultural Institute, Industry &amp; Investment NSW</td>
</tr>
<tr>
<td>Characterisation of abalone herpes-like virus infections in abalone</td>
<td>Commonwealth Scientific and Industrial Research Organisation, Victorian Department of Primary Industries, South Australian Research and Development Institute</td>
</tr>
<tr>
<td>Surveys of ornamental fish for pathogens of quarantine significance</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Risk analysis: aquatic animal diseases associated with bait translocation</td>
<td>DigsFish Services Pty Ltd</td>
</tr>
<tr>
<td>Determining the susceptibility of remnant populations of abalone previously exposed to abalone viral ganglioneuritis (AVG)</td>
<td>Victorian Abalone Divers Association</td>
</tr>
<tr>
<td>Investigation of an emerging bacterial disease in wild Queensland gropers, marine fish and stingrays with production of diagnostic and epidemiological tools to reduce the spread of disease to other states in Australia</td>
<td>Queensland Department of Employment, Economic Development and Innovation</td>
</tr>
<tr>
<td>Improved fish health management for integrated inland aquaculture through better management practices (BMPs)</td>
<td>Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>Investigations into the genetic basis of resistance to infection of abalone by the abalone herpes-like virus</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Development of improved molecular diagnostic tests for Perkinsus olsenii in Australian molluscs</td>
<td>Commonwealth Scientific and Industrial Research Organisation; Department of Fisheries, Western Australia</td>
</tr>
</tbody>
</table>

Table A4.16 Meat & Livestock Australia animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification and validation of new drug targets for control of gastrointestinal nematode parasites of sheep</td>
<td>Australian Wool Innovation Management Agreement, Australian National University, Commonwealth Scientific and Industrial Research Organisation, Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>In vitro larval assays for anthelmintic resistance in cattle nematodes</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Refinement and validation of a polymerase chain reaction (PCR) test to replace worm egg count and faecal culture larval differentiation</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>A re-evaluation of worm control and anthelmintic resistance on beef cattle properties in Western Australia</td>
<td>Western Australian Agricultural Authority</td>
</tr>
<tr>
<td>Impact of infectious diseases on beef cattle reproduction</td>
<td>Industry &amp; Investment NSW</td>
</tr>
<tr>
<td>A coordinated approach to minimising the impact of annual ryegrass toxicity in agriculture</td>
<td>Western Australian Agricultural Authority</td>
</tr>
</tbody>
</table>
### Table A4.16 Meat & Livestock Australia animal health research projects (continued)

<table>
<thead>
<tr>
<th>Project</th>
<th>Research institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial ryegrass toxicity: increased understanding, awareness and potential mitigation strategies; identification of metabolites associated with severe cases of perennial ryegrass toxicosis</td>
<td>University of Melbourne, Reed Pasture Science</td>
</tr>
<tr>
<td>RHD Boost — new calicivirus strains for potential release in Australia</td>
<td>Invasive Animals Cooperative Research Centre, Commonwealth Scientific and Industrial Research Organisation, Industry &amp; Investment NSW</td>
</tr>
<tr>
<td>Development and delivery of a new feral pig toxin/HOG-GONE®</td>
<td>Invasive Animals Ltd</td>
</tr>
<tr>
<td>Efficacy of Gudair™ vaccination for control of ovine Johne’s disease in flocks</td>
<td>University of Sydney, Animal Health Australia</td>
</tr>
<tr>
<td>Epidemiology and control of bovine Johne’s disease in beef cattle herds</td>
<td>University of Melbourne, Animal Health Australia</td>
</tr>
<tr>
<td>Ovine strain of <em>Mycobacterium paratuberculosis</em> in beef cattle: case studies</td>
<td>Victorian Department of Primary Industries, Animal Health Australia</td>
</tr>
<tr>
<td>Field study to assess the efficacy of Silirum™ vaccine in two cattle herds infected with bovine Johne’s disease</td>
<td>Pfizer Australia, Victorian Department of Primary Industries</td>
</tr>
<tr>
<td>Bovine and ovine Johne’s disease — basic and applied research for improved diagnosis and prevention</td>
<td>University of Sydney, Animal Health Australia</td>
</tr>
<tr>
<td>Improvement of Australia’s foot-and-mouth disease preparedness and response capability</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Fungal biopesticide for cattle tick control</td>
<td>Queensland Department of Employment, Economic Development and Innovation</td>
</tr>
<tr>
<td>Selection of novel tick vaccine candidates using vaccination-challenge studies in cattle</td>
<td>Cooperative Research Centre for Beef Genetic Technologies; Queensland Department of Employment, Economic Development and Innovation</td>
</tr>
<tr>
<td>In vitro culture of buffalo fly and infections with <em>Wolbachia</em></td>
<td>University of Queensland; Queensland Department of Employment, Economic Development and Innovation</td>
</tr>
<tr>
<td>Molecular methods for detection of calf scour pathogens</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Factors influencing the development of mucosal immunity in hand-reared calves</td>
<td>La Trobe University</td>
</tr>
<tr>
<td>Impact of bacteria and coccidia on scouring and productivity in sheep</td>
<td>Murdoch University, South Australian Research and Development Institute, University of Melbourne</td>
</tr>
<tr>
<td>Bovine anaemia caused by <em>Theileria orientalis</em>: distribution and significance of major piroplasm surface protein types; buparvaquone efficacy dose confirmation; vaccine feasibility; buparvaquone tissue residue assay method</td>
<td>New South Wales Department of Primary Industries, Tick Fever Centre, Agrisearch Analytical</td>
</tr>
</tbody>
</table>

### Table A4.17 Rural Industries Research and Development Corporation animal health research projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Research provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken meat</td>
<td></td>
</tr>
<tr>
<td>Improved diagnostics for detecting antibodies to H5N1</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Subunit vaccine against infectious bursal disease virus</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Improving control of infectious laryngotracheitis in Australian broiler flocks</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Surveillance and pathotyping of circulating infectious bursal disease virus strains</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Characterisation of avian nephritis virus (ANV) in commercial poultry</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Rapid typing of <em>Pasteurella multocida</em></td>
<td>University of Queensland</td>
</tr>
<tr>
<td>Project</td>
<td>Research provider</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Honey bee and pollination</strong></td>
<td></td>
</tr>
<tr>
<td>Genetic variation of <em>Varroa jacobsoni</em> and pathology of microbial pathogens</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>Use of sniffer dogs in detection of American foul brood in beehives</td>
<td>Queensland Department of Employment, Economic Development and Innovation</td>
</tr>
<tr>
<td>Preparing for <em>Varroa</em>: how susceptible are Australian honey bee stocks</td>
<td>University of Sydney</td>
</tr>
<tr>
<td><strong>Horses</strong></td>
<td></td>
</tr>
<tr>
<td>Maternal metabolic status and the occurrence of osteochondrosis dissecans in thoroughbred foals</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Diagnosis and control of small strongyle parasites of horses</td>
<td>Charles Sturt University</td>
</tr>
<tr>
<td>Antimicrobial susceptibility patterns of bacterial isolates from horses</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Virus and horse-specific risk factors for equine herpesvirus 1 neurological disease</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Respiratory disease and biomarkers in the foal</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>Epidemiological investigations into the 2007 equine influenza outbreak</td>
<td>University of Sydney</td>
</tr>
<tr>
<td>An adenoviral vector vaccine against <em>Rhodococcus equi</em></td>
<td>University of South Australia</td>
</tr>
<tr>
<td><strong>New animal products</strong></td>
<td></td>
</tr>
<tr>
<td>Viral and endogenous retroviral detection and characterisation in crocodiles</td>
<td>Northern Territory Department of Resources</td>
</tr>
</tbody>
</table>
APPENDIX 5

KEY AUSTRALIAN ANIMAL HEALTH WEBSITES
<table>
<thead>
<tr>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Health Australia</td>
</tr>
<tr>
<td>AUS-MEAT</td>
</tr>
<tr>
<td>Australasian Veterinary Boards Council</td>
</tr>
<tr>
<td>Australian Alpaca Association</td>
</tr>
<tr>
<td>Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease</td>
</tr>
<tr>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>Australian Chicken Meat Federation</td>
</tr>
<tr>
<td>Australian Dairy Farmers</td>
</tr>
<tr>
<td>Australian Egg Corporation</td>
</tr>
<tr>
<td>Australian Food and Grocery Council</td>
</tr>
<tr>
<td>Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>Australian Harness Racing</td>
</tr>
<tr>
<td>Australian Honey Bee Industry Council</td>
</tr>
<tr>
<td>Australian Horse Industry Council</td>
</tr>
<tr>
<td>Australian Livestock Export Coop (LiveCorp)</td>
</tr>
<tr>
<td>Australian Lot Feeders’ Association</td>
</tr>
<tr>
<td>Australian National Quality Assurance Program</td>
</tr>
<tr>
<td>Australian Overseas Aid Program, AusAID</td>
</tr>
<tr>
<td>Australian Poultry Cooperative Research Centre</td>
</tr>
<tr>
<td>Australian Racing Board</td>
</tr>
<tr>
<td>Australian Veterinary Association</td>
</tr>
<tr>
<td>Australian Wool Innovation</td>
</tr>
<tr>
<td>Biosecurity Australia</td>
</tr>
<tr>
<td>Cooperative Research Centre for Beef Genetic Technologies</td>
</tr>
<tr>
<td>Cooperative Research Centre for High Integrity Australian Pork</td>
</tr>
<tr>
<td>Cooperative Research Centre for Sheep Industry Innovation</td>
</tr>
<tr>
<td>CSIRO Australian Animal Health Laboratory</td>
</tr>
<tr>
<td>CSIRO Livestock Industries</td>
</tr>
<tr>
<td>Dairy Australia</td>
</tr>
<tr>
<td>Deer Industry Association of Australia</td>
</tr>
<tr>
<td>Department of Agriculture and Food, Western Australia</td>
</tr>
<tr>
<td>Department of Fisheries, Western Australia</td>
</tr>
<tr>
<td>Department of Primary Industries, New South Wales</td>
</tr>
<tr>
<td>Website</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Department of Primary Industries, Victoria</td>
</tr>
<tr>
<td>Department of Employment, Economic Development and Innovation, Queensland</td>
</tr>
<tr>
<td>Department of Primary Industries, Parks, Water and Environment, Tasmania</td>
</tr>
<tr>
<td>Department of Primary Industries and Resources, South Australia</td>
</tr>
<tr>
<td>Department of Resources, Northern Territory</td>
</tr>
<tr>
<td>Faculty of Veterinary Science, University of Melbourne</td>
</tr>
<tr>
<td>Faculty of Veterinary Science, University of Sydney</td>
</tr>
<tr>
<td>Farm Biosecurity</td>
</tr>
<tr>
<td>Food Standards Australia New Zealand</td>
</tr>
<tr>
<td>Meat &amp; Livestock Australia</td>
</tr>
<tr>
<td>National Farmers' Federation</td>
</tr>
<tr>
<td>National Pests &amp; Disease Outbreaks</td>
</tr>
<tr>
<td>Primary Industries Ministerial Council</td>
</tr>
<tr>
<td>Rural Industries Research and Development Corporation</td>
</tr>
<tr>
<td>SAFEMEAT</td>
</tr>
<tr>
<td>School of Animal and Veterinary Sciences, Charles Sturt University</td>
</tr>
<tr>
<td>School of Veterinary Science, University of Queensland</td>
</tr>
<tr>
<td>School of Veterinary and Biomedical Sciences, James Cook University</td>
</tr>
<tr>
<td>School of Veterinary and Biomedical Sciences, Murdoch University</td>
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<tr>
<td>Seafood Services Australia</td>
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</table>
ACRONYMS AND ABBREVIATIONS
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AAHL</td>
<td>Australian Animal Health Laboratory</td>
</tr>
<tr>
<td>AAWS</td>
<td>Australian Animal Welfare Strategy</td>
</tr>
<tr>
<td>ABLV</td>
<td>Australian bat lyssavirus</td>
</tr>
<tr>
<td>ACIAR</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>AHA</td>
<td>Animal Health Australia</td>
</tr>
<tr>
<td>AHC</td>
<td>Animal Health Committee</td>
</tr>
<tr>
<td>APMV-1</td>
<td>avian paramyxovirus type 1</td>
</tr>
<tr>
<td>AQUAVETPLAN</td>
<td>Australian Aquatic Veterinary Emergency Plan</td>
</tr>
<tr>
<td>AusAID</td>
<td>Australian Agency for International Development</td>
</tr>
<tr>
<td>AUSVETPLAN</td>
<td>Australian Veterinary Emergency Plan</td>
</tr>
<tr>
<td>AWHN</td>
<td>Australian Wildlife Health Network</td>
</tr>
<tr>
<td>BEF</td>
<td>bovine ephemeral fever</td>
</tr>
<tr>
<td>BTV</td>
<td>bluetongue virus</td>
</tr>
<tr>
<td>CCEAD</td>
<td>Consultative Committee on Emergency Animal Diseases</td>
</tr>
<tr>
<td>Codex</td>
<td>Codex Alimentarius Commission</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
</tr>
<tr>
<td>CSIRO-AAHL</td>
<td>CSIRO Australian Animal Health Laboratory</td>
</tr>
<tr>
<td>DAFF</td>
<td>Australian Government Department of Agriculture, Fisheries and Forestry</td>
</tr>
<tr>
<td>DoHA</td>
<td>Australian Government Department of Health and Ageing</td>
</tr>
<tr>
<td>EAD</td>
<td>emergency animal disease</td>
</tr>
<tr>
<td>EADRA</td>
<td>Emergency Animal Disease Response Agreement</td>
</tr>
<tr>
<td>EID</td>
<td>emerging infectious disease</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>FMD</td>
<td>foot-and-mouth disease</td>
</tr>
<tr>
<td>HACCP</td>
<td>hazard analysis and critical control points</td>
</tr>
<tr>
<td>IRA</td>
<td>import risk analysis</td>
</tr>
<tr>
<td>NAHIS</td>
<td>National Animal Health Information System</td>
</tr>
<tr>
<td>NAMP</td>
<td>National Arbovirus Monitoring Program</td>
</tr>
<tr>
<td>NAQS</td>
<td>Northern Australia Quarantine Strategy</td>
</tr>
<tr>
<td>NLIS</td>
<td>National Livestock Identification System</td>
</tr>
<tr>
<td>NSDIP</td>
<td>National Significant Disease Investigation Program</td>
</tr>
<tr>
<td>NSHP</td>
<td>National Sentinel Hive Program</td>
</tr>
<tr>
<td>NTSESP</td>
<td>National Transmissible Spongiform Encephalopathies Surveillance Program</td>
</tr>
<tr>
<td>NVD</td>
<td>National Vendor Declaration</td>
</tr>
<tr>
<td>OIE</td>
<td>World Organisation for Animal Health</td>
</tr>
<tr>
<td>OsHV-1</td>
<td>Ostreid herpesvirus-1</td>
</tr>
<tr>
<td>PCR</td>
<td>polymerase chain reaction</td>
</tr>
<tr>
<td>PISC</td>
<td>Primary Industries Standing Committee</td>
</tr>
<tr>
<td>QA</td>
<td>quality assurance</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>research and development</td>
</tr>
<tr>
<td>SCAHLS</td>
<td>Sub-Committee on Animal Health Laboratory Standards</td>
</tr>
<tr>
<td>ScoPI</td>
<td>Standing Council on Primary Industries</td>
</tr>
<tr>
<td>SOP</td>
<td>standard operating procedure</td>
</tr>
<tr>
<td>SWF</td>
<td>screw-worm fly</td>
</tr>
<tr>
<td>TSE</td>
<td>transmissible spongiform encephalopathy</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
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<td>WTO</td>
<td>World Trade Organization</td>
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### Glossary

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<tr>
<td>acaricide</td>
<td>Pesticides used to control acarids such as mites and ticks.</td>
</tr>
<tr>
<td>antimicrobial</td>
<td>Antibacterial agents (including ionophores) but not including antiprions, antifungals, antiseptics, disinfectants, antineoplastic agents, antivirals, immunologicals, direct-fed microbials or enzyme substances.</td>
</tr>
<tr>
<td>biosecurity</td>
<td>The exclusion, eradication or effective management of risks posed by pests and diseases to human and animal health, horticultural industries, ecological systems and the economy.</td>
</tr>
<tr>
<td>camelids</td>
<td>Members of the biological family Camelidae, including camels, alpacas, llamas and dromedaries.</td>
</tr>
<tr>
<td><strong>Culicoides</strong></td>
<td>A genus containing at least 123 species of biting midge — very small insects, visible to the naked eye, with a wing length of about 0.9 mm. Particular <strong>Culicoides</strong> species carry and spread bluetongue and Akabane viruses by taking blood meals from hosts such as cattle and sheep. The distribution and population of <strong>Culicoides</strong> are affected by factors such as climate (rainfall, wind), light and proximity of livestock.</td>
</tr>
<tr>
<td>emergency animal disease</td>
<td>A disease that is (a) exotic to Australia or (b) a variant of an endemic disease or (c) a serious infectious disease of unknown or uncertain cause or (d) a severe outbreak of a known endemic disease, and that is considered to be of national significance with serious social or trade implications.</td>
</tr>
<tr>
<td>emerging (disease)</td>
<td>A new infectious disease resulting from a change in an existing pathogenic agent, a known disease occurring in a new area or population, or a previously unrecognised pathogen or disease.</td>
</tr>
<tr>
<td>endemic animal disease</td>
<td>A disease affecting animals (which may include humans) that is known to occur in Australia.</td>
</tr>
<tr>
<td><strong>enteric</strong></td>
<td>Intestinal; to do with the intestines (gut).</td>
</tr>
<tr>
<td><strong>epidemic</strong></td>
<td>An unexpected and substantial increase in the incidence of a disease.</td>
</tr>
<tr>
<td><strong>epidemiological</strong></td>
<td>Relating to the study of disease and its causes in a population.</td>
</tr>
<tr>
<td><strong>epidemiologist</strong></td>
<td>A scientist who studies the transmission and control of epidemic diseases.</td>
</tr>
<tr>
<td><strong>epidemiology</strong></td>
<td>Science of the distribution of disease in populations, with investigations into the source and causes of infection.</td>
</tr>
<tr>
<td><strong>exotic animal disease</strong></td>
<td>A disease affecting animals (which may include humans) that does not normally occur in Australia. See also Emergency animal disease, Endemic animal disease.</td>
</tr>
<tr>
<td><strong>granulomas</strong></td>
<td>Lesions with a yellowish appearance that have a caseous (cheesy), caseo-calcerous (cheesy and chalky) or calcified (bony) consistency. Occasionally, they may contain pus. The caseous centre is usually dry, firm and covered with a capsule of varying thickness that is made from the surrounding tissue. Granulomas can vary in size from small (and therefore easily missed) to very large, involving the greater part of the organ.</td>
</tr>
<tr>
<td><strong>invasive (animals)</strong></td>
<td>Any animal having, or with the potential to have, an adverse economic, environmental or social/cultural impact.</td>
</tr>
<tr>
<td><strong>nucleotide substitution</strong></td>
<td>A form of mutation of the nucleotide sequence of deoxyribonucleic acid (DNA), where one base is replaced by another.</td>
</tr>
<tr>
<td><strong>pandemic disease</strong></td>
<td>An epidemic disease that occurs over a widespread area (multiple countries or continents) and usually affects a substantial proportion of the population.</td>
</tr>
<tr>
<td><strong>pathogen</strong></td>
<td>A biological agent that causes disease or illness in its host.</td>
</tr>
<tr>
<td><strong>pathogenic</strong></td>
<td>Capable of causing disease.</td>
</tr>
<tr>
<td><strong>phytosanitary</strong></td>
<td>Relating to the health of plants; especially the freedom from pests and diseases requiring quarantine.</td>
</tr>
<tr>
<td><strong>polymerase chain reaction (PCR)</strong></td>
<td>A highly sensitive test that can detect DNA fragments of viruses or other organisms in blood or tissue. It works by repeatedly copying genetic material using heat cycling and enzymes.</td>
</tr>
<tr>
<td><strong>precursor</strong></td>
<td>A substance, or virus, from which another substance can form.</td>
</tr>
<tr>
<td><strong>progenitor</strong></td>
<td>The primary virus from which the current virus developed.</td>
</tr>
<tr>
<td><strong>ratite</strong></td>
<td>A large, flightless bird, such as an emu or an ostrich.</td>
</tr>
<tr>
<td><strong>real-time polymerase chain reaction (RT-PCR)</strong></td>
<td>A laboratory technique that is used to amplify and simultaneously quantify a targeted DNA molecule.</td>
</tr>
<tr>
<td><strong>sentinel</strong></td>
<td>A previously uninfected animal or hive of animals, kept at a specific location to detect the presence of disease-causing organisms, such as viruses or parasites. Samples (e.g. blood, bees) are collected from the sentinels at intervals to check whether infection or infestation has occurred.</td>
</tr>
<tr>
<td><strong>serology</strong></td>
<td>Immunological reactions and properties of serum, often used to diagnose disease.</td>
</tr>
<tr>
<td><strong>stamping out</strong></td>
<td>The strategy of eliminating infection from premises through the destruction of animals in accordance with the particular AUSVETPLAN manual, and in a manner that permits appropriate disposal of carcasses and decontamination of the site.</td>
</tr>
<tr>
<td><strong>synthetic pyrethroids</strong></td>
<td>Synthetic chemical insecticides that act in a similar manner to naturally derived pyrethrins.</td>
</tr>
<tr>
<td><strong>taxon</strong></td>
<td>A taxonomic category or group, such as phylum, order, family, genus or species.</td>
</tr>
<tr>
<td><strong>transboundary animal diseases</strong></td>
<td>Epidemic animal diseases that are highly infectious, with potential for very rapid spread, irrespective of national borders, and able to seriously impact the economy or human health (or both).</td>
</tr>
<tr>
<td><strong>vector</strong></td>
<td>A living organism (frequently an arthropod) that transmits an infectious agent from one host to another. A biological vector is one in which the infectious agent must develop or multiply before becoming infective to a recipient host. A mechanical vector is one that transmits an infectious agent from one host to another but is not essential to the life cycle of the agent.</td>
</tr>
<tr>
<td><strong>virology</strong></td>
<td>The study of viruses and viral diseases.</td>
</tr>
<tr>
<td><strong>virulent</strong></td>
<td>A term referring to the relative ability of an infectious agent to cause disease.</td>
</tr>
<tr>
<td><strong>zoonosis</strong></td>
<td>A disease of animals that can be transmitted to humans.</td>
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