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ANIMAL HEALTH IN AUSTRALIA 2016

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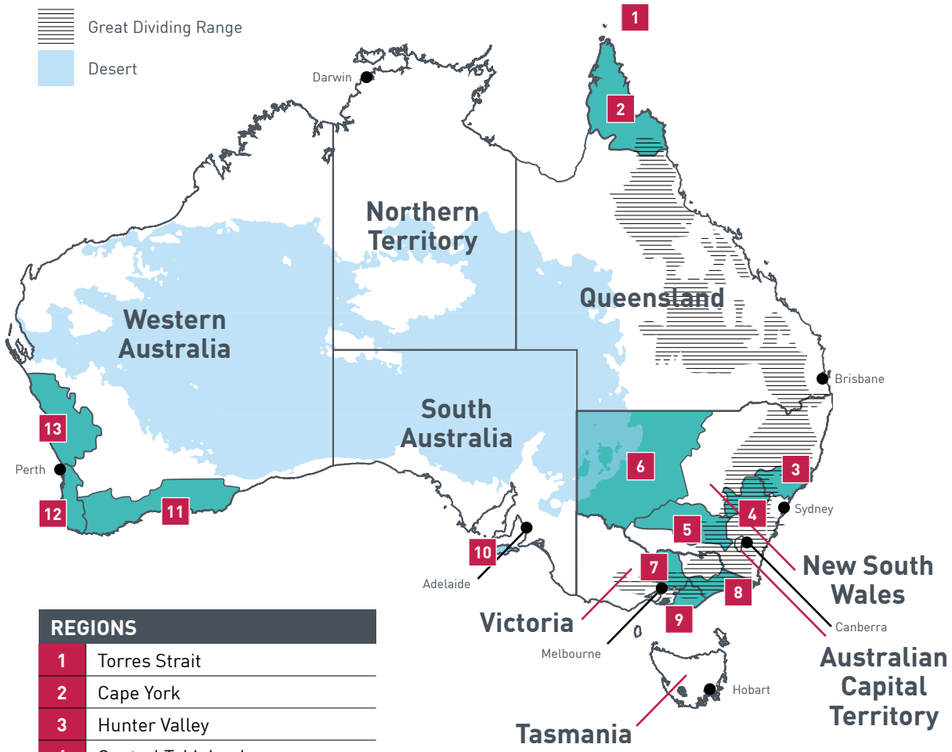
2016



REGIONS	
1	Torres Strait
2	Cape York
3	Hunter Valley
4	Central Tablelands
5	Riverina
6	Western NSW
7	Goulburn Broken
8	East Gippsland
9	West Gippsland
10	Kangaroo Island
11	Southern Agricultural Region
12	Southwest Agricultural Region
13	Northern Agricultural Region

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Feedback

Comments and suggestions regarding the *Animal Health in Australia 2016* report are welcomed. Please forward all correspondence to the Communications and Partnerships Manager, Animal Health Australia, via email at aha@animalhealthaustralia.com.au.

FOREWORD

It is my pleasure to present this annual summary of Australia's animal health status and system for 2016. It provides information on significant terrestrial and aquatic animal diseases, and outlines the governance, surveillance, emergency management, animal welfare, food safety and international trade arrangements that underpin our animal health system. The report highlights Australia's contribution to regional animal health activities and provides a summary of the key animal health research and development activities in Australia in 2016.

Surveillance has been a key priority for Australia this year. Under the auspices of the Agricultural Competitiveness White Paper, the Government has invested $200 million over four years in biosecurity surveillance and analysis, to protect our animal and plant health status and ensure Australian agriculture remains strong and competitive. The four target areas for this funding include strengthening surveillance, information and analysis, community-based action, and improving scientific capability.

The White Paper funding also includes additional resources for biosecurity activities in northern Australia, where the risks vary due to the tropical environment and proximity to other countries. The Northern Australia Biosecurity Framework expanded on the Northern Australia Quarantine Strategy to progress surveillance activities and manage new biosecurity risks across northern Australia. The Framework encourages collaboration between governments, industries and communities to develop and share information on tropical biosecurity, and share resources to ensure timely and informed decisions.

Australia continued its collaboration with the European Commission for the Control of Foot-and-Mouth Disease (EuFMD), developing an online emergency preparation course to improve Australia's national capacity to recognise, report, and sustain an effective response to an outbreak of foot-and-mouth disease (FMD). The pilot course was delivered by the EuFMD, using a portal developed in partnership with the Royal Veterinary College of the University of London. Facilitators guided 118 participants through interactive online discussions, live webinars and self-directed coursework over a four-week period.

Australia led the International Animal Health Emergency Reserve (IAHER) network to develop an operations manual setting out agreed policies, procedures and templates. A draft version of the manual was endorsed in May 2016. Subsequently, Exercise Athena was conducted during November and December, simulating an outbreak of FMD in Australia. The exercise provided an opportunity for signatory countries to practise their roles in the IAHER, and to train staff in relation to the requirements of participating in a response. Lessons identified during the exercise will be incorporated into the manual for final endorsement in 2017. The IAHER arrangement allows signatory countries (Australia, Canada, Ireland, New Zealand, United Kingdom and the United States) to share personnel during an emergency animal disease (EAD) event.

Australia signed two other arrangements in the margins of the World Organisation for Animal Health (OIE) General Session supporting EAD preparedness capabilities. The first was a foreign animal disease zoning arrangement signed by Australia, Canada, Mexico, New Zealand and the United States, to manage biosecurity risks while minimising trade disruptions during a foreign animal disease outbreak. The other arrangement

signed was an FMD vaccine-sharing arrangement signed by Australia, Canada, New Zealand and the United States, to support the sharing of vaccines between participating countries.

Also in May, the OIE released their final report on Australia's Performance of Veterinary Services. The results highlight Australia's extraordinary commitment to biosecurity and excellent reputation as a producer and exporter of safe and healthy animals and animal products. Thirty-eight of the 47 criteria measured were given the highest competency level, at level five. The remaining criteria were all assessed at either level three or four. Australia was complimented for its widespread understanding of the importance of biosecurity; technical proficiency in veterinary education, risk analysis and laboratory capability; the comprehensive measures in place for border protection, surveillance and emergency preparedness; and effective government and industry partnerships.

The Biosecurity Act 2015 (Cwlth) commenced on 16 June 2016, allowing the Australian Government to manage biosecurity risks in a more modern and flexible way. The Act reflects contemporary industry practice and includes: additional powers to monitor and manage onshore and marine biosecurity risks; improved compliance tools that are fit for purpose; and better alignment with several international agreements and obligations. Similarly, some individual jurisdictions are also reviewing and updating their biosecurity legislation.

Substantial progress was made on the Aquatic Emergency Animal Disease Response Agreement (Aquatic Deed), which outlines shared responsibilities and costs for managing emergency aquatic animal disease incidents. The working group was expanded and now includes representatives from eight major aquatic industry sectors. A draft Deed is expected by late 2017.

November saw the release of the Implementation Plan for Australia's first National Antimicrobial Resistance Strategy 2015–2019. Australia recognises antimicrobial resistance as a One Health issue which requires a coordinated response in all sectors in which antimicrobials are used, including in the human health, animal health, food and agriculture sectors. The Implementation Plan identifies focus areas for activity, as well as specific actions being undertaken to address gaps and ensure that appropriate policies and programs are in place to limit the development of antimicrobial resistance.

2016 has been a dynamic year for Australian agriculture and we look forward to managing the ongoing challenges and improving our animal health systems into the future. I trust you find this report informative.

Dr. Mark Schipp
Australian Chief Veterinary Officer

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Image credit: ACMF

OVERVIEW

Australia's animal health system relies on the government agencies, commercial companies, organisations, universities and individuals underpinning animal health and the livestock production chain. Together, they maintain Australia's high standard of animal health.

This report describes Australia's animal health system, details the current status of animal health, and includes significant animal health-related events that occurred in 2016 in Australia.

Organisation of the animal health system

The introductory Chapter 1 describes the organisation of Australia's animal health system, including the roles of government and non-government organisations, and the consultative mechanisms that link them. The Australian Government Department of Agriculture and Water Resources is responsible for international animal health matters, including biosecurity, export certification and trade, and reporting on diseases to the World Organisation for Animal Health (OIE). Individual state and territory governments are responsible for animal health matters within their boundaries. Animal Health Australia (AHA) coordinates national livestock animal health programs in Australia. Wildlife Health Australia (WHA) complements livestock health activities by investigating, and managing reporting on, the health of native and feral animals.

The National Biosecurity Committee, which operates under the Intergovernmental Agreement on Biosecurity, is driving the implementation of the six identified priority reforms: national decision making and investment, emergency preparedness and response, management of established pests and diseases of national significance, surveillance and diagnostics, information management, and communications and engagement.

New biosecurity legislation, the *Biosecurity Act 2015* (Cwlth), commenced on 16 June 2016. The Act replaced the *Quarantine Act 1908* (Cwlth) as the primary legislative means for the Australian Government to manage biosecurity risks. It reflects contemporary practices and changing risks and priorities, and allows biosecurity risks to be managed in a more modern, flexible way.

Australia was one of the first economically developed countries to undergo an OIE Evaluation of Performance of Veterinary Services in October–November 2015. The final report, published in May 2016, recognised the collaborative approach to maintaining and enhancing Australia's animal health status. Thirty-eight of the 47 criteria assessed were given the highest competency level (level five) and the remaining criteria were all assessed at level three or four. The work of addressing some of the report findings is expected to commence in 2017. The veterinary services network continues to be a cohesive system with components working effectively together.

Australia's first National Antimicrobial Resistance Strategy was released in 2015, and in November 2016, the associated Implementation Plan, outlining specific focus areas for action and activities that are being undertaken, was released. The Department of Agriculture and Water Resources continues to actively work against antimicrobial resistance (AMR) and participates in several AMR groups.

Terrestrial animal health status

Chapter 2 provides information on Australia's reporting system for animal diseases, Australia's status for nationally significant terrestrial animal diseases, and control programs for endemic diseases of national significance in terrestrial animals.

Australian, state and territory governments are obligated by legislation to determine the occurrence and prevalence of certain diseases deemed notifiable because of their significance in Australia and internationally. Some data from a range of government and non-government surveillance and monitoring programs are collated in the National Animal Health Information System (NAHIS). Australia uses these data to provide regular reports on diseases of interest to the OIE. The information in NAHIS is also essential for supporting trade in animal commodities.

Several significant notifications were made during the year, including one of an Asian honey bee (AHB) nest infested with varroa mite (*Varroa jacobsoni*), detected at the Port of Townsville. AHB was not previously known to occur in Townsville, and the nest was removed and destroyed. One other AHB nest has since been found to contain varroa mite, and Biosecurity Queensland has implemented an eradication program within the Townsville area, including surveillance to detect and destroy feral AHB nests and swarms in the Townsville area, and examination for the presence of varroa mite. No other incursions of AHB in other jurisdictions have been reported.

In New South Wales in 2016, 34 investigations of bovine anaemia were undertaken. As in previous years, investigations occurred in districts

where disease had been reported previously, predominantly coastal districts. In Victoria in 2016, six cases from five properties in Gippsland and north-east Victoria were reported; three cases in dairy cattle and three in beef cattle.

During 2016, no Hendra virus (HeV) incidents were reported in Queensland, but an unusual presentation occurred in northern New South Wales. A HeV infection was confirmed in an unvaccinated horse that died in December 2016 after being ill for several weeks. Initially, all samples were negative to HeV on polymerase chain reaction (PCR) testing, but there was a strong antibody response which was due to natural infection with HeV, not due to vaccination. The horse died a week after the initial sampling and a weak positive PCR test result was found. Veterinarians were reminded that they should not make assumptions that horses are not infectious only on the basis of HeV PCR testing.

The national cattle industries, after extensive industry consultation, decided in 2016 to deregulate Johne's disease (JD) in cattle. This is a move away from the previous zoning system to encouraging producers to take increased responsibility for their own biosecurity for JD and other endemic diseases.

Pigeon paramyxovirus 1 (PPMV-1) occurred in several new jurisdictions in 2016. It was detected for the first time in the Murraylands of South Australia in January 2016, where the owner had introduced pigeons from interstate to his pigeon loft. Twenty of his 40 introduced birds died, and the owner was advised to implement a vaccination plan and voluntary cessation of movement of birds. Another pigeon loft that had received birds from the Murraylands property was confirmed infected, with advice given but no specific regulatory disease control measures implemented. In December 2016, the Queensland Department of Agriculture and Fisheries confirmed the first cases of PPMV-1 in Queensland, in four racing pigeon lofts in Cairns. Testing showed the isolates to be similar to strains circulating in Victoria in 2015.

Terrestrial animal disease surveillance and monitoring

Chapter 3 describes Australia's disease surveillance and monitoring activities for terrestrial animal diseases and zoonoses under government and non-government programs operating at the national level. These programs are managed by AHA, WHA, and the Australian, state and territory governments.

In April 2016, the Animal Health Committee endorsed the National Animal Health Surveillance and Diagnostics Business Plan 2016–2019, developed collaboratively by governments and livestock industries. An implementation group, made up of industry and government representatives, is providing oversight to support the effective delivery of the Business Plan.

The Northern Australian Quarantine Strategy (NAQS) of the Department of Agriculture and Water Resources integrates active and passive surveillance measures to protect Australia from pest and disease incursions of significance to animal health, production and trade. In 2016, NAQS undertook 11 targeted animal health surveys and tested 671 wild and domestic animals for a range of exotic diseases across northern Australia.

As part of the Northern Australia Biosecurity Framework, new sentinel cattle herds were established in 2016 to monitor animal health and arbovirus activity in remote areas of the Northern Territory, Queensland and the Western Province of Papua New Guinea. A series of surveys and workshops were also held across northern Australia, Torres Strait and Papua New Guinea to support rabies preparedness modelling and communications.

During 2015–16, the National Significant Disease Investigation Program (NSDIP) subsidised 315 investigations by private veterinary practitioners. From July 2016, the scope of NSDIP activities was expanded to include training of private veterinary practitioners in significant disease investigation.

Data relating to events involving disease investigations in wildlife continue to be held in the national database of WHA. More than 900 events were added in 2016. Approximately 34% of these events were bats (mostly submitted for exclusion testing for Australian bat lyssavirus), wild bird mortalities accounted for a further 33%, and a further 19% related to marsupials.

In May 2016, as part of routine monitoring for rabbit haemorrhagic disease virus, RHDV-2 was detected for the first time in wild European brown hares (*Lepus europaeus*) in South Australia and Victoria.

Following a review of the Screw-Worm Fly Surveillance and Preparedness Program in 2015, which reassessed the priority of targeted surveillance for Old World screw-worm fly as moderate, a revised program was initiated and implemented throughout 2016.

The final report for the statistical review and redesign of the National Bee Pest Surveillance Program (NBPSP) was delivered in 2016. The recommendations have been the catalyst for Plant Health Australia, the honey bee industry, pollination-reliant plant industries, research and development agencies, and governments to implement a long-term funding agreement for the NBPSP since December 2016.

Managing terrestrial animal health emergencies

Chapter 4 describes Australia's arrangements for preparing for, and responding to, terrestrial emergency animal diseases (EADs), including planning, training and communication. The chapter also describes EAD responses during 2016.

In 2016, the Australian Veterinary Emergency Plan (AUSVETPLAN) celebrated its 25th anniversary. Since its inception in 1991, it has grown from 15 to 90 manuals, policy briefs and supporting guidance and resource documents, and has become the international benchmark for EAD preparedness and response. It has been adapted by several other countries to form the basis of their emergency planning. AUSVETPLAN was also celebrated in 2016 when the AUSVETPLAN Technical Review Group received a prestigious 2016 Australian Biosecurity Award, recognising the outstanding contribution of the Technical Review Group in protecting the health of Australia's animals.

In 2016, the AUSVETPLAN team completed minor updates for six disease strategies; a major review of the HeV response policy brief; and two new guidance documents, on risk-based assessment of disease control options for rare and valuable animals, and on EAD tracing and surveillance.

Exercise Apollo, based on a simulated foot-and-mouth disease (FMD) outbreak, was successfully completed, and focused on disposal strategies, policies and procedures in a real-time scenario-based exercise. The exercise involved approximately 150 people from Australian, local and state governments, and industry.

The Prohibited Pig Feed (Swill) Compliance and Awareness Project commenced in 2015–16. In 2015–16, there were 351 industry audits within the Australian Pork Industry Quality Assurance Program and 264 government inspections of piggeries, with no incidents of swill feeding found.

In 2016, as part of the Farm Biosecurity campaign, five key activities took place to improve awareness about on-farm biosecurity. The activities included the final Farm Biosecurity video '*Production Practices*', an external consultant review to guide the Farm Biosecurity program, a custom-built smartphone app for producers to create their own biosecurity plan, 11 monthly e-newsletters distributed to more than 1000 subscribers, and improvements and updates to the Farm Biosecurity website and resources.

The Australian and New Zealand governments continued their collaboration on FMD preparedness activities in 2016, which has led to training of a further 10 New Zealand veterinarians under the Australian FMD real-time training program, participation of two Australian state government officials in a New Zealand exercise on carcass disposal in an FMD outbreak, and collaboration on an epidemiological modelling project on FMD.

The Laboratories for Emergency Animal Disease Diagnosis and Response (LEADDR) network progressively adds targeted diseases to its quality assurance programs and, in 2016, continued to harmonise testing performance for targeted EADs of terrestrial and aquatic animals. LEADDR has also continued to harmonise screening capability for FMD using methods that do not require live virus, to increase laboratory biosecurity and reduce biosafety risk. The network began establishing a testing capability for classical swine fever in its member laboratories, and the Department of Agriculture and Water Resources continued to fund LEADDR for specific development projects.

In 2016, signatory countries to the International Animal Health Emergency Reserve (IAHER) drafted an Operations Manual with policies, procedures and templates for personnel and resources to be rapidly deployed during an EAD outbreak. A simulation exercise, Exercise Athena, was conducted in November 2016 to support the IAHER arrangement and assess the utility of the IAHER Operations Manual.

There were five incidents of anthrax in New South Wales in 2016. The disease did not spread beyond the single affected property in each case. In 2016, there was a single unusual incident of HeV infection in a horse in December near Casino, New South Wales.

In June 2016, an Asian honey bee nest in Townsville containing *Varroa jacobsoni* was destroyed. Seven other Asian honey bee nests were found in Townsville and were destroyed. Only one additional colony, found in July 2016, contained varroa mite.

Aquatic animal health

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

Australia's strategic plan for aquatic animal health, AQUAPLAN 2014–2019, outlines the priorities to strengthen Australia's arrangements for managing aquatic animal health, and to support sustainability, productivity and market access for Australia's aquatic animal industries. The plan covers aquatic animal health issues relevant to aquaculture, commercial fisheries, recreational fisheries, the ornamental fish industry, the tourism industry and the environment.

In 2016, as part of AQUAPLAN, the *Aquaculture farm biosecurity plan: Generic guidelines and template* was published, and a prototype mobile application for the *Aquatic animal diseases significant to Australia: Identification field guide* was developed.

During the year, the Department of Agriculture and Water Resources continued to focus on managing the biosecurity risks associated with imports of live ornamental fish, and made changes to quarantine requirements for gourami, cichlid and poeciliid fish, which came into effect on 1 March 2016.

Work continued on developing a formal arrangement for industries and governments to share the responsibilities and costs for managing aquatic EAD incidents that affect aquatic animal industries (aquaculture and the ornamental and wild-caught fish sectors). This corresponds with the emergency response agreements that Australia has in place for terrestrial animal and plant diseases.

In August, a new Australian Aquatic Veterinary Emergency Plan (AQUAVETPLAN) disease strategy manual for whirling disease was published, and disease strategies for viral encephalopathy and retinopathy, withering syndrome of abalone, crayfish plague and infectious salmon anaemia were revised. These revised manuals are in the process of endorsement before publication.

Disease events and investigations during 2016 included confirmation and OIE notification in January of *Bonamia exitiosa* in native flat oysters (*Ostrea angasi*) for the first time in Australia. Subsequent targeted surveillance detected subclinical infections of *B. exitiosa* in native flat oysters in South Australia and Western Australia. Ostreid herpesvirus-1 microvariant (OsHV-1 µvar) associated with Pacific oyster mortality syndrome was detected in farmed Pacific oysters (*Crassostrea gigas*) in Tasmania, also in January. In November 2016, infection with white spot syndrome virus in farmed tiger prawns (*Penaeus monodon*) was found in Queensland; this is the first outbreak of white spot disease in farmed prawns in Australia.

Trade

Australia continues to show a strong commitment to the principles of the World Trade Organisation (WTO) and is a signatory to the Sanitary and Phytosanitary Measures Agreement. Through the WTO framework, the Department of Agriculture and Water Resources works to ensure that international standards are based on scientific principles and that sanitary and phytosanitary measures are not used to impede trade.

In February 2016, the Department hosted the 22nd session of the Codex Committee on Food Import and Export Inspection and Certification Systems that developed new guidelines on exchanging information between countries about food imports and exports, food safety incidences and rejected food consignments.

The Department negotiates with trading partners to maintain and improve market access, and to open new markets for edible animal products (such as meat, fish, dairy and eggs) and animal by-products (such as rendered meals, pet food, skins and hides, wool, and technical and pharmaceutical goods). For example, in 2016, the Department improved access for meat exports to Indonesia and for fresh and frozen pork exports to Singapore. The department also assisted in sending our first exports of goat meat to India, and eggs and egg products to Taiwan and Japan.

By evaluating the existing legislation and through a comprehensive stakeholder consultation process, the Australian Government has found scope to review the export legislation to enable better support for exporters, farmers and other primary producers in this changing trade environment.

Consultation on the draft export legislation will be undertaken throughout 2017. Engaging with our international trading partners is a priority to ensure the changes are understood and there is no subsequent impact on market access. The improved legislation will be implemented before 1 April 2020.

The new Mickleham post-entry quarantine facility was officially opened October 2015. The bee facility, plant compounds, horse compounds and the first stage of the dog and cat compounds were operational in late 2015. Phase 2 is scheduled for completion between December 2016 and the end of 2018. This will extend the cat and dog capacity by March 2017 and provide quarantine facilities for fertile poultry eggs, live pigeons and alpacas by late 2018.

Consumer protection – food

Several Australian agencies at the national, and state and territory levels cooperate to ensure the safety of the Australian domestic food supply and the safety of Australian food exports. Chapter 7 describes activities to ensure that locally produced foods are safe for consumers. The Australian Government Department of Health monitors communicable diseases, including foodborne diseases, to provide early warning of any potential microbiological contamination.

Australia plays a strong leadership role in developing international, evidence-based food standards through the Codex Alimentarius Commission and its subsidiary bodies. Australia also contributes to the work of Codex committees, and in 2016, that participation continued to ensure that Codex outcomes are based on the principles of sound scientific analysis and evidence.

Food Standards Australia New Zealand has a major role in ensuring the safety of Australian foods, from developing food standards, assessing food-related health risks, setting and monitoring levels of contaminants in foods, and undertaking risk assessment and risk analysis, to collaborating with international scientific and regulatory bodies.

The safety of Australian food exports is controlled through hazard analysis and critical control points (HACCP) systems to ensure that meat, dairy, seafood, eggs and the products made from these commodities are safe for human consumption in Australia's export and domestic markets.

Animal welfare

Each state and territory is responsible for implementing and enforcing its own animal welfare legislation. Organisations in the livestock, zoo and aquarium industries also have arrangements in place to improve animal welfare.

At a national level, the Animal Welfare Task Group continued in 2016 to develop nationally consistent standards and guidelines for the welfare of livestock, based on the model code of practice for the welfare of animals. Standards and guidelines for cattle and sheep welfare continued to be implemented by state and territory governments. Australian animal welfare standards and guidelines for poultry, exhibited animals, and livestock at saleyards, depots and abattoirs continued to be developed for the future consideration of state legislatures.

Several projects took place under the National Primary Industries Animal Welfare Research, Development and Extension Framework during 2016. The strategies within the Framework encourage co-investment and collaboration to improve efficient use of research, development and extension resources in animal welfare.

The Australian Government works with international organisations such as the OIE to support the

development of scientifically based international animal welfare guidelines. In November and December of 2016, the first teleconferences were held for the newly formed OIE Regional Animal Welfare Strategy (RAWS) Advisory Group. The Group reviewed its *Modus Operandi* document and discussed the development of the third edition of the RAWS and associated action plan and key performance indicators.

Regional animal health initiatives

Chapter 9 describes Australia's activities in collaborating with developing countries in the Asia–Pacific and African regions to improve the health of their livestock. These activities occur in three main categories: pre-border surveillance and capacity building, overseas aid, and international animal health research.

Australia assists its near neighbours Papua New Guinea (PNG) and Timor-Leste with field surveillance for significant animal diseases. In 2016, joint animal health surveys took place in PNG and in Timor-Leste. Survey participants from these countries developed skills in surveillance and communication via increased public awareness, thus improving animal health surveillance in the region. The surveys also increase the capacity of the region to identify and respond to animal disease emergencies, thus helping to mitigate exotic animal disease threats to Australia.

As part of the Solomon Islands Biosecurity Development Project 2013–2016, the Australian Government Department of Agriculture and Water Resources collaborated with the Solomon Islands Ministry of Agriculture and Livestock to deliver a terrestrial animal health survey in early 2016. This was the first general animal health surveillance activity performed in the Solomon Islands in nearly 20 years.

Australia's overseas aid program focuses on the Indo-Pacific region. In 2016, Australia continued to participate in several ongoing zoonotic disease initiatives in the region, under partnerships with the OIE and the United States Agency for International Development. There are also inter-governmental initiatives with Indonesia and Timor-Leste, via funding from the Department of Foreign Affairs and Trade, which jointly focus on animal health, food security and regional biosecurity.

Australian research activities in the region are primarily resourced through the Australian Centre for International Agricultural Research and the Australian Government Department of Foreign Affairs and Trade. Many research projects conducted by organisations in Australia and partner countries use multi-disciplinary approaches to solve problems in smallholder animal health and production. Several projects focus on Cambodia, Indonesia, Lao People's Democratic Republic and PNG, and there has been increased emphasis on Myanmar and several African countries, as well as on regional cooperation in the countries involved in the South-East Asia and China Foot-and-Mouth Disease campaign.

Research and development

Chapter 10 provides a snapshot of Australian research in animal health during 2016. The Commonwealth Scientific and Industrial Research Organisation, cooperative research centres, universities (including veterinary science faculties) and industry-based research and development corporations are all involved in animal health research.

The National Animal Biosecurity Research, Development and Extension Strategy, published in 2013, promotes collaboration among research organisations in supporting biosecurity research, development and extension.

Image credit: Taryn Mokotupu

1

ORGANISATION OF THE ANIMAL HEALTH SYSTEM

This introductory chapter describes the organisation of Australia's animal health system, including the roles of government and non-government organisations.

Effective national surveillance and control of animal diseases in Australia requires cooperative partnerships among government agencies, organisations, commercial companies and individuals involved in animal industries. The Australian Government advises on and coordinates national animal health policy. It is responsible for international animal health matters, including biosecurity, export certification and trade, and disease reporting to the World Organisation for Animal Health (OIE). Under the Australian constitution, individual state and territory governments are responsible for animal health matters within their boundaries. Such matters include disease surveillance and control, emergency preparedness and response, chemical residues in animal products, livestock identification and traceability, and animal welfare. National decision making and coordination for animal health matters occurs through the Animal Health Committee (AHC), which includes the Australian Chief Veterinary Officer (CVO), CVOs from all states and territories, and the director of the Australian Animal Health Laboratory (AAHL) of the Commonwealth Scientific and Industrial Research Organisation (CSIRO). AHC also includes observers from the Australian Government Department of Environment and Energy, Animal Health Australia (AHA), Wildlife Health Australia (WHA) and the New Zealand Government.

Australian governments have a close association with livestock industries. This allows effective consultation between government and industry to determine national animal health priorities. The livestock industries are active partners in policy development, support targeted animal health activities and contribute to veterinary emergency responses. Australia's livestock industries are described in Appendix A.

Australia's animal health system includes all organisations, government agencies, commercial companies, universities and individuals involved in animal health and the livestock production chain. Links are maintained with human health agencies, particularly for zoonoses (diseases that are transmissible between animals and humans), antimicrobial resistance, One Health issues (see Section 1.8) and food safety issues. The Australian Government Department of Agriculture and Water Resources is represented in the Communicable Diseases Network Australia group, a key public health network. Links are also maintained with environmental agencies, particularly for wildlife health. WHA complements livestock health activities by supporting investigation and reporting on the health of wild native and feral animals.

More than 13 000 people are directly involved in animal health in Australia (Table 1.1).

AHA is an incorporated, not-for-profit, public company established in 1996 by the Australian, state and territory governments, and major national livestock industries. It is governed by an independently selected, skills-based board.

AHA's members include the state, territory and Australian governments, the major terrestrial livestock industries, and other animal health organisations and service providers.

AHA coordinates and manages more than 60 national projects to assist its members and partners to protect and improve animal health and the sustainability of Australia's livestock industries, and to support market access and trade.[1] These projects span emergency animal disease (EAD) preparedness and response, biosecurity, surveillance and animal welfare.

Information on aquatic animal health management in Australia is provided in Chapter 5.

1.1 Governance

1.1.1 Australian Government committees

Consultative committees ensure that all components of the animal[2] health system work together to serve the interests of Australia (AHA links these components by providing information, networks, programs and training to its members). The committees advise and support senior areas of government through national departmental and ministerial forums for agriculture – that is, the Agriculture Senior Officials' Committee (AGSOC) and the Agriculture Ministers' Forum, respectively. Figure 1.1 illustrates the structure of the animal health management committees and organisations in Australia.

Table 1.1 Veterinarians and other animal health personnel in Australia, 2016

Veterinarians		Auxiliary personnel	
Government	696	Stock inspectors, meat inspectors, etc	1 152
Laboratories, universities, pharmaceutical etc	802		
Private practitioners	10 419		
Other veterinarians	725		
Total	**12 642**	**Total**	**1 152**

1 For AHA purposes, livestock are animals kept for use or profit, including any class of cattle, sheep, goats, pigs, horses (including mules and donkeys), poultry, emus, ostriches, alpaca, deer, camels or buffalo, and farmed aquatic species.

2 Both terrestrial and aquatic animals.

National Biosecurity Committee

The National Biosecurity Committee (NBC) provides strategic leadership across state and territory governments and industry sectors to develop and oversee implementation of national approaches and policies for emerging and ongoing biosecurity issues. NBC membership comprises senior officials from the Australian, state and territory governments. NBC is supported by four sectoral committees, including AHC, which is the key government committee focusing on national animal health issues.

NBC provides advice to agriculture senior officials and ministers on progress in implementing the Intergovernmental Agreement on Biosecurity (IGAB).[3] IGAB came into effect in January 2012 and is an agreement between the Commonwealth and all state and territory governments, with the exception of Tasmania, with its Schedules identifying priority areas for collaboration. In 2015, NBC assessed IGAB achievements to date and identified six priority reform areas requiring further focus: national decision making and investment, emergency preparedness and response, management of established pests and diseases of national significance, surveillance and diagnostics, information management, and communications and engagement. NBC is driving the implementation of the priority reforms, with support from sectoral committees and two expert groups (See Section 1.4).

IGAB requires that Australian, state and territory ministers responsible for biosecurity matters review the implementation and effectiveness of the agreement and its schedules within five years of commencement. Ministers agreed that this review would take place in 2016. Continuous review of the biosecurity system is essential to ensure that the system is contemporary and flexible, and that resources are allocated appropriately to reflect changing risks and priorities. The IGAB review is being conducted by a three-person independent panel comprising Dr Wendy Craik AM (chair), Mr David Palmer and Dr Richard Sheldrake AM, and has involved extensive stakeholder consultation across all relevant sectors. In May 2016, a discussion paper was released, on which over 60 submissions were received. The

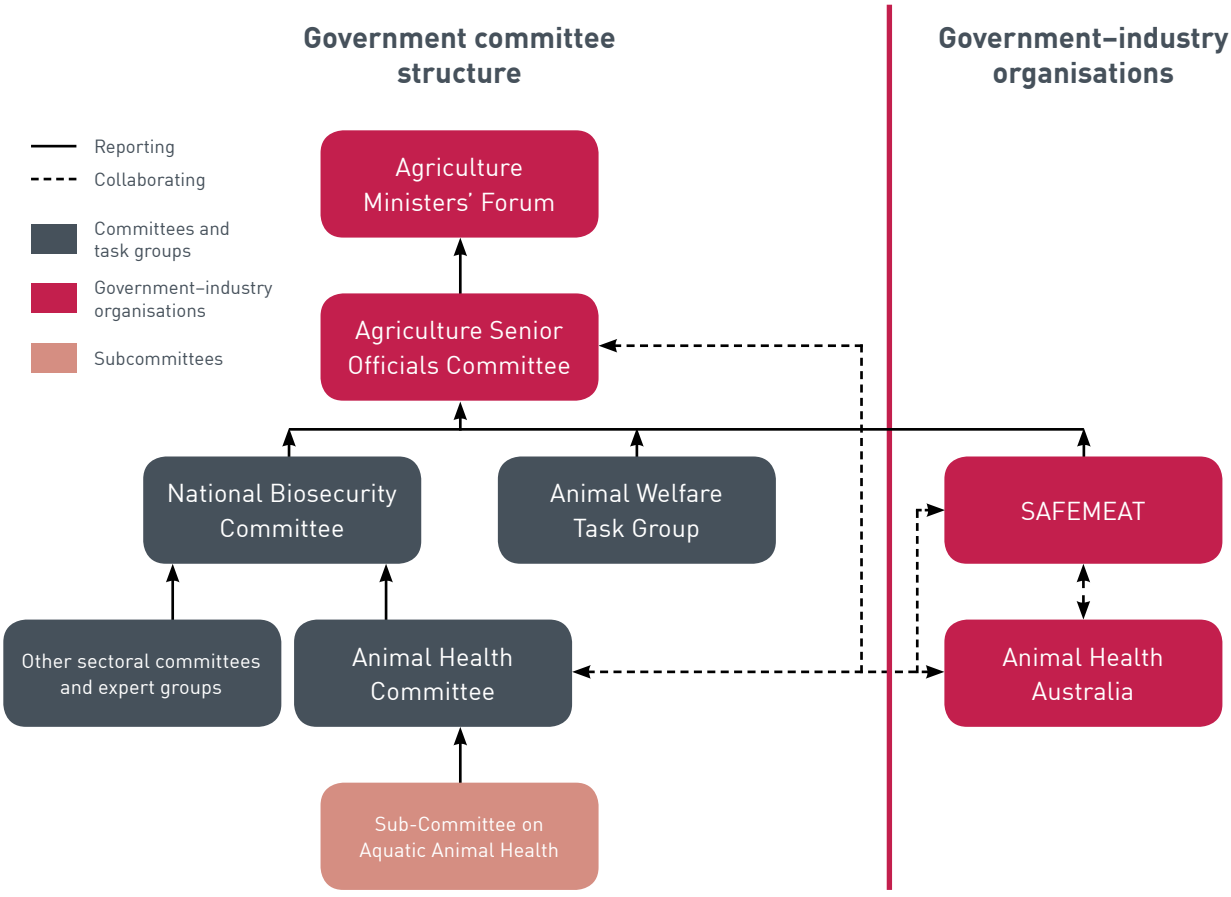


Figure 1.1 Structure of animal health and welfare management committees and organisations in Australia

3 www.agriculture.gov.au/biosecurity/partnerships/nbc/intergovernmental-agreement-on-biosecurity

panel released its draft report on 16 December 2016. A final report and recommendations will be provided in 2017 to agriculture ministers for consideration. Outcomes of the IGAB review will shape the work plan of NBC in the future.

Animal Health Committee

AHC[4] provides the Australian Government with scientific, strategic and nationally coordinated policy advice on animal health issues through the NBC and the AGSOC. AHC leads the development and implementation of government policy, programs, operational strategies and standards in national animal health, animal biosecurity and veterinary public health.

AHC members comprise the Australian, state and territory CVOs, and the director of the AAHL. AHC observers are from the Australian Government Department of Environment and Energy, AHA, WHA and the New Zealand Government.

AHC is advised on aquatic animal health issues by its Sub-Committee on Aquatic Animal Health (SCAAH). Specialist ad hoc task groups advise AHC on technical or policy issues as required.

AHC communicates and consults with its animal industry stakeholders through its newsletter *Vetcommuniqué,*[5] AHA industry members, and industry participation in AHC meetings. Aquatic industries are consulted through the National Aquatic Animal Health Industry Reference Group and the Australian Fisheries Management Forum. Those with an interest in zoo or wild (including feral) animals are consulted through WHA.

Sub-Committee on Aquatic Animal Health

SCAAH provides high-level scientific, technical and strategic advice to AHC to support the development of policy and programs on national aquatic animal health that affect 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; AAHL; and Australian universities. It also has an industry observer. Other aquatic animal health experts from both government and non-government agencies – including specialists from academia, industry and the private sector – may be invited to participate.

Animal Welfare Task Group

The Animal Welfare Task Group advises and supports governments on national animal welfare policy issues. The task group focuses on animal welfare issues that support improved long-term and sustainable economic, social and environmental outcomes, informed by community expectations, for example, development of nationally consistent animal welfare standards and guidelines.

1.1.2 Government–industry committees and organisations

Consultative Committee on Emergency Animal Diseases

The Consultative Committee on Emergency Animal Diseases (CCEAD)[6] is convened in the event of an EAD outbreak. The CCEAD comprises AHC members and 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.

Animal Health Australia

AHA works with its members to keep Australia free of EADs and new and emerging diseases, improve animal health[7] and market access, and foster the resilience and integrity of the Australian animal health system.

The key factor behind the success of AHA is the ability of its members, both government and industry to work together to deliver a world-class system for the management of livestock biosecurity risks to help Australia maintain its enviable disease-free status. The current membership of AHA is shown in Table 1.2, with website details for these organisations provided in Appendix B.

4 www.agriculture.gov.au/animal/health/committees/ahc

5 www.agriculture.gov.au/animal/health/committees/communique

6 www.agriculture.gov.au/animal/health/committees/ccead

7 Animal health and welfare are inextricably linked. AHA's role in the animal welfare continuum is contained to issues that may affect animal production, trade and market access, and community social licence.

AHA continues to improve the contribution of agriculture to national policy and national prosperity through the following four strategic priorities:

- Effectively manage and strengthen Australia's EAD response arrangements through successful partnerships with members.
- Enhance the EAD preparedness and response capability of AHA and its members.
- Strengthen biosecurity, surveillance and animal welfare to enhance animal health, and support market access and trade.
- Deliver member value, enhancement of organisational performance, and sustainable resourcing.

Plant Health Australia

Plant Health Australia (PHA) is the national coordinator of the government-industry partnership for plant biosecurity in Australia. PHA was established in 2000 as a not-for-profit company to service its members.

The purpose of PHA is for government and industry to have a strong biosecurity partnership that minimises pest impacts on Australia, enhances market access and contributes to industry and community sustainability.

PHA is responsible for the management of the National Bee Biosecurity Program, the National Bee Pest Surveillance Program and the BeeAware website[8] which is the central place for all bee biosecurity-related information.

Table 1.2 Members of Animal Health Australia

Government	Organisation
Australian Government	**Industry**
Commonwealth of Australia	Australian Alpaca Association Ltd
State and territory governments	Australian Chicken Meat Federation Inc.
Australian Capital Territory	Australian Dairy Farmers Ltd
Northern Territory	Australian Duck Meat Association Inc.
State of New South Wales	Australian Egg Corporation Ltd
State of Queensland	Australian Horse Industry Council Inc.
State of South Australia	Australian Lot Feeders' Association Inc.
State of Tasmania	Australian Pork Ltd
State of Victoria	Cattle Council of Australia Inc.
State of Western Australia	Equestrian Australia Ltd
Service providers	Goat Industry Council of Australia Inc.
Australian Veterinary Association Ltd	Harness Racing Australia Inc.
Commonwealth Scientific and Industrial Research Organisation – Australian Animal Health Laboratory (AAHL)	Sheepmeat Council of Australia Inc.
	WoolProducers Australia Ltd
	Associate members
	Australian Livestock Export Corporation Ltd (LiveCorp)
	Racing Australia Ltd
	Council of Veterinary Deans of Australia and New Zealand
	Dairy Australia Ltd
	National Aquaculture Council Inc.
	Wildlife Health Australia
	Zoo and Aquarium Association Inc.

8 www.beeaware.org.au

SAFEMEAT

SAFEMEAT[9] is a partnership between the peak meat industry bodies,[10] the Australian Government, and the state and territory governments. Reporting to AGSOC and peak industry councils, SAFEMEAT oversees and promotes sound management systems to deliver safe and hygienic products to the marketplace.

The strategic directions of SAFEMEAT are set out in its business plan, which has nine key programs of industry priority:

- standards and regulations
- emergency disease management
- animal diseases
- residues
- pathogens
- systems development and management
- communication and education
- emerging issues
- SAFEMEAT Initiatives Review – implementation of recommendations.

Initiatives developed by SAFEMEAT include:

- targeted residue-monitoring programs for the export red meat industry – these surveys are conducted by the National Residue Survey (see Section 6.3.3)
- the National Livestock Identification System (NLIS), which has been developed for cattle, sheep, goats and pigs; a similar system is under development for alpacas (see Section 1.6.4)
- a system of National Vendor Declarations (NVDs) 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.

9 safemeat.com.au

10 Australian Livestock Exporters' Council Ltd, Meat & Livestock Australia, Sheepmeat Council of Australia, WoolProducers Australia, Cattle Council of Australia, Australian Lot Feeders' Association, Australian Meat Industry Council, Australian Dairy Farmers Ltd, Australian Pork Ltd, Australian Livestock & Property Agents Association, Australian Livestock Markets Association, Goat Industry Council of Australia and Animal Health Australia

Some major activities during 2016 are described below.

During 2016, continuing work was performed on the Implementation Pathway. This was an outcome of the SAFEMEAT Initiatives Review and the Steering Group's August 2015 report 'Towards an Integrated Integrity System'. The Implementation Pathway comprises the following core elements:

- governance
- funding
- standards
- strengthened program elements
- monitoring and compliance
- education and communications
- system enhancements.

Key elements to implementing the pathway – a transition plan and a funding plan (for the future funding of industry's integrity systems) – are currently being developed with key stakeholders. A responsive and fully integrated through-chain risk management system, accompanied by technology enhancements to drive operational efficiencies, will ensure that Australia's systems continue to be recognised as world's best practice. They will underpin the sustainability and prosperity of the meat and livestock industries into the future.

There was also continued improvement in NLIS systems for cattle, sheep, goats and pigs. This included progressing the SAFEMEAT-endorsed NLIS Cattle Standards (replacing the previous Operational Rules of 2005), endorsing a new NLIS Pig Standard (which will facilitate national mandatory pig-movement reporting), further developing the proposed business rules for enhancement of NLIS (Sheep and Goats) following the release of the Australian Government's NLIS Sheep and Goat Decision Regulation Impact Statement, and working with stakeholders to enhance NLIS compliance in the live animal export sector.

In 2016, SAFEMEAT members also undertook substantial NLIS work through the various NLIS committees. This included:

- working with the Australian Livestock Exporters' Council, jurisdictions and the Department of Agriculture and Water Resources to improve compliance with NLIS requirements in the livestock export sector

- working with the Livestock Production Assurance Advisory Committee to ensure a greater level of scrutiny of producer compliance with NLIS requirements relating to property-to-property movements.

National consistency in interpreting and applying NLIS rules by the jurisdictions continued to be discussed in various SAFEMEAT forums.

Other major activities during 2016 included finalising the investigation into the use of cotton trash and failed cotton crops as a potential emergency drought feed; the continued development of an integrated electronic NVD system under the oversight of the SAFEMEAT Initiatives Review Steering Group; and the initiation of a review into the work undertaken by a Working Group appointed to manage the detection of rodenticide residues in pig offal.

The many committees and working groups within SAFEMEAT continue to provide a valuable mechanism for industry to maintain a high level of food safety and market access for its products.

1.2 Performance of Veterinary Services

Australia became one of the first economically developed countries to undergo an OIE Evaluation of Performance of Veterinary Services (PVS evaluation) in October–November 2015.

PVS evaluations involve a systematic evaluation of a country's animal health system using the OIE PVS Tool based on the OIE Standards for Veterinary Services. The PVS evaluation includes the role of animal health authorities and relevant partner organisations such as in animal product food safety, veterinary drugs regulation, animal welfare, veterinary education, regulation of the veterinary profession and interactions with industry stakeholders.[11]

The OIE's final report,[12] published in May 2016, demonstrates how the various components of the Australian veterinary service work together to maintain Australia's animal health status. These systems are the result of a shared effort between the Australian Government, state and territory governments, industry and private veterinarians. Of the 47 criteria measured, Australia was given the highest competency level (level five) for 38. The remaining criteria were all assessed at either levels three or four. The report recognised the collaborative approach to maintaining and enhancing Australia's animal health status, and the benefits that such an approach brings Australia and its trading partners.

To address some of the report findings, AHC agreed that jurisdictions would undergo evaluations of their veterinary services. This work is expected to commence in 2017.

1.3 International representation and collaboration

The Australian CVO is Australia's Delegate to the OIE. In 2015, the Australian CVO, Dr Mark Schipp, was elected for a three-year term as Vice President of the OIE World Assembly with a corresponding position on the OIE Council. Key issues addressed by the OIE Council in 2016 included the implementation of the OIE 6th Strategic Plan 2016–2020, the introduction of a new procedure for election of experts to OIE Specialist Commissions, and the development and progress of OIE strategies on antimicrobial resistance, peste des petits ruminants and rabies.

The Australian CVO is supported by designated 'OIE focal points' within Australia for: animal disease notification, animal production food safety, animal welfare, aquatic animals, communication, veterinary laboratories, veterinary products and wildlife. Focal points are a direct point of contact for the OIE and a source of advice for the OIE Delegate on these topics.

Other Australian experts held elected positions as President of the OIE Aquatic Animal Health Standards Commission, Vice President of the OIE Scientific Commission for Animal Diseases, and a member of the OIE Biological Standards Commission.

11 www.oie.int/support-to-oie-members/pvs-evaluations

12 www.agriculture.gov.au/animal/health/oie-evaluation-report

Several Australian experts participated in OIE *ad hoc* Groups on:

- veterinary paraprofessionals
- evaluation of the African horse sickness status of member countries
- bovine spongiform encephalopathy
- susceptibility of fish species to infection with OIE-listed diseases
- the OIE Manual of Diagnostic Tests for Aquatic Animals
- animal welfare and pig production systems
- evaluation of the foot-and-mouth disease (FMD) status of Member Countries
- susceptibility of crustacean species to infection with OIE-listed diseases.

The Australian CVO also represents Australia in the Animal Health Quadrilateral Group (Quads). The Quads mission is to provide a forum for senior animal health officials of the Quads countries (Australia, Canada, New Zealand and the United States) to address strategic issues related to the health and welfare of terrestrial and aquatic animals and wildlife, especially as they affect international trade. By working collectively on significant and strategic animal health issues, outputs and outcomes are realised that would be more difficult – if not impossible – for each country to individually achieve. Key achievements for 2016 include the signing of three arrangements between Quads countries to improve EAD preparedness and capacity:

- The International Animal Health Emergency Reserve arrangement provides participating countries access to additional human resources in the event of an EAD outbreak (see Section 4.2.8).
- A foreign animal disease zoning arrangement aims to manage biosecurity risks while minimising trade disruptions in the event of a foreign animal disease outbreak in a participating country through the application and recognition of zoning and other controls.
- An FMD vaccine-sharing arrangement supports the sharing of a vaccine bank for FMD between participating countries.

1.4 National biosecurity reforms

Australia has a strong biosecurity system that protects human, animal and plant health, protects our unique environment, and supports our reputation as a safe and reliable trading nation. This reputation has significant economic, environmental and community benefits for all Australians. To ensure that Australia's biosecurity system remains relevant and effective, areas of the system are undergoing reform. This will allow delivery of a more modern system that is even more responsive and targeted, in a changing global trading environment.

Australian governments, primary industries and other stakeholders work closely together to prevent, detect, control and manage pest and disease outbreaks, and minimise impacts on the economy, environment and international trade. To do this effectively, the states and territories, industries and stakeholders use consistent and collaborative approaches. NBC has overseen a number of policy reforms to improve the effectiveness of Australia's biosecurity system:

- A national surveillance and diagnostic framework has been developed to improve early detection and accurate, timely diagnosis of pests and diseases.
- The National Framework for the Management of Established Pests and Diseases of National Significance has been developed to provide a consistent policy approach to the identification and management of pests and diseases of national significance.
- A National Biosecurity Information Governance Agreement has been signed by the Commonwealth and all states and territories except the Northern Territory. The Agreement provides for national biosecurity information governance arrangements, including national standards and protocols for data collection, which will support the sharing of biosecurity information to improve decision making and enhance operational efficiency
- A National Biosecurity Data and Information Governance Framework is being developed to set out the national arrangements in place for collecting, managing and sharing biosecurity information.

- National minimum data standards for emergency responses have been developed, while those for surveillance are being developed. These will improve the sharing of data and information between jurisdictions, and the effectiveness of emergency responses. They will also support market access for Australian agricultural, fisheries, food and forestry industries.
- Research, development and extension (RD&E) strategies for animal, plant and the community and environmental biosecurity have been developed to establish the future direction for RD&E, and to improve the focus, efficiency and effectiveness of RD&E.
- A national stocktake of biosecurity investment has been undertaken for three consecutive years, identifying significant investments made by Australian, state and territory governments across a portfolio of biosecurity activities. Understanding how funds are invested will help improve the efficiency and effectiveness of national biosecurity spending and the biosecurity system.
- National arrangements are being developed to fill recognised gaps in the existing emergency response deeds (agreements) – these arrangements will guide decision making and cost sharing for national responses to incursions of weeds affecting agricultural production and aquatic animal diseases.
- A National Framework for Cost Sharing of Biosecurity Programs has been developed to guide cost sharing of biosecurity activities.

The NBC has established two ongoing expert groups – the National Biosecurity Information Governance Expert Group and the National Biosecurity Emergency Preparedness Expert Group – to address two IGAB priority reform areas. These groups are working to improve the way biosecurity information is collected and shared, and to improve our capacity to respond to biosecurity incidents.

The Biosecurity Act 2015 (Cwlth) commenced on 16 June 2016. The Biosecurity Act allows the Australian Government to manage biosecurity risks in a more modern and flexible way, and reflects contemporary industry practice. It includes:

- additional powers to monitor and manage onshore and marine biosecurity risks
- improved compliance tools that are fit for purpose, modern and useful
- better alignment with a number of international agreements and obligations.

1.5 Service delivery

1.5.1 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 national coordination of EAD response activities, and coordinates and provides advice on national policy on animal health and welfare. In some circumstances, it provides financial assistance for national animal disease control programs. The Australian Government Department of Agriculture and Water Resources delivers the Australian Government's activities in animal health and welfare.

The Department of Agriculture and Water Resources works to deliver effective, risk-based services across the biosecurity continuum, i.e. onshore, at the border, and offshore.

The following areas in the Department of Agriculture and Water Resources are responsible for animal health and veterinary public health:

- Office of the Chief Veterinary Officer (OCVO)
- Biosecurity Animal Division
    - Animal Biosecurity Branch
    - Animal Health Policy Branch
    - Animal and Biological Import Assessments Branch
- Exports Division
    - Export Standards Branch
    - Live Animal Exports Branch
    - Meat Exports Branch
    - Residues and Food Branch.

This structure reflects a national approach to biosecurity and welfare, and aims to simplify domestic and international communications, and improve responsiveness.

Office of the Chief Veterinary Officer

The OCVO supports the Australian CVO in providing national leadership and direction on priority policy issues relating to animal health in Australia, including for EAD responses. It also provides strategic, technical and administrative support to AHC and CCEAD.

The OCVO provides links for Australia internationally through the OIE, and domestically through national animal health, human health and wildlife health committees. As Australia's international reference point for animal health and welfare, it coordinates Australia's commitments to the OIE, animal health intelligence gathering, and communication with other international agencies involved in animal health and welfare.

Biosecurity Animal Division

Animal Biosecurity Branch

The Animal Biosecurity Branch develops biosecurity policy, and provides technical and scientific advice on the safe importation of animals and animal products (including aquatic animals and their products), and on marine vessel biosecurity, using science-based risk analysis. It provides scientific and technical support to gain, maintain and improve access for the export of Australian animals and their genetic material. It also contributes to the development and maintenance of international animal health standards.

Animal Health Policy Branch

The Animal Health Policy Branch leads Department of Agriculture and Water Resources activities on national animal health policies and programs for terrestrial and aquatic animals, and marine pests. It also provides support on animal health matters to Australia's immediate neighbours to the north. The branch manages:

- national surveillance and disease preparedness activities
- international offshore surveillance and capacity-building programs with partner countries (Indonesia, Papua New Guinea and Timor-Leste)
- epidemiology and One Health programs, including wildlife health, veterinary public health and antimicrobial resistance issues.

Animal and Biological Import Assessments Branch

The Animal and Biological Import Assessments Branch manages the importation of live animals, animal reproductive material and other animal-derived materials into Australia. Animal-derived materials include veterinary and human therapeutics, pet foods, stockfeed supplements, foods for human consumption, fertilisers, bioremediation agents, laboratory materials, and skins and hides.

The branch works across the entire biosecurity continuum – pre-border, border and post-entry quarantine – to minimise the risk of exotic animal pests and diseases entering Australia. It achieves this by determining appropriate science-based import conditions, assessing and granting import permits, auditing overseas and domestic facilities, providing advice to clients and regulatory officers, and providing technical support for inspection, clearance and quarantine activities.

Exports Division

Live Animal Exports Branch

The Live Animal Exports Branch manages the Australian Government's legislative requirements for the export of live animals and animal genetic material from Australia. The branch provides export inspection and certification for live animals and animal reproductive material that meet importing country requirements. It contributes to market access assurance for live animals and animal genetic material. Information about the current activities of the program can be found on the Department of Agriculture and Water Resources website.

Export Standards Branch

The Export Standards Branch negotiates with trading partners to maintain, improve or develop market access for the export of meat, fish, dairy, eggs, animal by-products and non-prescribed goods. The Branch negotiates and facilitates agreed conditions for market access and advises stakeholders of these. The Branch also develops Australian positions on international standard setting for trade in food, provides chemical residue and microbiological expertise, laboratory oversight and export meat performance monitoring, and administers the Package Assisting Small Exporters.

Meat Exports Branch

The Meat Exports Branch is responsible for national certification, verification, audit and inspection requirements for the export of meat (red meat, poultry and game meat) and the delivery and maintenance of export meat systems.

Residues and Food Branch

The Residues and Food Branch is responsible for the operational aspects of exports of dairy, fish and eggs, as well as of non-prescribed food (including organics) and animal by-products. This branch is also responsible for export documentation, including registration and licensing, quota administration and certification, and the National Residue Survey.

1.5.2 Other national animal health services and programs

Wildlife Health Australia

WHA is the peak body for wildlife health in Australia. It is a not-for-profit association that was initiated by the Australian Government, with funding from the Department of Agriculture and Water Resources, and support from state and territory governments, and stakeholders. WHA extends the work of the Australian Wildlife Health Network, which was established in 2002 as an Australian Government initiative and replaced by WHA in 2013.

WHA focuses on human and animal health issues associated with free-ranging populations of wild animals. It works closely with human health, agriculture and environment agencies, as well as universities, veterinary clinics, zoos and wildlife parks.

WHA has more than 600 members, including wildlife health professionals, wildlife carers, private practitioners, and institutional representatives from national, state and territory departments of environment, agriculture and human health; universities; zoos; hunting groups; wildlife and other industries; and diagnostic pathology services. Australia's OIE Focal Point for Wildlife is within WHA and provides support to Australia's OIE Delegate.

WHA promotes and facilitates collaborative links in the investigation and management of wildlife health, to support human and animal health, biodiversity and trade. It coordinates and develops national wildlife health surveillance, wildlife health expertise and resources, and research needs and priorities. It collates national data on mass mortalities involving wildlife, and manages specific datasets, such as those from avian influenza surveillance in wild birds and Australian bat lyssavirus monitoring. WHA monitors for new and emerging diseases in wildlife, particularly those that could affect humans and production animals. WHA also facilitates and contributes to education and training courses in wildlife health and preparedness.

Image credit: AHA

WHA's activities include:

- coordinating national wildlife disease surveillance programs and focus groups
- 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, monitoring and supporting field investigations of disease incidents
- advancing education and training in wildlife health
- publishing fact sheets about diseases of national importance in wildlife
- providing information about wildlife health to the community.

These activities are underpinned by One Health principles, through active fostering of interdisciplinary work on wildlife health issues.

Animal health laboratories

Australia's animal health laboratories provide diagnostic and research services for endemic and exotic animal diseases, including transboundary animal diseases and zoonoses. The Australian Government, state and territory governments, AAHL, veterinary schools and the private laboratory sector maintain a network of world-class animal health laboratories.[13] National laboratory responses to EAD incursions are primarily coordinated by the Laboratories for EAD Diagnosis and Response (LEADDR) network (see Chapter 4).

Since the Sub-Committee on Animal Health Laboratory Standards (SCAHLS) was dissolved in mid-2015, AHC has streamlined all essential laboratory functions through a variety of arrangements. Some of the functions are now performed or coordinated by other bodies, as further described in Chapter 4. These bodies report directly to AHC (rather than as before through SCAHLS). All other activities are coordinated by the recently formed National Laboratory Task Group, which consists of members from the Australian Government, AAHL and state and territory government laboratories.

AAHL[14] is a national facility that is one of six major high-containment animal health laboratories in the world. It is an OIE or national reference laboratory for several transboundary animal diseases. It develops and improves diagnostic technologies, provides laboratory services for exotic and other major EADs, and provides scientific advice. It also plays a key role in transferring testing capabilities for major EADs to state and territory government animal health laboratories and, if appropriate, other laboratories under controlled quality assurance conditions. AAHL is vital for the timely and secure response to EADs that could threaten Australia's animal industries and public health.

State and territory government laboratories specialise in services for endemic diseases, and are the primary providers of export testing for animals and animal products. Some states have outsourced laboratory testing to the private sector, so several private animal health laboratories are also important to Australia's overall EAD testing capacity. Veterinary schools at universities offer diagnostic services and related research in specialty areas and for training 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*),[15] 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.

To ensure quality assurance for laboratory services, the Department of Agriculture and Water Resources supported the development and evaluation of new tests for EADs, and the production of a comprehensive series of Australian and New Zealand Standard Diagnostic Procedures (ANZSDPs)[16] for specific EADs. The ANZSDPs reflect the relevant international standards prescribed by the OIE.

13 www.agriculture.gov.au/animal/health/system/lab-network

14 www.csiro.au/en/Research/Facilities/AAHL

15 www.iso.org/iso/catalogue_detail?csnumber=39883

16 www.agriculture.gov.au/animal/health/laboratories/procedures

The Australian National Quality Assurance Program (ANQAP)[17] provides proficiency testing (PT) programs to support continuous improvement of individual laboratories in EAD testing performance. ANQAP is an international PT program provider; it supports a range of PT programs for veterinary serology, virology and bacteriology on a fee-for-service basis. Most PT programs are used by laboratories that perform veterinary tests associated with quarantine, export health certification and disease control programs. About 27 animal health laboratories in Australia, New Zealand, Asia, Africa and North America currently participate in various ANQAP PT programs. AAHL and AHA, through AHA's Australian Animal Pathology Standards Program, also collaborate with other laboratories in Australia and overseas to develop and implement specific PT programs for quality assurance in diagnostic pathology.

Regular and ad hoc scientific and training activities are held by the Australian Association of Veterinary Laboratory Diagnosticians and other networks for laboratory specialty areas, for professional development. These play a key role in supporting diagnostic and research services in Australia.

1.5.3 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 animal health services aim to protect the interests of livestock producers and the community by providing world-class biosecurity systems that 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, AHC ensures a harmonised outcome by coordinating the jurisdictions' approaches to national animal health issues.

The state and territory governments develop and administer legislation relating to surveillance, control, investigation and reporting of diseases; chemical residues and contaminants; and animal welfare. They deliver their services through government-appointed or government-accredited animal health personnel – district veterinarians, regional veterinary officers and local biosecurity officers – who administer the relevant state and territory legislation, and provide extension services to industry and the community. The work of these personnel includes:

- surveying, controlling, investigating and reporting on livestock diseases of interest, including EADs
- contributing to the control of specified endemic livestock diseases, in partnership with relevant livestock industries
- monitoring and ensuring compliance with animal identification systems, and supplying vendor declarations
- maintaining appropriate controls on the movement of livestock to ensure a high level of biosecurity
- investigating reports of chemical contamination in livestock products and implementing response plans to protect consumers from chemical residues
- contributing to producer awareness of best practice in local livestock management systems
- ensuring compliance with national and local standards for livestock welfare
- 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) about 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 animal health authorities when such diseases are suspected or diagnosed.

The National List of Notifiable Animal Diseases[18] lists exotic, emergency and endemic terrestrial animal diseases of national significance. Australia also maintains a National List of Reportable

17 www.anqap.com

18 www.agriculture.gov.au/pests-diseases-weeds/animal/notifiable

Diseases of Aquatic Animals[19] (see Section 5.1). Notifiable diseases for each state and territory include diseases on the national list, together with diseases that are of significance in a particular jurisdiction. Government-appointed veterinarians and biosecurity officers 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 response or control.

The coordinated efforts of state and territory animal health services – often assisted by nationally harmonised arrangements – have eradicated many notifiable diseases. These include classical swine fever, contagious bovine pleuropneumonia, contagious equine metritis, bovine brucellosis, bovine tuberculosis, virulent Newcastle disease, equine influenza and highly pathogenic avian influenza.

Surveillance and other collaborative activities

As well as administering legislation, state and territory animal health personnel conduct surveillance and applied research projects. Authorities are constantly alert to the possible emergence of new infectious diseases, as early detection of disease facilitates more rapid control and eradication. This work requires close links with livestock producers, industry and community organisations, private veterinarians, veterinary laboratories, research organisations, 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. Field staff are supported by government or government-contracted veterinary diagnostic laboratories, which provide reports to government. Many of the advances in Australia in understanding and managing livestock diseases have come from the partnership between government laboratories and field workers.

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

Collaboration with industry strengthens government animal health services and contributes to high-quality policy decisions. It also leads to joint government–industry 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, AHA trains livestock industry staff to work in EAD control centres.

Protecting human health from diseases and pests of animals is a key role of state and territory animal health personnel. They work closely with their government public health counterparts in a joint approach to zoonoses such as salmonellosis, chlamydophilosis, avian influenza and Hendra virus infection.

In 2016, collaboration between the Department of Agriculture and Water Resources, state and territory governments, AHA and the livestock industries, including through AHC, led to outcomes for the following national animal health priorities:

- A new approach to the management of Johne's disease in cattle in Australia. This followed a review of the management of bovine Johne's disease in 2015, and the development of a framework document. The document represents the deliberations of the Australian, state and territory governments, and cattle industries. The new national framework commenced on 1 July 2016, and sets a pathway for the removal of control measures implemented by jurisdictions to one that is market driven, biosecurity focused and producer oriented. This approach will place Johne's disease in cattle in the same context as any other endemic disease.

19 www.agriculture.gov.au/animal/aquatic/reporting/reportable-diseases

- The National Animal Health Surveillance and Diagnostics Business Plan 2016–2019 was endorsed by AHC in 2016. The purpose of the business plan is to guide the efficient and effective delivery of surveillance activities in accordance with nationally agreed objectives and priorities. The business plan is being implemented by governments and industries in partnership. The plan is discussed in Section 3.1.2.
- A number of initiatives relating to FMD and other EAD preparedness continued in 2016. FMD is recognised as the single greatest EAD threat to the red meat, dairy, wool and pig industries.[20] The priorities for Australia are to prevent the introduction of FMD, and to limit the impact of an FMD outbreak and enable a quick resumption of trade.
- Further information on Australia's animal health surveillance systems is contained in Chapter 3.

1.5.4 Private veterinary services and veterinary education

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

Veterinary practitioners must be registered to practice veterinary science under state or territory legislation. 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.

In 2016, Australian Government funding was made available to state and territory governments, under the Agricultural Competitiveness White Paper (see Section 3.1.3), to conduct training workshops for private veterinarians in the identification, investigation and reporting of EADs.

Some private veterinarians, as well as government veterinarians and livestock workers, participated in the FMD training activities described in Section 4.2.3. In October 2016, private veterinarians were also among the attendees at the AAHL EAD symposium, which is an annual event focusing

20 data.daff.gov.au/anrdl/metadata_files/pb_pseiFMDd9abbl20131011_11a.xml

Image credit: APL

on emerging diseases of interest, surveillance initiatives, and the role of veterinarians in EAD preparedness.

The national Accreditation Program for Australian Veterinarians[21] is designed to integrate private veterinary practitioners into the national animal health system, to support the international standing of Australia's animal health capability. The program accredits non-government veterinarians who can use their skills and knowledge effectively to contribute to government and industry animal disease control programs, and export inspection and certification.

The National Significant Disease Investigation Program also engages private veterinarians in the national animal health system. It is described further in Section 3.2.1.

Australia has seven veterinary schools – at the University of Queensland, the University of Sydney, the University of Melbourne, Murdoch University, Charles Sturt University, James Cook University and the University of Adelaide. All Australian veterinary courses include strong programs in the health of horses, companion animals, farmed livestock and wildlife, as well as in animal welfare, biosecurity and public health. The veterinary schools also provide research, continuing education and postgraduate training relevant to Australia's livestock industries (See Chapter 10).

Once every seven years, the Australian Veterinary Schools Accreditation Committee visits each established Australian veterinary school and Massey University in New Zealand to audit the schools against 12 standards, including curriculum, facilities, staffing and outcomes. Since 1999, the Australasian Veterinary Boards Council (AVBC)[22] has audited the veterinary schools. Most site visits include a representative from the Royal College of Veterinary Surgeons (United Kingdom) on the team. All seven Australian veterinary schools are accredited with the Royal College of Veterinary Surgeons and the South African Veterinary Council. In recent years, teams from the United States accreditation system have joined AVBC visits to American Veterinary Medical Association-accredited schools at Massey University, Murdoch University, the University of Melbourne, the University of Queensland and the University of Sydney.

Schools must also submit annual reports, which are assessed against the 12 standards for veterinary accreditation.

As well as being responsible for accreditation, the AVBC advises on the standards for veterinary registration in Australia and New Zealand, and on the registration of veterinary specialists. It also assesses the skills of veterinarians who wish to migrate to Australia and administers the National Veterinary Examination to recognise the skills of overseas-qualified veterinarians.

1.5.5 Agricultural colleges and other registered training organisations

Universities, agricultural colleges and other registered training organisations in the Australian vocational education and training sector provide training for veterinary nurses, animal technologists, farm managers and others involved in caring for 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 in the Australian Qualifications Framework. The standards are agreed by industry, professional organisations and each jurisdiction.

In 2012, a suite of vocational qualifications in biosecurity emergency management at the levels of Certificate III, Certificate IV and Diploma was nationally endorsed by the National Skills Standards Council. These provide a training and qualification pathway for people engaged in EAD preparedness and response activities, including government employees and livestock producers. In 2016, a major project to develop a full suite of nationally consistent training and assessment materials was commenced to support the three qualifications.

21 www.animalhealthaustralia.com.au/training-centre/accreditation-program-for-australian-veterinarians-apav

22 www.avbc.asn.au

1.5.6 Livestock Biosecurity Network

The Livestock Biosecurity Network (LBN) is an independent industry initiative funded by the Cattle Council of Australia. The LBN has completed the final phase of its pilot period (ending June 2016), and the achievements in strategic operational activities and partnerships have been reviewed. As a result of this review, the LBN has become a subsidiary company of AHA and the Cattle Council of Australia.

The LBN has developed key partnerships to boost the delivery of activities that build awareness of the need to manage biosecurity risks on-farm for producers, and for allied animal health workers, such as livestock agents, and workers in saleyards, extension bodies, industry programs and agricultural shows. Targeted extension campaigns have also been held in veterinary and agricultural schools.

The partnerships and collaborations with industry programs (e.g. Making More from Sheep, More Beef from Pastures and Grazing Best Management Practices) have provided opportunities for extension and awareness on biosecurity risk management. They have also enabled feedback to be collected on key areas of extension that are required.

Collaboration with state and territory government animal health authorities, particularly in areas where changes in biosecurity regulation are occurring, highlights the relevance of the LBN in making information and tools accessible to producers, to assist them in meeting their biosecurity obligations.

Small lot holders (or hobby farmers) have often been identified as a biosecurity risk to the greater livestock industry. The LBN continues to build on the Small Lot Holders Forum, which identified the key risks, and workshopped the most effective channels for communicating pertinent information on their requirements and obligations for keeping livestock.

The LBN has more than 70 active and regularly engaged networks that are used to collect and disseminate information on livestock health, welfare and biosecurity. With the development of corporate partnerships with key industry influencers, such as the Parraway Pastoral Company, and the use of producer and organisational advocates, the LBN continues to build awareness of the importance of these messages.

Practice change at the farm level is occurring as a result of the LBN's work, with increasing uptake of recommendations on better practice for livestock health, welfare and biosecurity. Building on the foundations for awareness, knowledge and attitudinal change in these areas will support ongoing uptake of practices for better biosecurity risk management.

1.5.7 National Bee Biosecurity Program

In 2016, the Australian Honey Bee Industry Council, state and territory governments and PHA continued to work together on developing the Australian Honey Bee Industry Biosecurity Code of Practice and the National Bee Biosecurity Program.

The code and program commenced in 2016, with the Code being nationally endorsed by industry in July 2016. The program, through the code, aims to improve the management of established bee pests and diseases (particularly American foulbrood), increase the preparedness of beekeepers for exotic pests, and increase surveillance for exotic pests. The program is funded by the honey bee industry through the honey levy, with state governments contributing extensive in-kind resources. It is managed nationally by PHA, and includes the employment of bee biosecurity officers in state primary industries departments. To date, bee biosecurity officer contracts have been fully executed in Victoria and South Australia, with the other states at various stages of contract negotiation.

1.6 Livestock identification and traceability programs

NLIS is Australia's system for livestock identification and traceability. All cattle, goat, pig and sheep producers must identify their stock and record their movements onto and off properties in the NLIS database. All movements to and from saleyards and to abattoirs must also be recorded.

When fully implemented for a type of livestock, NLIS is 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 implementing NLIS. Jurisdictions monitor compliance with NLIS requirements throughout the livestock supply chain – checking those consigning, receiving and slaughtering stock.

Information on animal movements is recorded on movement documents and submitted to the NLIS database by producers, saleyard operators, livestock agents and processors. NLIS Limited administers the NLIS database on behalf of industry and government stakeholders. This includes managing the development and operation of the database according to stakeholder requirements.

1.6.1 NLIS for cattle

NLIS (Cattle) is an electronic identification system in which each animal is tagged with a radiofrequency identification device and accompanied by movement documentation (an NVD) when moved from a property. As well as recording animal movements from properties, the system enables the residue and disease status of animals to be identified.

1.6.2 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 labelled with property identification codes (that is, codes allocated by state or territory departments to properties). When mobs are transported, they are accompanied by a movement document, such as an NVD or a waybill. Movements of mobs are recorded in the NLIS database, allowing animals to be traced.

In August 2016, the state of Victoria announced it would transition to a NLIS (Sheep and Goats) based on the mandatory use of electronic ear tags. From 1 January 2017, all sheep and goats born in Victoria must be identified with an electronic NLIS (Sheep) tag before leaving the property of birth; and saleyards, abattoirs and knackeries will commence scanning electronic tags of sheep and goats and uploading information to the NLIS database from July 2017. Mandatory scanning of all electronically tagged sheep and goats must be occurring in Victorian abattoirs from 31 December 2017 and all saleyards from 31 March 2018.

1.6.3 NLIS for pigs

Australian Pork Limited is continuing to develop NLIS (Pigs), which is known to the pork industry as PigPass. It is a mob-based system based on tattoos and brands to identify the property of birth, along with movement documents. Voluntary movement reporting is now occurring through the PigPass portal.

AGSOC, comprising the heads of the Australian, state, territory and New Zealand primary industries government agencies, endorsed draft business rules for NLIS (Pigs) in July 2014. The business rules have been converted to standards, with SAFEMEAT partners endorsing the NLIS (Pigs) standards in May 2016.

NLIS (Pigs) standards are progressing through the regulatory approval process, with NBC completing its consideration of the standards. AGSOC will now consider the standards – a precursor to state and territory legislation to enable mandatory reporting of movements. NLIS (Pigs) is to be presented to agriculture ministers for final approval. Once legislation is implemented, further testing will be undertaken to ensure that NLIS (Pigs) meets the national livestock traceability performance standards.

1.6.4 NLIS for alpacas and llamas

The NLIS (Alpaca and Llama) tracing system is under development. The industry is advocating the use of identification tags that incorporate radio frequency identification.

1.7 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. Some livestock industry QA programs are detailed in the following sections.

1.7.1 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 commenced in 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 (including LPA QA) is managed on behalf of the red meat industry by AUS-MEAT[23] through the LPA Advisory Committee. 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 the Department of Agriculture and Water Resources.

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)[24] principles and comprise five elements:

- property risk assessment – to assess the risk of livestock being exposed to areas on a property that are contaminated with organochlorides or other persistent chemicals
- safe and responsible animal treatments – ensure that livestock intended for human consumption do not contain unacceptable chemical residues or physical hazards
- stock foods, fodder crops, grain and pasture treatments – ensure 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 – ensure 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.

Following the phase-out of older versions of the LPA NVD in 2015, the key program focus for 2016 was the development of an online learning course for each of the five elements of the LPA standards. In conjunction with the launch of the LPA learning tool in early September 2016, producers seeking LPA accreditation were required to successfully complete a 10-question assessment before accreditation. In 2017, all existing participants will be required to complete the assessment, and then complete it every three years, as part of an enhanced recommitment process.

At 30 November 2016, approximately 218 000 property identification codes were accredited in the LPA program. For the year ending 30 June 2016, approximately 3250 on-farm audits were completed under the core random audit program and the targeted audit program conducted on behalf of the National Residue Survey (see Section 6.3.3). To 30 November 2016, more than 49 800 audits had been completed since program commencement.

1.7.2 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 1994. This program, which covers approximately 400 beef cattle feedlots, encompasses QA systems, animal health and welfare, environmental management, food safety and product integrity. Third-party annual auditing of each accredited feedlot ensures adherence and compliance to

23 www.ausmeat.com.au

24 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 can be taken at 'critical control points' to reduce or eliminate the risk of the hazards being realised.

the scheme's standards. Importantly, NFAS requirements are more stringent than legislation and regulation because of the industry's desire for continuous improvement and to exceed community expectations.

The NFAS is owned and managed independently of the industry to ensure that credibility and integrity are maintained. The scheme is overseen by the Feedlot Industry Accreditation Committee, which comprises government representatives from around Australia and AUS-MEAT representatives.

Accreditation is compulsory for the supply of grain-fed beef to the export market (grain-fed and grain-fed young beef) and any grain-fed beef product sold domestically, so lot feeders have a large incentive to be accredited under the NFAS. Government and commercial incentives to increase NFAS uptake have also been implemented. For example, the peak body for the cattle feedlot industry, the Australian Lot Feeders' Association (ALFA), has been able to negotiate an environmental licence fee discount for NFAS-accredited feedlots in some states as a result of alignment with state regulations and desired outcomes in environmental performance of such operations. All feedlots require an environmental licence to operate.

Continuous updating of the NFAS with relevant scientific and technical information enables the feedlot industry to show that it operates according to the requirements and expectations of consumers, markets, governments and the wider community. The standards and integrity delivered by NFAS mean that the program is now recognised under legislation in some states, further encouraging industry uptake. For example, the Victorian Government has recognised the NFAS as an Approved Compliance Arrangement under the *Livestock Management Act 2010* (Victoria). This means that NFAS-accredited feedlots in Victoria are deemed compliant with the requirements of the Livestock Management Act, and are not subject to further inspection or audit, other than that already required under the NFAS. This recognition of the NFAS by the Victorian Government will result in considerable cost savings to both producers and government.

ALFA has reviewed animal welfare practices and outcomes within the sector and has recently amended the NFAS standards. These have been publicised through the industry via ALFA animal health and welfare workshops, development and dissemination of best-practice manuals, and the contracted technical services officer. Several research projects have been initiated to address identified knowledge gaps. ALFA also completed a strategic review of the NFAS in 2015 to ensure that the program meets the current and future needs of the industry and other stakeholders. The recommendations from the strategic review have been considered by industry and the Feedlot Industry Accreditation Committee, with a number of improvements being implemented over time.

Image credit: AHA

1.7.3 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 SAFEMEAT Partnership, on advice from meat regulatory agencies, has recognised the dairy industry on-farm food safety program as meeting the requirements of the Australian meat standards.

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) must be licensed, and compliance with the food safety program must be 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 program are complemented by recommended biosecurity elements to protect animal health; they cover provisions of national disease control programs, including for enzootic bovine leucosis and Johne's disease.

The state dairy food safety authorities license the operation of farm businesses. All on-farm dairy food safety programs are HACCP-based. They 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 sanitisation
- identification of animals from birth
- traceability systems for both farm inputs (including animal feeds and pasture) and farm outputs (milk, and animal or meat products)
- appropriate records to enable verification
- competence of personnel.

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

1.7.4 Australian Pork Industry Quality Assurance Program

In 2016, the Australian Pork Industry Quality Assurance Program (APIQ✓®) underwent a minor review (major reviews are undertaken every three years; the last one was in 2015). As a result, the APIQ✓® Standards (Version 4.2, 1/2017) will commence on 1 January 2017.

APIQ✓® provides options for verification of additional requirements for specific customers or markets. Version 4.2 includes verification options for the following label claims:

- gestation stall free (GSF)
- Customer Specifications for Coles supermarkets.
- APIQ✓® has three certification types available to producers:
- indoor (specified as APIQ✓®)
- free-range (specified as APIQ✓® FR)
- outdoor-bred, i.e. raised indoors on straw (specified as APIQ✓® OB).

APIQ✓® certification incorporates the legal requirements set out in the CSIRO *Model code of practice for the welfare of animals: pigs*.[25] Certification enables producers to show that they are meeting relevant national, state and territory legislation, and following good agricultural practice.

The APIQ✓® standards are outcome focused and supported by performance indicators.

25 www.publish.csiro.au/book/5698

Supplementary information to help producers comply with the standards is provided in manuals, including a compliance guide and auditor guide for auditors.

Australian Pork Limited manages the program on the industry's behalf through APIQ Management. A wide range of stakeholders have provided technical and policy input into the program, including producers, scientists, QA and audit experts, retailers, consumer organisations, government, and supply chain members.

APIQ✓®-certified producers must have an annual on-site compliance audit and meet all the certification requirements. Auditors must be APIQ✓®-registered and accredited by Exemplar Global as National Food Safety Auditors, Level 2; they must also have passed APIQ✓® Scope (an examination to test knowledge of the pig industry) and have attended annual APIQ✓® auditor training programs. 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 is audited annually by an independent certifying body to ensure that its policies, processes and administration are robust, reliable and of a high standard.

An independent panel of experts, the APIQ Panel, considers major or critical incidents involving producers and auditors and determines courses of action when non-compliance issues arise, in accordance with APIQ✓® certification policies.

APIQ✓® 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 the Department of Agriculture and Water Resources under the *Australian standard for the hygienic production and transportation of meat and meat products for human consumption* (AS 4696:2007).[26]

As of 5 December 2016, 90% of commercial sows in production in Australia were APIQ✓® certified, with 10% of these certified as FR or OB. Producers continue to move voluntarily towards GSF production, in line with the industry's 2010 Shaping Our Future initiative, and 71% of commercial sows in Australia are now GSF verified. Progress in this initiative slowed over the last year because of industry expansion which required an APIQ✓® audit to verify its GSF status, resulting in a lag time.

1.7.5 Egg Corp Assured

The Australian Egg Corporation Limited (AECL) developed Egg Corp Assured (ECA), a voluntary national egg QA scheme, on behalf of the egg industry. The scheme is 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[27] and the industry's responsibility to the community to ensure the production of quality eggs. ECA is a unique QA scheme that provides standards for a range of egg industry good-practice criteria for pullet rearing and egg production, grading and packing. It addresses:

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

Launched in November 2004, the scheme 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 regimen. Voluntary uptake of the scheme by the industry has led to AECL issuing 221 certificates across 147 sites that constitute 56 egg businesses. The scheme covers more than half the national laying flock. All farming systems from all regions and all sizes of businesses are licensed under the scheme.

As a result of a recent external review of the scheme, the administration and operations of ECA have been outsourced to Scheme Support Services, a wholly owned subsidiary of Freshcare. AECL entrusts audit management of ECA to global

26 www.publish.csiro.au/pid/5553.htm

27 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement

certification bodies whose auditing staff have Exemplar Global accreditation in food safety, as a minimum qualification. Auditors must also attend the ECA auditor training program held each year by AECL. A program of verification and unannounced audits form part of the scheme.

AECL is looking to replace ECA with a more robust QA scheme. Egg Standards of Australia is undergoing final review and it is hoped that it will be launched in 2017.

1.7.6 Australian Chicken Meat Federation quality systems

The Australian Chicken Meat Federation maintains and promotes the *National farm biosecurity manual for chicken growers*.[28] This manual sets out the minimum biosecurity requirements that must be implemented on meat chicken farms. Compliance with the manual is obligatory for chicken growers under their contractual arrangements with the chicken-processing companies they supply. The manual includes an auditable checklist. Companies periodically assess their growers for compliance with the measures identified in the manual. This year, a biosecurity induction video resource was developed to help farmers ensure their staff are aware of biosecurity risks and understand and apply good biosecurity practices on their farms. This resource was funded by the Poultry Cooperative Research Centre and the Rural Industries Research and Development Corporation Chicken Meat program.

Implementation of the procedures in the manual also satisfies the requirements for poultry farming specified in the Primary Production and Processing Standard for Poultry Meat,[29] issued by Food Standards Australia New Zealand. This standard came into effect on 20 May 2012, and has been incorporated into state and territory legislative frameworks. Under the standard, all meat chicken farms must have an appropriate food safety management system in place. Depending on the jurisdiction, farms may have to be licensed, and their food safety management system audited by the relevant jurisdictional authority and/or the processor to whom the farmer is contracted, to confirm that appropriate measures are in place to ensure food safety.

Chicken meat processing companies are also required to meet the standards required by their major customers, such as the major supermarket chains and quick service restaurants. These standards cover food safety, animal welfare and animal health. In many cases, compliance with the standards is independently audited. Some customers have global supplier farm and animal welfare standards and assurance programs which Australian chicken meat suppliers must also comply with.

The industry has developed auditable industry animal welfare standards for all steps in the chicken meat production process, including hatcheries, breeder farms and grow-out farms. Although there is currently no formal, across-industry farm assurance program to deliver these standards, processors are encouraged to integrate the standards into their in-house QA systems.

Most chickens farmed with access to an outside range area are accredited under the Free Range Egg and Poultry Australia (FREPA) certification program. Compliance with FREPA standards is independently assessed. Most chickens produced in Australia are from farms that comply with Royal Society for the Protection of Cruelty to Animals (RSPCA) Approved Farming Scheme standards,[30] and most of these are accredited under this system; RSPCA staff assess compliance with scheme standards.

1.7.7 Q-Alpaca

The Q-Alpaca program, developed and managed by the Australian Alpaca Association, 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.

The objectives of Q-Alpaca are to:

- encourage easier and more affordable disease monitoring and management, to increase member participation in disease surveillance programs

28 www.farmbiosecurity.com.au/livestock/chickens/meat-chicken-production-biosecurity

29 www.foodstandards.gov.au/code/primaryproduction/poultry/pages/default.aspx

30 www.rspca.org.au/what-we-do/rspca-approved-farming-scheme/rspca-standards-meat-chickens

- provide a means of early detection of an EAD (such as FMD) in Australia and reduce the effects of such a disease on the Australian alpaca industry
- ensure that alpaca herds remain healthy, by using private veterinary practitioners to professionally investigate deaths
- help to prevent disease spread between alpaca herds, and the introduction of diseases into a herd
- allow herds that are currently in the Alpaca Market Assurance Program (AlpacaMAP) for Johne's disease to gain an extra Monitored Negative (MN) status credit; these herds can maintain their MN status without further faecal testing, provided they continue their participation in Q-Alpaca
- allow other herds that are not in the AlpacaMAP to gain the equivalent of MN1 status (the lowest level of assurance).

The Q-Alpaca program provides disease surveillance information about the Australian alpaca herd. Postmortem examinations are required for any adult alpaca over 12 months of age that dies or is euthanased, or any cria under 12 months of age that shows signs of emaciation or diarrhoea and either dies or is euthanased.

The program is fully auditable. Among other requirements, owners of participating alpaca herds are required to keep movement records, adopt sound biosecurity practices when new arrivals are added to the herd, and maintain appropriate and adequate fencing.

An agreement signed between the participant and the private veterinary practitioner forms the basis of a partnership for adhering to the requirements of Q-Alpaca and the adoption of best practice in biosecurity.

1.7.8 B-QUAL

The honey industry recognises that quality and food safety standards are required by customers, wholesalers and regulators. The industry must comply with the requirements of Food Standards Australia New Zealand – including the development of a HACCP-based food safety program – to ensure that honey products meet international, national, and state and territory food safety requirements.

The B-QUAL food safety program is a voluntary program for apiarists and honey-processing businesses, ensuring that the honey bee industry's standards meet best practice, and domestic and international market demands. The program is owned by the Australian Honey Bee Industry Council, managed by the B-QUAL Australia board and administered by AUS-QUAL (a certification body accredited by the Joint Accreditation System of Australia and New Zealand).

The B-QUAL standards encompass all facets of honey production and industry services, including honey production, queen bees, pollination and honey packing. B-QUAL is a cost-effective and easy-to-use program. Beekeepers who wish to become certified first undergo training in HACCP principles and the B-QUAL requirements. The nationally recognised training is provided by AUS-MEAT through its registered training organisation. Groups of beekeepers can attend face-to-face workshops, or individual beekeepers can complete a self-learning pack.

Once a beekeeper has integrated the B-QUAL requirements into their operation, the business is audited by an Exemplar Global third-party auditor. Certification is provided by AUS-QUAL. Beekeepers selling direct to the public are audited every year. Those selling bulk honey to packers are audited once every two years.

The B-QUAL program provides comprehensive work instructions and record forms that must be maintained for:

- hive management (identification, location, movement and disease status)
- extraction (process, facilities and equipment)
- biosecurity
- hygiene (personal, machinery maintenance, sanitation and vermin control)
- purchases (inventory lists and stocktake activities)
- equipment calibration
- internal and external audit results
- staff training
- occupational health and safety issues.

The B-QUAL Board is committed to maintaining the integrity of the B-QUAL program and ensuring

it remains relevant and beneficial to the industry. To this end, the Board is currently undertaking a review of the program.

1.7.9 Other quality assurance programs

FeedSafe®

The Stock Feed Manufacturers' Council of Australia (SFMCA) operates FeedSafe® as the QA accreditation program for the Australian stockfeed industry. FeedSafe® aims to increase the commitment of the Australian stockfeed industry to QA and risk mitigation in the manufacture and use of animal feeds. Through FeedSafe®, the SFMCA has recognised the need for a broader industry approach to feed and food safety, and is providing greater security of supply to Australia's livestock industries.

The central aspect of FeedSafe® is a code of good manufacturing practice.[31] This was developed in consultation with the CVOs of each state and territory, and was endorsed by the then Standing Council on Primary Industries. FeedSafe® requires feed manufacturers to meet minimum standards and undergo annual site audits by independent third-party food safety auditors. Feed manufacturers are required to implement HACCP as part of their FeedSafe® accreditation.

Rendering standards and accreditation

The *Australian standard for the hygienic rendering of animal products* (AS 5008:2007)[32] provides the framework for producing safe rendered products in Australia. It prescribes minimum requirements for:

- implementing QA and HACCP principles
- hygienic construction of rendering plants
- hygienic rendering operations, microbiological testing and validation of heat treatments
- product tracing and recall
- labelling requirements that are consistent with state and territory legislation on labelling stockfeed with a statement relating to restricted animal material.

Each state and territory requires rendering plants to comply with the standard. Compliance is verified by regular audits by, or on behalf of, state and territory food authorities, or by independent auditors, who recommend accreditation of rendering plants according to the scheme managed by the Australian Renderers Association (ARA). Independent auditors report their findings to the ARA. While not a mandatory pre-requisite for export, some trading partners recognise compliance with the standard as meeting import requirements. Accordingly, the Department of Agriculture and Water Resources is notified of all critical non-compliances affecting applicable export operations. In some states and territories, the auditors also report results of audits, or compliance with product labelling requirements, to the relevant state or territory authorities.

PetFAST

The Pet Food Adverse Event System of Tracking (PetFAST)[33] is a voluntary joint initiative of the Australian Veterinary Association and the Pet Food Industry Association of Australia. It is designed to track health problems in dogs and cats that are suspected of being associated with eating certain pet foods or treats. The system enables veterinarians to report, and information to be analysed, so that potential problems can be identified and action taken. PetFAST was launched in January 2012.

Australian standards for the seafood industry

Australia's seafood comes from a combination of wild-capture and aquaculture sources. All producers and manufacturers consider public and consumer confidence in seafood safety to be of paramount importance. Many of the larger sectors have developed their own QA programs, based on HACCP principles and good manufacturing practices that are tailored to their individual operations.

The Fisheries Research and Development Corporation (FRDC) was accredited in October 2013 by the Accreditation Board for Standards Development Organisations to develop Australian standards for the seafood industry. The FRDC manages the ongoing maintenance and development of the *Australian fish names standard*

31 www.sfmca.com.au/items/943/Q1.3ver4CodeofGMP.doc

32 www.publish.csiro.au/pid/5666.htm

33 www.ava.com.au/petfast

(AS 5300),[34] which specifies the nationally agreed standard names for all fish species in Australia.

The seafood industry has developed and maintains a Seafood Incident Response Plan (SIRP [formerly Seafood Emergency Plan]), to be activated in the event of an adverse seafood incident. The role of the SIRP is to minimise damage to the seafood industry by providing guidance on how the industry is to respond in the unlikely event of an adverse incident.

All individual food businesses are legally required to have a documented food recall plan in case a product has to be recalled. Similarly, all food safety agencies have well developed emergency response strategies in place and regularly trial them. The strategies involve:

- stopping any further distribution and sale of unsafe food
- retrieving the potentially unsafe food
- informing the public and the relevant authorities about the problem.

1.8 One Health

The One Health concept acknowledges that human and animal health are interdependent and related to the ecosystems in which they coexist. Stated simply, the health of people is connected to the health of animals and the environment. The goal of One Health is to encourage collaborative efforts of multiple disciplines, working locally, nationally and globally, to achieve the best health outcomes for people, animals and our environment. A One Health approach is critical to the growing global threat of antimicrobial resistance (AMR). The development of antimicrobial resistance threatens both human and animal health, and is driven by antimicrobial manufacture and use in humans, animals and the subsequent spread of antimicrobial agents into the wider environment.

1.8.1 Antimicrobial resistance

Antimicrobial resistance mitigation

AMR is a global risk that poses a serious and imminent threat to human and animal health. AMR cannot be addressed through unilateral action; a One Health approach and significant effort in human and animal health fields will be required to reverse the trend.

Australia has a good track record on AMR from an animal health perspective, as a result of strict regulation of the use of antimicrobials in animals. The Australian Pesticides and Veterinary Medicines Authority (APVMA) continues not to register fluoroquinolones or third and fourth generation cephalosporins for use in food-producing animals. Both classes of antibiotics are registered for use in companion animals but are limited to the target animal species listed on the product label and the use of both classes is based on cases for which culture and sensitivity testing indicate no suitable alternatives. Colistin, one of the antibiotics of last resort used to treat infections in humans, is not registered for use in any species of animal in Australia. A plasmid-mediated colistin-resistance mechanism (MCR-1), which can be shared among bacteria, was first reported in China in 2015. MCR-1 has since been found in at least 20 countries, in humans, livestock and animal products. The APVMA evaluates and registers antimicrobial agents, and almost all those used in animals are listed on Poisons Schedule 4, meaning they are prescription-only medicines. The APVMA evaluation process involves conducting a risk assessment, including for antibiotic resistance.

The Department of Agriculture and Water Resources has a leadership role in AMR. At an international level, the department is involved in the work of several multi-lateral organisations, such as the World Health Organization (WHO), OIE and the Food and Agriculture Organization of the United Nations (FAO). These organisations provide global guidance on the best way to limit AMR.

At a national level, the department worked with the Department of Health to release Australia's first National Antimicrobial Resistance Strategy on 2 June 2015 and its Implementation Plan on 10 November 2016.[35] The Implementation Plan outlines specific focus areas for action and includes activities that are being undertaken by the Australian Government, state and territory governments, non-government organisations, professional bodies and research organisations to

34 seafoodstandards.com.au/fish-names/Pages/default.aspx

35 agriculture.gov.au/animal/health/amr

Image credit: AHA

minimise the development of AMR and to ensure the continued availability of effective antimicrobials for human and animal health.

The department also participates in the following groups:

- The Antimicrobial Resistance Prevention and Containment Steering Group, which is jointly chaired by the secretaries of both departments, and includes the Australian Chief Medical Officer and CVO. This provides governance and leadership on AMR issues, and oversees implementation of the national strategy.
- The Australian Strategic and Technical Advisory Group on Antimicrobial Resistance, an expert group from the health and veterinary sectors, which is co-chaired by the Australian Chief Medical Officer and CVO. This provides strategic, technical, scientific and clinical advice to the steering group.
- The Antimicrobial Resistance Surveillance Task Group, which includes animal health industry participants. This focuses on implementing Australia's AMR surveillance program for livestock.
- The Antibiotic Awareness Week working group, which is led by the Australian Commission on Safety and Quality in Health Care. This supports an annual global initiative endorsed by the WHO (see below).

National Antibiotic Awareness Week

National Antibiotic Awareness Week took place on 14–20 November 2016. It formed part of the first World Antibiotic Awareness Week, declared by WHO and supported by the OIE to increase global public awareness of the importance of AMR as a One Health issue. The department was involved in activities[36] which included:

- internal communications raising awareness of AMR mitigation activities
- a global Twitter chat on AMR
- encouraging the animal health community to take the pledge to manage AMR
- promoting the joint Department of Health and Department of Agriculture and Water Resources release of the Implementation Plan for the National Antimicrobial Resistance Strategy (2015–2019) on 10 November 2016.

36 www.agriculture.gov.au/animal/health/amr/antibiotic-awareness-week

Image credit: Joshua Smith

2

TERRESTRIAL ANIMAL HEALTH STATUS

Australia has a long history of freedom from the major epidemic diseases of livestock. The geographical isolation of the continent provides a natural biosecurity barrier, which is supported by sound biosecurity 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.

State and territory governments manage the control and eradication of animal diseases, 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).

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[37] of terrestrial animals facilitates disease reporting and control. It is based on the list of diseases that are notifiable to the World Organisation for Animal Health (OIE) and also includes endemic diseases of national significance. Any occurrences of diseases on this list must be reported to government authorities. This ensures that unusual incidents involving animal mortality or sickness and diseases of public health significance are investigated. The list is reviewed periodically by the AHC and was last reviewed in early 2015. Table 2.1 shows Australia's status for diseases on the National List of Notifiable Animal Diseases that are not reported to the OIE, for 2016.

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. Table 2.2 shows Australia's status for OIE-listed diseases in 2016.

Table 2.1 Australia's status for diseases on the National List of Notifiable Diseases of Terrestrial Animals, 2016, (not reportable to the OIE)

Disease	Status	Date of last occurrence and notes
Australian bat lyssavirus	Present	–
Brucella canis	Free	Never reported
Devil facial tumour disease	Present	Restricted distribution
Encephalitides (tick-borne)	Free	Never reported
Infection with Borna disease virus	Free	Never reported
Infection with Bungowannah virus (porcine myocarditis)	Present	2003. Restricted distribution, one piggery
Infection with duck herpesvirus 1 (duck viral enteritis/duck plague)	Free	Never reported
Infection with equine encephalosis virus	Free	Never reported
Infection with Getah virus	Free	Never reported
Infection with Hendra virus	Present	Sporadic occurrence
Infection with *Histoplasma farciminosum* (epizootic lymphangitis)	Free	Never reported
Infection with influenza A viruses in swine	Present	–
Infection with Jembrana disease virus	Free	Never reported
Infection with Menangle virus	Present	1997
Infection with *Mycobacterium avium* (avian tuberculosis)	Present	–
Infection with *Neorickettsia risticii* (Potomac horse fever)	Free	Never reported
Infection with porcine epidemic diarrhoea virus	Free	Never reported. National survey conducted in 2016 with negative results

37 www.agriculture.gov.au/pests-diseases-weeds/animal/notifiable

cont.

Disease	Status	Date of last occurrence and notes
Infection with *Psoroptes ovis* (sheep scab)	Free	1896
Infection with *Salmonella* Abortusequi	Free	Never reported
Infection with *Salmonella enteritidis* in poultry	Present	–
Infection with swine vesicular disease virus	Free	Never reported
Infection with *Taenia saginata* (*cysticercus bovis*)	Present	–
Infection with Teschovirus A (porcine enteroviral encephalomyelitis)	Free	Never reported
Infection with *Trypanosoma cruzi* (Chagas disease)	Free	Never reported
Infection with vesicular stomatitis virus	Free	Never reported
Infection with Wesselsbron virus	Free	Never reported
Louping ill	Free	Never reported
Malignant catarrhal fever (wildebeest-associated)	Free	Never reported
Post-weaning multi-systemic wasting syndrome	Free	Never reported
Pulmonary adenomatosis (jaagsiekte)	Free	Never reported
Transmissible spongiform encephalopathies (chronic wasting disease or deer, feline spongiform encephalopathy)	Free	Two cases of feline spongiform encephalopathy have been diagnosed in imported animals in Australian zoos in 1992 (cheetah) and 2002 (Asiatic golden cat), where exposure before importation to feeds derived from BSE affected cattle are thought to have caused the disease.
Vesicular exanthema	Free	Never reported
Warble fly infestation	Free	Never reported

Table 2.2 Australia's status for OIE-listed diseases of terrestrial animals, 2016

Disease	Status	Date of last occurrence and notes
Multiple-species diseases		
Anthrax	Present	Limited distribution
Aujeszky's disease virus (infection with)	Free	Never occurred
Bluetongue	Virus present	Restricted to specific northern areas of Australia. Sentinel herd and vector monitoring programs are in place
Brucella abortus (infection with)	Free	Australia declared freedom in all terrestrial animal species in 1989
Brucella melitensis (infection with)	Free	Never occurred in terrestrial animals.
Brucella suis (infection with)	Serological evidence	Maintained in feral pigs in parts of NSW and Qld. Rare occurrence in domestic pigs

cont.

Disease	Status	Date of last occurrence and notes
Crimean Congo haemorrhagic fever	Free	Never occurred
Echinococcus granulosus (infection with)	Present	–
Echinococcus multilocularis (infection with)	Free	Never occurred
Epizootic haemorrhagic disease	Virus present	Disease has not been reported
Equine encephalomyelitis (eastern)	Free	Never occurred
Foot-and-mouth disease	Free	1872. Australia is officially recognised by the OIE as free without vaccination
Heartwater	Free	Never occurred
Japanese encephalitis	Serological evidence	Detected annually in Torres Strait and on Cape York in 1998 and 2004
New World screw-worm fly (*Cochliomyia hominivorax*)	Free	Never occurred
Old World screw-worm fly (*Chrysomya bezziana*)	Free	Never occurred
Paratuberculosis	Present	National control and management programs are in place
Q fever	Present	Q fever, caused by *Coxiella burnetti*, is present in Australia but rarely causes disease in animals and is not notifiable. The main carriers of the disease are farm animals, but other animals such as kangaroos, feral pigs, bandicoots and birds, as well as domestic pets such as dogs and cats can also be infected. Vaccination is advised for people at high risk such as those who work with animals.
Rabies virus (infection with)	Free	1867
Rift Valley fever virus (infection with)	Free	Never occurred
Rinderpest virus (infection with)	Free	1923. With the global eradication of rinderpest in 2011, all countries are free
Surra (*Trypanosoma evansi*)	Free	Never occurred
Trichinella spp. (infection with)	Not reported	*Trichinella. spiralis* is not present. *T. pseudospiralis* is present in wildlife
Tularaemia	Present	Two human cases reported in Tasmania in 2011, detected in archived samples from Tasmanian ringtail possums sampled in 2002
West Nile fever	Australian variants present	A previously unknown Australian strain of West Nile virus was identified following an outbreak of neurological disease in horses in 2011. No cases were reported in 2016
Cattle diseases		
Bovine anaplasmosis	Present	Transmission mainly in areas of QLD, NT and WA
Bovine babesiosis	Present	Transmission mainly in areas of QLD, NT and WA
Bovine genital campylobacteriosis	Present	–
Bovine spongiform encephalopathy	Free	Never occurred. The National Transmissible Spongiform Encephalopathies Freedom Assurance Program includes surveillance. Australia has official OIE 'negligible risk' status

cont.

Disease	Status	Date of last occurrence and notes
Bovine tuberculosis	Free	Australia declared freedom in 1997; the last case in any species was reported in 2002
Bovine viral diarrhoea	Present	Bovine viral diarrhoea virus 1 (BVDV-1) is present; BVDV-2 has never occurred
Enzootic bovine leucosis	The dairy cattle herd is free. Very low prevalence in beef cattle	Australian dairy herd achieved freedom on 31 December 2012
Haemorrhagic septicaemia	Free	Never occurred. Strains of *Pasteurella multocida* are present, but not the 6b or 6e strains that cause haemorrhagic septicaemia
Infectious bovine rhinotracheitis/ infectious pustular vulvovaginitis	Present	Bovine herpesvirus (BHV)-1.2b is present; BHV-1.1 and BHV-1.2a have never occurred
Lumpy skin disease	Free	Never occurred
Mycoplasma mycoides subsp. *mycoides* SC (contagious bovine pleuropneumonia) (infection with)	Free	1967. Australia declared freedom in 1973 and is officially recognised by the OIE as free
Theileriosis	Free	*Theileria parva* and *T. annulata* are not present
Trichomonosis	Present	–
Trypanosomosis (tsetse borne)	Free	Never occurred
Sheep and goat diseases		
Caprine arthritis–encephalitis	Present	Voluntary accreditation schemes exist
Chlamydophila abortus (enzootic abortion of ewes, ovine chlamydiosis) (infection with)	Free	Never occurred
Contagious agalactia	Free	*Mycoplasma agalactiae* has been isolated, but Australian strains do not produce agalactia in sheep
Contagious caprine pleuropneumonia	Free	Never occurred
Maedi–visna	Free	Never occurred
Nairobi sheep disease	Free	Never occurred
Ovine epididymitis (*Brucella ovis*)	Present	Voluntary accreditation schemes exist in all states
Peste des petits ruminants (infection with)	Free	Never occurred. Australia is officially recognised by the OIE as free
Salmonellosis (*Salmonella abortusovis*)	Free	Never occurred. Surveillance has shown no evidence of infection in sheep
Classical scrapie	Free	1952. The National Transmissible Spongiform Encephalopathies Freedom Assurance Program includes surveillance. Atypical scrapie has been detected several times
Sheep pox and goat pox	Free	Never occurred
Equine diseases		
African horse sickness virus (infection with)	Free	Never occurred. Australia is officially recognised by the OIE as free
Contagious equine metritis	Free	1980
Dourine	Free	Never occurred

cont.

Disease	Status	Date of last occurrence and notes
Equid herpesvirus 1 (equine rhinopneumonitis) (infection with)	Present	–
Equine encephalomyelitis (western)	Free	Never occurred
Equine infectious anaemia	Present	Limited distribution and sporadic occurrence
Equine influenza virus (infection with)	Free	Australia's first outbreak occurred between 24 August and 25 December 2007. Australia declared freedom according to OIE standards on 25 December 2008
Equine piroplasmosis	Free	1976
Equine viral arteritis (infection with)	Serological evidence	–
Glanders	Free	1891
Venezuelan equine encephalomyelitis	Free	Never occurred
Swine diseases		
African swine fever	Free	Never occurred
Classical swine fever virus (infection with)	Free	1962. Australia is officially recognised by the OIE as free
Nipah virus encephalitis	Free	Never occurred
Porcine cysticercosis	Free	Never occurred
Porcine reproductive and respiratory syndrome	Free	Never occurred
Transmissible gastroenteritis	Free	Never occurred
Avian diseases		
Avian chlamydiosis	Present	–
Avian infectious bronchitis	Present	–
Avian infectious laryngotracheitis	Present	–
Avian mycoplasmosis (*Mycoplasma gallisepticum*)	Present	–
Avian mycoplasmosis (*M. synoviae*)	Present	–
Duck virus hepatitis	Free	Never occurred
Fowl typhoid	Free	1952
Highly pathogenic avian influenza virus (infection with)	Free	2013
Infectious bursal disease (Gumboro disease)	Present	Infectious bursal disease occurs in a mild form. Very virulent strains are not present
Low pathogenicity avian influenza virus (poultry) (infection with H5 or H7 viruses)	Occasional	2013
Newcastle disease virus in poultry (infection with)	Lentogenic viruses present	Virulent Newcastle disease last occurred in poultry in 2002. In August 2011, a paramyxovirus not previously reported in Australia was detected in hobby pigeons in Victoria. Disease caused by this virus has not spread to poultry
Pullorum disease	Not reported	Last reported in 1992. *Salmonella* pullorum has been eradicated from commercial chicken flocks
Turkey rhinotracheitis	Free	Never occurred

cont.

Disease	Status	Date of last occurrence and notes
Lagomorph diseases		
Myxomatosis	Present	Used as a biological control agent for wild rabbits
Rabbit haemorrhagic disease	Present	Used as a biological control agent for wild rabbits. A new strain was detected in 2015[a]
Bee diseases		
Acarapis woodi (infestation of honey bees with)	Free	Never occurred
Paenibacillus larvae (American foulbrood) (infection of honey bees with)	Present	–
Melissococcus plutonius (European foulbrood) (infection of honey bees with)	Present	–
Aethina tumida (small hive beetle) (infestation with)	Present	Restricted distribution
Tropilaelaps spp. (infestation of honey bees with)	Free	Never occurred
Varroa spp. (varroosis) (infestation of honey bees with)	Present?	*Varroa destructor* has never been reported in Australia. Incursion of *V. jacobsoni*
Other diseases		
Camel pox	Free	Never occurred
Leishmaniasis	Australian variant present	Rare. Australian *Leishmania* was isolated in 2015 from macropods. A case occurred in an imported dog in 2015

OIE = World Organisation for Animal Health

a http://www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review?page_refer=MapFullEventReport&reportid=18075

2.3 National reporting system for animal diseases in Australia

Australia's disease surveillance includes targeted and general activities delivered under the authority of the Australian Government and state and territory governments (jurisdictions). Each jurisdiction is required to comply with legislated obligations to detect the occurrence and prevalence of notifiable diseases. Data on disease investigations are held in jurisdiction field and laboratory databases, enabling disease control programs to be informed by property, regional and jurisdiction intelligence on diseases.

A subset of jurisdiction-held disease investigation data are collated nationally in Australia's National Animal Health Information System (NAHIS). The NAHIS is a web-based database management system enabling online submission to discrete data projects, automation of data analysis and summary, and provision of customised output reports. The NAHIS makes a current, consistent national dataset of important surveillance information available to the Australian Government Department of Agriculture and Water for reporting to the OIE, for substantiating Australian claims to disease occurrence status and for trade negotiations.

The NAHIS is managed by Animal Health Australia and governed by an ongoing collaboration of its member representatives: governments, livestock industries and Wildlife Health Australia. The NAHIS Steering Committee facilitates effective cooperation for identifying needs and priorities for collating and reporting summary animal health information and required enhancements to the NAHIS.

NAHIS data are routinely reported, together with topical surveillance-related news and case reports of veterinary investigations, in the *Animal Health Surveillance Quarterly* newsletter,[38] and annually in this report (Animal Health in Australia).

38 www.animalhealthaustralia.com.au/our-publications/animal-health-surveillance-quarterly

2.4 Endemic pests and diseases of national significance

This section describes the status of, and programs for, endemic animal pests and diseases of national significance in 2016. Disease notifications for the Australian Capital Territory are included in the reports for New South Wales.

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 infects both adult bees and brood. Adult bees do not display signs of disease but they easily spread the disease around the hive and to neighbouring hives. All infected larvae die, and eventually the whole affected hive is killed. AFB is very 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, and then burn, bury or irradiate the hive material. AFB is a nationally notifiable disease 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 areas with a high incidence of AFB, the Biosecurity Compliance Unit of the New South Wales Department of Primary Industries (NSW DPI) has conducted special apiary compliance operations. These aim to raise awareness of the apiary industry's responsibilities under the *Apiaries Act 1985 (NSW)*, to detect breaches of the Act and to allow compliance action to be taken, where necessary. The apiary industry has worked closely with NSW DPI in providing departmental apiary inspectors with information about the location of abandoned, neglected and diseased hives, and helping with the removal of some of these hives for destruction.

The take-home messages to the apiary industry were:

- to use the diagnostic, advisory and compliance services provided by NSW DPI
- that industry is responsible for eradicating AFB from its own operations.

Northern Territory

AFB is a notifiable disease in the Northern Territory. In 2016, a case of AFB in a single hive was reported. The NT maintains strict movement control measures to minimise the risk of introduction of AFB.

Queensland

AFB is widespread in Queensland, and its control is a routine part of apiary management. Apiary staff from the Queensland Department of Agriculture and Fisheries (DAF) hold monthly information sessions for beekeepers in various locations, which cover sterilisation, control and management techniques.

During 2016, 144 submissions, most of them consisting of multiple samples, were made to the Biosecurity Science Laboratory of Queensland DAF for diagnosis of AFB and European foulbrood (see Section 2.4.15). Of these, 96 contained one or more samples that were diagnosed as positive for AFB by microscopic examination.

South Australia

AFB is endemic in South Australia, except for Kangaroo Island, which remains free from the disease. AFB management is achieved predominantly through a combination of apiarist reporting, packer testing and active disease surveillance. During 2016 AFB was reported/detected in 54 hives belonging to 36 apiarists.

Tasmania

AFB is endemic in Tasmania. The Tasmanian apiary industry has established disease control programs for voluntarily registered beekeepers. Registration fees fund the testing of honey samples for AFB. This assists with 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.

Victoria

AFB is endemic in Victoria, and 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 quarantine measures and a requirement to follow a management plan. The Department of Agriculture and Food Western Australia (DAFWA) provides a diagnostic service that allows beekeepers to monitor the AFB status of their apiaries and the department to monitor infected apiaries. These measures support a quality assurance program, B-QUAL, which has been adopted by the industry (see Section 1.7.8). The percentage of infected apiaries reported increased nominally in 2016 but remains low (< 10%).

2.4.2 Anthrax

Anthrax is on the list of nationally notifiable diseases. It is subject to 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.

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 in 1933. The only case in Western Australia was an isolated case in 1994.

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

The National Anthrax Reference Laboratory situated at the AgriBio Centre within Agriculture Victoria provides and maintains diagnostic capability in bacteriological and molecular methods to detect *Bacillus anthracis* in biological specimens. The Reference Laboratory has a wide range of capabilities to characterise isolates, including genotyping assays and whole genome sequencing. An 'animal-side' immunochromatographic test (ICT), developed by the then Victorian Department of Primary Industries, has been used for the past several years in Victoria. This field test enables rapid screening for anthrax when government or private veterinarians are investigating sudden, unexplained deaths in ruminant livestock. Following approval of this test in 2010 by the then Sub-Committee on Animal Health Laboratory Standards, the ICT kits have been manufactured by AgriBio and are being supplied for use in other states.

Image credit: Department of Agriculture and Water Resources

New South Wales

Five anthrax incidents occurred during 2016. In late February, a total of 10 cattle died out of a herd of 230 in the Rankins Springs district of the Riverina Local Lands Services (LLS). Although there was no recorded history of anthrax on this property, it is in an area with significant numbers of anthrax cases occurring since 1970. In mid-March, anthrax was diagnosed as the cause of death in 18 sheep of a flock of 1197, in the Cumnock district of the Central Tablelands LLS. This property had reports of anthrax in sheep in 1958 and 1961, but none recorded again until the incident this year. Two further properties near the Cumnock property were confirmed anthrax positive in early April and each involved the death of a single animal; one lamb out of 678 sheep and the other with one steer out of 279 cattle. The fifth incident occurred in late April and involved the death of 11 of 222 cattle on a property in the Hillston area of the Western LLS. A neighbouring property had been diagnosed with anthrax in 2006.

The ICT was used in all positive diagnoses. The first, second and fifth incidents were anthrax positive with the ICT. The third and fourth incidents were ICT negative, and those animals may have been dead for more than 48 hours.

These cases were managed according to NSW DPI Anthrax Policy. Properties were placed in quarantine, carcasses were burned and death sites disinfected. All remaining at-risk animals on the properties were vaccinated. NLIS was used to trace movements, and no movements of at-risk animals were found to have occurred.

During 2016, anthrax was excluded in 127 investigations of livestock mortality: 80 investigations in cattle, 38 in sheep, one in pigs, two in horses, one in a hippopotamus, two investigations in dogs and three exclusions in goats.

Alternative diagnoses in cattle included ptaquiloside toxicity (*Cheilanthes sieberi*), *Clostridium chauvoei* infection, bloat, urea toxicity, nitrate toxicity, severe cystitis, severe mastitis, hypomagnesaemia, hypocalcaemia, bloat, *Mannheimia haemolytica* pneumonia theileriosis, vetch (*Vicia* spp.) toxicity and polioencephalomalacia.

Alternative diagnoses in sheep included *Clostridium perfringens* infection, haemonchosis, lactic acidosis and haemobartonellosis, hypomagnesaemia, internal parasites, photosensitisation, *Verbesina encelioides* toxicity, *Lythrum hyssopifoliai* toxicity, *Trichostrongylus* spp., polioencephalomalacia, red gut (intestinal torsion), pneumonia and hypocalcaemia.

Investigation of one pig death found that it had died of choke. One investigation of dog deaths resulted in a diagnosis of canine parvovirus. No diagnoses were made in the other investigation of dog deaths, but rodenticide toxicity was suspected, and five of nine animals died. One of the goat death investigations resulted in a diagnosis of internal parasites. No alternative diagnoses were made for the horse or hippopotamus deaths.

The ICT was used in 92 of the 127 exclusions with 91 negative results. One false positive anthrax ICT result in one of two sheep was negative in all further laboratory tests, including polymerase chain reaction (PCR) and culture.

Victoria

There were no confirmed anthrax cases in Victoria during 2016. A total of 70 anthrax-exclusion investigations were undertaken (54 in cattle, 13 in sheep, two in alpacas and one in a camel).

2.4.3 Asian honey bee

Asian honey bees (AHB) (*Apis cerana*) were first detected in Queensland in 2007 and are known to have spread throughout the Atherton Tablelands and Cairns hinterland. One of the primary concerns with the continued spread of Asian honey bee is the potential for subsequent incursions to carry exotic bee parasites, whose establishment could be facilitated by distributing across the resident population of AHB and subsequently transferred onto the European honey bee, *A. mellifera*. The introduction of exotic bee parasites could have major impacts on the honey bee industry and pollinator-reliant plant industries as European honey bees have little to no defence against exotic bee parasites that Asian honey bees can carry.

The Australian Government invested $2 million from July 2011 to June 2013 to move from eradication of AHB to management of the pest in Australia through establishment of the Asian Honey Bee Transition to Management (AHB T2M)

program. This was done in partnership with Biosecurity Queensland and the Australian Honey Bee Industry Council, which contributed significant funding and undertook several relevant activities. The program, which was administered by Plant Health Australia and concluded on 30 June 2013, focused on minimising the bee's spread and providing a range of safe and effective tools to help the community manage this pest. An Asian Honey Bee Transition Management Group was established to oversee the program, monitor its delivery and ensure that its outcomes were achieved. An Asian Honey Bee Scientific Advisory Group was also established to provide technical advice, feedback and consideration of specific projects and activities under the AHB T2M program.

Queensland

Several research and development projects delivered by organisations such as the Rural Industries Research and Development Corporation (RIRDC), CSIRO and Horticulture Innovation Australia (formerly Horticulture Australia Limited) are continuing in 2016–17. Projects are capitalising on opportunities to reduce the incidence and impact of bee pests and diseases, and build capacity to apply research findings through extension and education.

In 2016, an AHB nest infested with varroa mite (*Varroa jacobsoni*) was detected at the Port of Townsville. AHB was not known to occur in Townsville. The nest was removed and destroyed. Since then, one other AHB nest has been found to contain varroa mite. In response, Biosecurity Queensland has implemented an eradication program, that is cost-shared nationally, within the Townsville City Council local government area under the Emergency Plant Pest Response Deed. Activities include surveillance to detect and destroy feral AHB nests and swarms in the Townsville area, and examination for the presence of varroa mite. Further information on the varroa response is included in Section 4.7.3.

There have been no incursions of AHB in other jurisdictions. Victoria conducts floral sweep netting and uses swarm catch boxes at ports and airports as a part of ongoing surveillance through the National Bee Biosecurity Program.

2.4.4 Australian bat lyssavirus

Australian bat lyssavirus (ABLV) is on the list of nationally notifiable diseases.

ABLV is a rhabdovirus that is related to, but distinct from, rabies virus. Bats are the natural reservoir of ABLV, and both flying foxes (*Pteropus* spp.) and insectivorous microbats can be infected. There are two known sub-lineages of ABLV, the pteropid variant and the yellow-bellied sheath-tailed bat variant. Knowledge of other lyssaviruses has led to the assumption that all mammal species are probably susceptible to ABLV infection.

ABLV has only been reported in Australia. Serological evidence suggests a wide geographical distribution in bats in Australia. ABLV infection has been detected in bats from most states and territories. Clinical signs of ABLV infection in bats include unusual or aggressive behaviour and neurological signs such as paralysis, paresis, tremors, convulsions and unusual vocalisation.

There have been three human cases of ABLV infection following a bite or scratch from a bat, all fatal. Two horses in Queensland with neurological disease were found to be infected with ABLV in 2013, the first cases in an animal other than a bat or a human. In 2013, a dog in New South Wales that had contact with a flying fox was found to be seropositive and was euthanased. Post-mortem testing found no evidence of ABLV infection. There were no detections of ABLV infection in 2016 in species other than bats.

Bats are tested for ABLV for a variety of reasons, most commonly following potentially infectious contact with a human, e.g. a bite or scratch, or a domestic animal, e.g. a pet dog or cat. Members of the public are advised to contact their state or territory biosecurity authority (department of agriculture or primary industries) for advice on sick bats or bats that have interacted with pets. WHA collates and publishes national ABLV bat test results[39] (see Section 3.2.5 for a summary of 2016 data).

Northern Territory

There was one case of ABLV identified in a single black flying fox during 2016.

39 ABLV Bat Stats: www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx

Tasmania

Testing for ABLV is conducted in cases where there have been bat-related injuries to humans or animals or there are suspect clinical signs. ABLV has not been detected in Tasmania.

Victoria

There were no cases of ABLV in livestock or domestic animals reported in Victoria in 2016.

Western Australia

WA routinely performs ABLV testing on bats displaying unusual or aggressive behaviour, those with known contact (e.g. a bite or scratch) with humans or pet dogs and cats, or any unusual bat deaths. There were no detections of ABLV in WA in 2016.

2.4.5 Bovine anaemia caused by *Theileria orientalis*

Theileria orientalis, the tick-borne blood parasite that causes benign theileriosis, has been present in Australia for more than 100 years. It is established in coastal regions of eastern Australia. Historically, it has rarely caused disease. Australia is free from East Coast fever (*T. parva* infection) and Mediterranean theileriosis (caused by *T. annulata*), which are diseases listed by the OIE.

Since late 2005, the number and severity of disease cases due to *T. orientalis* infection in cattle in eastern Australia have increased. Disease has been seen in areas where it had not previously been found, often associated with the introduction of animals from areas where the disease is known to be present. This may be associated with the Ikeda type of *T. orientalis*.

New South Wales

In New South Wales in 2016, 89 investigations with 34 positive cases were reported. As in previous years, investigations occurred in districts where disease had been reported previously, predominantly coastal districts.

Northern Territory

T. orientalis has never been identified in the Northern Territory.

Queensland

While parasitaemia with *Theileria* spp. is a common finding in the investigation of tick fever in coastal Queensland, it is usually considered to be incidental and of no clinical significance, based on its presence in healthy, non-anaemic animals. The lack of cases of clinical significance in Queensland could be due to the fairly limited distribution of the more pathogenic *T. orientalis* Ikeda type and of the *Haemaphysalis longicornis* tick vector in Queensland.

Tasmania

No cases of bovine anaemia caused by *T. orientalis* were detected in Tasmania during 2016.

Victoria

In Victoria in 2016, six cases from five properties were reported; three cases were in dairy cattle and three were in beef cattle. As in previous years, cases occurred in Gippsland and north-east Victoria.

Western Australia

In May 2013, the first case in Western Australia of bovine anaemia due to *T. orientalis* Ikeda type was detected on a beef cattle property in the Southern Agricultural Region. Cases have continued to be reported in the region, and sporadic cases have also occurred in the South West Agricultural Region. Since detection of this parasite in Western Australia, the Department of Agriculture and Food has conducted research on the distribution and impact and continues to provide technical advice to private veterinarians and producers.

2.4.6 *Brucella ovis*

Ovine epididymitis, 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. Voluntary accreditation schemes (primarily 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 2016 are shown in Table 2.3.

Table 2.3 Ovine brucellosis accredited-free flocks, at 31 December 2016

State	Accredited free
New South Wales	861
Queensland	72
South Australia	539
Tasmania	59
Victoria	436
Western Australia	180
Australia	**2151**

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 producers to adopt a biosecurity plan and a testing regimen. Flocks are tested by accredited private veterinary practitioners either annually or every second or 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 2016, the scheme covered 861 flocks, predominantly stud flocks.

Northern Territory

Infection with *B. ovis* has never been reported in the Northern Territory. There are no commercial sheep flocks in the Northern Territory.

Queensland

Queensland has a voluntary ovine brucellosis accreditation scheme for stud flocks. In December 2016, 72 flocks were accredited. One new flock was accredited during 2016, and herd dispersal and property sales contributed to five flocks exiting the scheme.

South Australia

A voluntary ovine brucellosis accreditation scheme operates in South Australia. It is administered by Primary Industries and Regions SA, and provides assurance of ram freedom from ovine brucellosis. As of December 2016, there were 421 producers and 539 flocks accredited free from ovine brucellosis.

Tasmania

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 maintains the records. Tasmania has about 59 accredited ovine brucellosis-free flocks at any one time. Ovine brucellosis has not been confirmed in any sheep in Tasmania since 1988.

Victoria

Ovine brucellosis is present at low levels in Victorian sheep flocks. During 2016, infection was detected in three flocks.

A voluntary ovine brucellosis accreditation scheme administered by the Victorian Department of Economic Development, Jobs, Transport and Resources 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. As of December 2016, 436 flocks were accredited as free from ovine brucellosis.

Western Australia

DAFWA administers a voluntary ovine brucellosis accreditation scheme for ram breeders. Registered veterinarians inspect properties, advise on property biosecurity, and inspect and blood test rams on studs participating in the scheme. As of December 2016, the scheme had 180 accredited flocks.

2.4.7 *Brucella suis*

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; however, orchitis and other clinical signs have been seen occasionally in antibody-positive pig-hunting dogs. The disease is a zoonosis, i.e. humans can also be infected, and in Australia feral pigs are the usual source of infection.

Image credit: Steve Marshall

New South Wales

There is serological evidence of *B. suis* at a low prevalence in feral pigs in northern New South Wales.

Northern Territory

In 2016, no cases of *B. suis* infection were reported in the Northern Territory.

Queensland

In Queensland, *B. suis* is confined to some populations of feral pigs. A *B. suis* Accredited Herd Scheme is administered by Queensland DAF on behalf of the pig industry, and during 2016 had 10 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

To protect the disease-free status of farmed pigs in South Australia, movement controls are maintained for domestic pigs originating from states where *B. suis* can occasionally be detected in feral populations. In 2016, no cases of *B. suis* infection were reported in South Australia.

Tasmania

Tasmania's small feral pig population is confined to Flinders Island. *B. suis* has not been detected in Tasmania.

Victoria

In 2016, no cases of *B. suis* infection were reported in Victoria.

Western Australia

In 2016, no cases of *B. suis* infection were reported in Western Australia.

2.4.8 Caprine arthritis–encephalitis

Caprine arthritis–encephalitis (CAE), a multi-systemic, inflammatory condition of goats, is caused by a caprine retrovirus. The disease is found in most countries, including Australia. It has been reported in all Australian states and territories except the

Northern Territory. CAE is not included on the list of nationally notifiable diseases. Although Australia has no regulatory control programs for CAE, there are some voluntary accreditation programs based on serological testing in New South Wales, Queensland, South Australia and Tasmania. Animals testing positive for CAE are removed from the herd.

New South Wales

In New South Wales, a voluntary control program is available to goat producers. Virologists at the Elizabeth Macarthur Agricultural Institute are continuing research for better diagnostic tests, with the aim of developing more cost-effective tools for detection of infection and providing an avenue for possible eradication of the disease.

Queensland

Queensland has had a voluntary control program for CAE in dairy goats since 1987. In December 2016, the program had 118 CAE -accredited herds.

South Australia

In South Australia, where CAE is present, the Dairy Goat Society of South Australia has a voluntary market assurance scheme. There are 422 accredited producers with 535 flocks.

Tasmania

A voluntary herd accreditation scheme for CAE was introduced in Tasmania in late 2011, with DPIPWE maintaining a register of accredited herds. As no herds have been registered since its instigation, DPIPWE no longer manages this register. Goat producers are encouraged to access the National Kid Rearing Plan and consult their local private veterinarian for advice on CAE control. CAE is not a notifiable disease in Tasmania.

Victoria

In Victoria, where CAE is a notifiable disease, up to 90 goat herds are tested annually for CAE, either for export, for breeding or showing, or for investigations of lameness or reduced productivity. In 2016, serologically CAE-positive goats were confirmed on three properties; of these, two herds were endemically infected. One of these herds was attempting eradication with regular whole herd blood and milk testing and segregation.

Western Australia

CAE is not a notifiable disease in Western Australia.

2.4.9 Cattle tick and tick fever

The cattle tick, *Rhipicephalus microplus* or *R. australis* (formerly *Boophilus microplus*), was introduced to Australia in the late 19th century. It spread steadily from Darwin across northern Australia, stabilising in its current distribution in the 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 damage hides, reduce production, and cause 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. The spread of ticks from endemic areas is restricted by state-managed zoning policies. Many producers in the tick endemic area have changed to *Bos indicus*-type cattle because these breeds have greater resistance to tick infestation.

No incursions of cattle ticks or cases of tick fever were reported in South Australia, Tasmania or Victoria during 2016.

New South Wales

New infestations of cattle tick regularly occur in New South Wales; they are generally confined to the far north-eastern corner of the state. NSW DPI maintains a surveillance program at all far North Coast saleyards, where all cattle presented for sale are inspected. Inspectors treat all cattle at the sale with acaricide (by dipping) before their dispatch. Regular surveillance also occurs 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 areas of Queensland. Led and tractable livestock may be treated at the Kirra clearing facility and at Mt Lindesay border crossing before they enter New South Wales from tick-infested areas of Queensland. All classes of stock originating from tick-infested areas may also be cleared in Queensland by authorised officers who issue biosecurity certificates before stock enter New South Wales.

During 2016, 169 new cattle tick infestations were recorded, an increase on the figures for the previous three years. Most outbreaks were directly attributable to failures of on-farm biosecurity, which allowed straying of cattle and access to land where cattle tick larvae were present. Most outbreaks were identified through abattoir and saleyard surveillance rather than on-farm detection. This meant that spread to other holdings had often occurred before quarantine was put in place. Acaricide resistance is not currently an issue in New South Wales isolates; amitraz resistance is only rarely recorded, usually associated with introductions of infected hosts from Queensland.

No cases of tick fever were recorded in NSW in 2016. There were four outbreaks in 2015, resulting in 34 deaths in cattle. Tick fever occurs in New South Wales infrequently; 17 outbreaks have been recorded in the past five years.

Northern Territory

Four declared areas for cattle tick are gazetted under Northern Territory legislation, and movement restrictions are in place to prevent the spread of cattle ticks between zones and interstate. The cattle tick-infested zone 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 may be present on properties within this zone, and is managed by regulated movement conditions and approved programs for property management of cattle tick. An active surveillance program is in place to detect changes in cattle tick distribution. No spread of cattle tick was detected during 2016 surveillance.

A Parkhurst-strain infested zone was declared in 2011 around Darwin. Parkhurst-strain cattle ticks, which are resistant to synthetic pyrethroid and organophosphate chemicals, were first detected on properties in the area in the 1990s and were originally managed by quarantining individual properties. A declared area was gazetted following active surveillance across the area, which identified spread to other properties. Movement controls, such as clean inspections and supervised treatment of livestock with an acaricide effective for Parkhurst-strain ticks, are used to minimise the risk of further spread of these ticks outside the declared area.

Surveillance on properties at the boundary of the declared area in 2016 showed no further spread of Parkhurst-strain ticks. There were no new detections of Parkhurst-strain ticks on properties outside the Parkhurst-infested zone. The only quarantined property outside the declared area was released from quarantine in 2015, following completion of an intensive surveillance and management program.

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.

Queensland

Queensland's regulatory framework for the control and management of cattle tick changed from 1 July 2016 with the commencement of the *Biosecurity Act 2014* (Qld). The *Biosecurity Regulation 2016* (Cwlth) provides for two cattle tick zones in Queensland: infested and free.

Stock moving from the infested zone or from a restricted place in the free zone are required to meet the risk minimisation requirements of the Biosecurity Regulation and the Queensland Biosecurity Manual. Cattle ticks and tick fever are notifiable incidents when they occur in the Queensland cattle tick-free zone.

Queensland DAF uses a system of accredited certifiers to provide cattle tick inspection services.

Accredited certifiers are trained and audited by Queensland DAF biosecurity officers and, as of December 2016, there were 50 accredited certifier businesses with 80 authorised people under these accreditations to inspect and supervise the treatment of stock.

Queensland DAF inspectors, working under the Biosecurity Act, provide regulatory and advisory services for cattle tick control, eradication and management and conduct surveillance to check for the presence or absence of cattle ticks in the Queensland cattle tick-free zone.

Queensland DAF provides laboratory services for the analysis of dip fluids, and for testing and identifying acaricide-resistant strains of cattle ticks.

A new tick line was implemented from 1 July 2016 that removed the control zone and, in higher risk areas, double-fenced roads were instituted as a barrier. In December 2016, there were 179 restricted places in the new Queensland cattle tick-free zone.

During 2016, 64 incidents of babesiosis (average mortality rate, 8% of at-risk animals; range, 0–60%) and 8 incidents of anaplasmosis (average mortality rate, 4% of at-risk animals; range, 1–17%) were confirmed through the Queensland DAF veterinary laboratory.

Live vaccines produced by the Tick Fever Centre of Queensland DAF are used to control babesiosis and anaplasmosis. During 2016, the centre sold 580 525 doses of trivalent vaccine (97% chilled and 3% frozen).

Western Australia

The cattle tick-infested area in Western Australia includes the Kimberley in the north; the southern boundary is generally at latitude 20°S. 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 there is almost no strategic treatment for ticks or vaccination for tick fever due to the extensive nature of cattle production.

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 nor have any cases of tick fever.

2.4.10 Devil Facial Tumour Disease

Tasmanian devil facial tumour disease (DFTD) is a transmissible cancer which was first recorded in wild Tasmanian devils (*Sarcophilus harrisii*) in 1996[40,41] and has spread to affect nearly the entire species range. DFTD is caused by a directly transmissible cell line; living cancer cells are transmitted between individuals by close contact during social interactions.[42]

The species is estimated to have declined by 80% in less than 20 years, with local population reductions as high as 97%.[43,44] Tasmanian devils are now listed as an endangered species at both national and state levels, and are listed as threatened by the International Union for Conservation of Nature.[45] Tasmanian DFTD is listed as a nationally notifiable disease.

DFTD causes tumours mainly on the face or inside of the mouth and readily metastasises. All affected individuals die, usually within months of the appearance of the tumours.[46,47] Although it was originally predicted that the disease would drive the species to extinction in the wild, recent studies

40 Hawkins CE, Baars C, Hesterman H, Hocking G, Jones ME, Lazenby B, Mann D, Mooney N, Pemberton D, Pyecroft S. Emerging disease and population decline of an island endemic, the Tasmanian devil *Sarcophilus harrisii. Biological Conservation* 2006; 131: 307–324.

41 Loh R, Bergfeld J, Hayes D, O'hara A, Pyecroft S, Raidal S, Sharpe R. The pathology of devil facial tumor disease (DFTD) in Tasmanian devils (*Sarcophilus harrisii*). *Veterinary Pathology Online* 2006; 43: 890–895.

42 Epstein B, Jones M, Hamede R, Hendricks S, McCallum H, Murchison EP, Schönfeld B, Wiench C, Hohenlohe P, Storfer A. Rapid evolutionary response to a transmissible cancer in Tasmanian devils. *Nature Communications* 2016; 7: 12684. doi: 10.1038/ncomms12684.

43 Hamede RK, Pearse A-M, Swift K, Barmuta LA, Murchison EP, Jones ME. Transmissible cancer in Tasmanian devils: localized lineage replacement and host population response. *Proceedings. Biological Sciences* 2015; 282. doi: 10.1098/rspb.2015.1468.

44 Save the Tasmanian devil program. The disease. Hobart: Save the Tasmanian Devil Program, 2015. www.tassiedevil.com.au/tasdevil.nsf/The-Disease/979FEB5F116CE371CA2576CB0011A26E (accessed 24 November 2016).

45 International Union for Conservation of Nature and Natural Resources. The IUCN Red List of Threatened Species. Cambridge, UK: IUCN, 2008. www.iucnredlist.org

46 Hawkins CE, Baars C, Hesterman H, Hocking G, Jones ME, Lazenby B, Mann D, Mooney N, Pemberton D, Pyecroft S. Emerging disease and population decline of an island endemic, the Tasmanian devil *Sarcophilus harrisii*. *Biological Conservation* 2006; 131: 307–324.

47 Loh R, Bergfeld J, Hayes D, O'hara A, Pyecroft S, Raidal S, Sharpe R. The pathology of devil facial tumor disease (DFTD) in Tasmanian devils (*Sarcophilus harrisii*). *Veterinary Pathology Online* 2006; 43: 890–895.

show that animals are persisting at low levels in all areas of suitable habitat in Tasmania.

The tumour is known to persist, partly due to its down-regulation of the host's ability to recognise foreign cells, and partly due to the lack of genetic diversity within the host.[48,49] There is no evidence that DFTD can spread to species other than Tasmanian devils.[50]

The response to DFTD is coordinated by the Save the Tasmanian Devil Program (a federal and state government initiative), and implemented by the DPIPWE. A robust captive insurance population of over 700 individuals is managed across several institutions within Tasmania and on the mainland. The current phase of the program is focused on securing wild Tasmanian devil populations, minimising the impact of DFTD and other ecological threats and maximising the genetic diversity of the species, in addition to maintaining the insurance population. A disease-free population has been established on Maria Island and wild populations have been supplemented by captive releases at several sites across the state. Studies into immunological therapies, including development of a vaccine, continue.

2.4.11 Enzootic bovine leucosis

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

All states have carried out testing of their dairy herds for many years. In 2008, building on the state-based programs, the Australian Dairy Industry Council and animal health authorities implemented a national EBL eradication program.

Declaration of unconditional freedom from EBL in the Australian dairy herd, according to the requirements in the national Standard Definitions and Rules for Control and Eradication of Enzootic Bovine Leucosis in Dairy Cattle (version 2.0, February 2009), was achieved in 2013.

Maintenance of the status of the Australian dairy herd requires strict ongoing controls on the introduction of beef cattle, as EBL is still present at a very low prevalence in sectors of the Australian beef herd.

Northern Territory

No cases of EBL were reported in the Northern Territory during 2016. A large serosurvey of cattle herds in the Northern Territory in 2009 showed 99.93% of samples tested to be negative for EBL.

Tasmania

Tasmania is considered free of enzootic bovine leucosis and has import requirements in place to maintain that status.

Victoria

There were no cases of EBL reported in Victoria in 2016.

Western Australia

The Western Australian dairy industry undertakes additional EBL testing over that required for maintenance of freedom, which is funded by the WA cattle industry. All WA dairy herds undergo a bulk milk test annually, and an intensive bulk milk test is conducted each year on one-third of herds milking over 200 cows.

2.4.12 Equid herpesvirus 1

Equid 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. Abortions caused by EHV-1 are generally sporadic, but outbreaks do occur. EHV-1 neurological disease is an emerging disease of increasing incidence overseas, and new cases have been diagnosed in recent years in Australia.

Herpesvirus infection can tentatively be diagnosed if intranuclear inclusion bodies are detected during examination of tissue samples under a microscope. However, definitive diagnosis of EHV-1 infection – in cases of either abortion or neurological disease –

48 Kreiss A, Cheng Y, Kimble F, Wells B, Donovan S, Belov K, Woods GM. Allorecognition in the Tasmanian devil (*Sarcophilus harrisii*), an endangered marsupial species with limited genetic diversity. *PloS One* 2011; 6: e22402.

49 Siddle HV, Kreiss A, Tovar C, Yuen CK, Cheng Y, Belov K, Swift K, Pearse A-M, Hamede R, Jones ME. Reversible epigenetic down-regulation of MHC molecules by devil facial tumour disease illustrates immune escape by a contagious cancer. *Proceedings of the National Academy of Sciences* 2013; 110: 5103–5108.

50 Save the Tasmanian devil program. The disease. Hobart: Save the Tasmanian Devil Program, 2015. www.tassiedevil.com.au/tasdevil.nsf/The-Disease/979FEB5F116CE371CA2576CB0011A26E (accessed 24 November 2016).

requires the virus to be detected by a PCR test or virus isolation. Virus detection and categorisation are essential when EHV-1 is suspected, because there are nine EHV serotypes. 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.

New South Wales

In NSW, a total of 8 mares had abortions due to EHV-1 .

Northern Territory

There were no cases of EHV-1 detected in the Northern Territory in 2016.

Queensland

One case of abortion from EHV-1 was diagnosed in Queensland during 2016.

Tasmania

In Tasmania in 2016, anecdotal reports of neurological disease with sporadic abortions were investigated. While serological evidence of exposure was detected, no confirmed cases were diagnosed.

Victoria

In Victoria in 2016, two cases of abortion due to EHV-1 infection were diagnosed in mares from separate properties. There was also a single case of an EHV-1-positive gelding showing neurological signs. The diagnosis in this case was based on clinical signs.

Image credit: iStock

2.4.13 Equine infectious anaemia

Equine infectious anaemia (EIA) is a contagious viral disease of horses and is notifiable in Australia.

Northern Territory

The Northern Territory is free from EIA.

Tasmania

Tasmania is free from EIA. There has been no laboratory detection of EIA in Tasmania in the past 20 years.

Victoria

There were no cases of EIA reported in Victoria in 2016.

Western Australia

The 22 horses that DAFWA tested for equine viral arteritis in 2016 were also tested for EIA and all returned negative results.

2.4.14 Equine viral arteritis

Equine viral arteritis (EVA) is an acute, contagious, viral disease of horses and other equids. The virus causes damage to the smaller blood vessels, resulting in oedema and haemorrhage in many tissues and organs. Some strains of the virus cause abortion and death in young foals.

Although EVA virus occurs in Australia, disease associated with EVA virus infection has never been recorded here, which suggests that the strains of virus circulating in Australia are of low virulence.

The virus is present in horse populations in many countries throughout the world.

Northern Territory

The Northern Territory is free from EVA virus.

Tasmania

Tasmania is free from EVA virus. There has been no laboratory detection of EVA virus in Tasmania in the past 20 years.

Victoria

There were no cases of EVA reported in Victoria in 2016.

Western Australia

With several of Australia's national notifiable diseases affecting horses, DAFWA supports the investigation of indicative clinical signs of diseases such as equine infectious anaemia and EVA, wherever indicated. In 2016, DAFWA tested 22 horses for EVA virus across the state from Geraldton in the Northern Agricultural Region to Busselton in the South West Agricultural Region, and all were negative.

2.4.15 European foulbrood

European foulbrood (EFB) is a disease of bee larvae caused by the bacterium *Melissococcus plutonius*. 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 comb. Because of the young age at which larvae are affected, cells with diseased larvae are usually unsealed. The disease causes high mortality of larvae 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 states and territories except Western Australia.

Western Australia

Western Australia maintains stringent control measures to minimise the risk of introduction of the disease. The disease is notifiable in all states and territories.

New South Wales

EFB is endemic in NSW and advice is provided to apiarists by government officers to limit its impact. Advice includes management strategies to reduce the reliance on antibiotic use.

Northern Territory

In 2016, EFB was detected in hives from two properties in the Northern Territory.

Queensland

EFB is endemic across Queensland. Beekeepers can submit matchstick or brood samples for laboratory testing, and a positive result can lead to a veterinary prescription for antibiotic treatment.

Tasmania

EFB is diagnosed intermittently in Tasmanian honey bees – the last case was detected in 2011. It is monitored by the Tasmanian apiary industry's Apiary Industry Disease Control Program for voluntarily registered beekeepers. No incidents of EFB were detected in Tasmania during 2016.

Victoria

EFB is endemic in Victoria, and beekeepers are encouraged to seek laboratory confirmation of EFB and obtain antibiotic treatment on prescription from a veterinarian.

2.4.16 Hendra virus infection

Numerous Hendra virus (HeV) incidents have occurred in Queensland and New South Wales since 1994, involving more than 90 horses. Most infected horses have died as a result of the disease.

Seven people are known to have been infected with HeV. Four have died, and one is reported to have ongoing health problems. HeV infection was detected in a dog in New South Wales in 2013,[51] and a dog from Queensland was previously found to be seropositive; in both cases the dog was in close contact with one or more HeV-infected horses. Both dogs remained clinically normal but were euthanased to manage potential public health risks.

Flying foxes are the natural host for HeV, and research suggests that infection can occur in flying fox populations across Australia. There is evidence that the black flying fox (*Pteropus alecto*) and spectacled flying fox (*P. conspicillatus*) are the primary reservoir hosts, with the grey-headed flying fox (*P. poliocephalus*) and little red flying fox (*P. scapulatus*) playing a less important role in the epidemiology and transmission.[52] Spillover of infection from flying foxes to horses occurs as rare, sporadic events. To date, cases of HeV infection in horses have only been detected in Queensland and mid-to-northern New South Wales.

Horse-to-horse transmission of the virus has been seen in some incidents. Humans who have become infected have had very close contact with infected horses. Infected and seropositive dogs have also been in close contact with infected horses. Neither person-to-person nor bat-to-person transmission of HeV has been reported.

The incidents are not known to be linked, beyond a common exposure of horses to flying foxes. Wherever flying foxes and horses are together, there is potential for spillover of the virus to horses and then transmission to other susceptible animals or people. Regardless of the likelihood that flying foxes in any particular area are infected, it is prudent risk management for horse owners to take steps to minimise the potential for contact between flying foxes and horses, and to vaccinate their horses against HeV.

The Queensland[53] and New South Wales[54] governments implement well established biosecurity and public health responses to HeV incidents. During 2016, no HeV incidents were reported in Queensland.

HeV infection was confirmed in an unvaccinated, 22-year-old horse in northern New South Wales that died on 15 December 2016 after being ill for several weeks.

At the time of the initial testing, all samples were negative to HeV by PCR testing, but there was a strong antibody response which AAHL showed was due to natural infection with HeV, not due to vaccination. When the horse died a week after the initial sampling, a weak positive PCR test result was found. It appeared that virus was not detected by PCR initially because the horse had been sampled

51 Kirkland PD, Gabor M, Poe I, Neale K, Chaffey K, Finlaison DS, Gu X, Hick PM, Read AJ, Wright T, Middleton D. Hendra virus infection in dog, Australia, 2013. *Emerging Infectious Diseases* 2015; 21: 2182–5. dx.doi.org/10.3201/eid2112.151324 (accessed Dec 2016).

52 Edson D, Field H, McMichael L, Vidgen M, Goldspink L, Broos A, Melville D, Kristoffersen J, de Jong C, McLaughlin A, Davis R, Kung N, Jordan D, Kirkland P, Smith C. Routes of Hendra virus excretion in naturally-infected flying-foxes: implications for viral transmission and spillover risk. *PLoS One* 2015; 10: e0140670. dx.doi.org/10.1371/journal.pone.0140670 (accessed Dec 2016).

53 www.daf.qld.gov.au/animal-industries/animal-health-and-diseases/a-z-list/hendra-virus

54 www.dpi.nsw.gov.au/agriculture/livestock/horses/health/general/hendra-virus

a few weeks after becoming unwell and had already mounted a strong immune response.

Initial clinical signs observed included failure to graze, nasal discharge, some ataxia, mild disorientation, weight loss and oral discomfort. Further behavioural abnormalities were seen before death.

Veterinarians were reminded that they should not make assumptions that horses are not infectious only on the basis of HeV PCR testing. The full suite of test results is required to confirm disease status.

2.4.17 Newcastle disease

Newcastle disease (ND) is a viral disease of domestic poultry and wild birds. It can cause gastrointestinal, respiratory and nervous signs. Avirulent strains of ND are endemic in Australia. Australia has been free from outbreaks of virulent ND since 2002, when two incidents of virulent 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 Newcastle Disease 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, which includes representatives from the commercial chicken sector, the Australian Government, most state governments and AAHL. Membership also includes experts in poultry vaccination and poultry disease management. AHA manages the plan and chairs the committee.

The goal of the *National Newcastle disease management plan 2013–16*[55] is a vaccination program that mitigates the risk of ND outbreaks of Australian origin. The program involves a strategic vaccination regimen using attenuated (live) V4 and inactivated (killed) 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 outcompete potential precursor strains of ND virus, i.e. strains with genome sequences similar to the virulent sequence that might result in the emergence of virulent ND virus. Based on the risk level 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. Vaccination compliance is monitored through reconciliation of data on vaccine sales with commercial chicken numbers, and industry intelligence.

In the *2013–16 plan*, there are no changes proposed to the vaccination requirements for long-lived birds (layers and broiler breeders) from the requirements in previous management plans. However, to be consistent with relaxation of the rules for short-lived birds in Tasmania and Western Australia in the 2008–12 plan, the 2013–16 plan provides for relaxed rules in such birds in Queensland and South Australia. If poultry owners opt for reduced vaccination in their flocks, the surveillance protocols detailed in the plan must be implemented.

During the year a total of 1240 birds from 316 laboratory submissions tested negative for virulent ND (see Appendix C). A total of 5 submissions tested positive for lentogenic V4 or V4-like strains. Lentogenic (avirulent) strains are endemic in Australia. Information on avian paramyxovirus in wild birds is included in the Wildlife Health Australia report (see Section 3.2.5).

New South Wales

The standard operating procedures for vaccination in New South Wales poultry were unchanged in 2016 from the previous year.

Northern Territory

The Northern Territory remains free from ND. There are no compulsory vaccination requirements for ND in the Northern Territory.

Queensland

In Queensland, vaccination of poultry against ND was in accordance with the *2013–16* plan for a low-risk state, as agreed by the national steering committee.

The 2013–16 management plan removed the compulsory vaccination requirements for broilers in Queensland, based on several risk assessments

55 www.animalhealthaustralia.com.au/what-we-do/endemic-disease/newcastle-disease

conducted by the ND risk assessment group under the National ND Management Plan Steering Committee. While vaccination of broilers is no longer compulsory in Queensland, producers can voluntarily choose to vaccinate their broiler flocks. Since 1 July 2016, the Newcastle Disease Prevention and Control Program and Newcastle Disease Surveillance Program, under the Biosecurity Act, has enabled non-vaccination of commercial broilers combined with targeted surveillance.

During 2016, no virulent ND or precursor ND viruses were detected in Queensland. All detections of ND virus were categorised as V4 or V4-like strains of ND viruses.

South Australia

Legislation in South Australia requires that all egg-laying and breeding chickens, and chickens over 24 weeks of age in commercial poultry flocks, are vaccinated against ND and are serologically monitored to demonstrate vaccination efficacy, unless otherwise approved by the Chief Inspector of Stock. In addition, no person may introduce into South Australia any chickens for egg-laying or breeding purposes, or any chickens over 24 weeks of age within the commercial poultry industry unless the birds have been vaccinated against ND. This requirement is in accordance with the ND vaccination program standard operating procedures. Vaccination is in accordance with the *2013–16 ND management plan*, as agreed by the national steering committee.

During 2016, no virulent ND viruses were detected in South Australia.

Tasmania

In Tasmania, compulsory vaccination requirements apply to growers with 1000 birds or more. Meat chicken producers are exempt from vaccinating flocks, provided they comply with the passive surveillance requirements under the *2013–16 ND management plan, and birds are grown for less than 24 weeks*. Meat chicken breeders are not included in this exemption. Vaccines are obtained from the supplier under licence from the state CVO and must be used according to the manufacturer's instructions.

Victoria

Owners of commercial poultry flocks with more than 1000 birds are required by law in Victoria to vaccinate against ND. In 2016, eight permits were issued for the purchase and use of approximately five million doses of ND vaccine on 41 properties. There were no ND detections in poultry in 2016.

Western Australia

In Western Australia, owners of 1000 or more chickens are required to vaccinate long-lived birds, keep vaccination records, and report and collect samples from any flock meeting the ND case definition. ND vaccination of meat chickens kept for less than 24 weeks is not required, and permits to purchase ND vaccine are no longer required. Vaccination compliance is assessed by comparing census data and vaccine sales. The nationally agreed biosecurity standards are strongly promoted to industry, and biosecurity practices are monitored.

2.4.18 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. Virulent footrot is more prevalent in areas with higher rainfall and moist pastures that keep the feet of sheep wet and soft at times of the year when average daily temperatures are above 10°C. Ovine footrot is not on the list of nationally notifiable diseases.

Several states have eradication or control programs aimed at limiting spread of the disease. A threat to the protected or control area in any jurisdiction is the importation of virulent strains (that may otherwise have been eradicated) from other states.

Tasmania and Victoria do not have official control programs for footrot, although legislation is available to quarantine properties, if required. The possibility of strain-specific footrot vaccines for eradication of footrot from large sheep flocks is being trialled in Tasmania. A similar trial is being undertaken in Western Australia.

New South Wales

The New South Wales Footrot Strategic Plan was implemented in 1988, and the state has been declared a protected area for footrot since August 2009.

The prevalence of virulent footrot in New South Wales has remained at fewer than 1% of flocks, in spite of a series of seasons that were highly conducive to footrot.

New South Wales requires sheep moving from interstate to be accompanied by a National Sheep Health Statement, which includes a declaration about the footrot status of the flock.

Northern Territory

There are no commercial sheep flocks in the Northern Territory.

Queensland

Footrot is not regarded as a significant problem in Queensland, and no clinical cases were reported in 2016.

South Australia

South Australia operates a control program for ovine footrot.

Western Australia

Western Australia operates a program of property movement controls to stop the movement of infected sheep. Sheep moving from interstate must be accompanied by a National Sheep Health Statement and undergo two inspections before being granted entry. In Western Australia, fewer than 1% of flocks are infected with virulent footrot.

2.4.19 Paratuberculosis

Johne's disease (paratuberculosis) is a chronic mycobacterial infection, primarily of the intestines, that causes ill-thrift, wasting and death in several species of grazing animals. In Australia, there are two main strains of the causative organism (*Mycobacterium avium* subsp. *paratuberculosis*); the sheep strain is largely restricted to sheep but has been found in cattle, and the cattle strain affects cattle, goats, alpaca, deer and, rarely, sheep.

The livestock industries, governments and the veterinary profession collaboratively manage the National Johne's Disease Project, which 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. One element of the program is the Australian Johne's Disease Market Assurance Programs for sheep, goats and alpaca (and previously for cattle). These provide a high level of assurance that participating herds and flocks are not infected with Johne's disease (JD). Details of herds and flocks in the Market Assurance Programs are maintained in NAHIS, and are available on the AHA website.[56]

In 2016, the national cattle industries, after extensive industry consultation, decided to deregulate JD in cattle. There was a move away from the previous zoning system to encouraging producers to take increased responsibility for their own biosecurity – for both JD and other endemic diseases.[57] JD will remain a notifiable disease nationally.

Alpacas

JD is rare in the alpaca industry, and no cases were detected in 2016.

Beef cattle

JD in cattle has rarely been detected in the northern and western beef industry. JD is also uncommon in beef herds in southeastern Australia. To help protect this situation, producers are encouraged to use the voluntary assurance system for cattle. Producers are also encouraged to use a National Cattle Health Declaration to provide health information on cattle for sale and to assess the risk of cattle being purchased.

Although the disease is uncommon, the impacts can be serious for individual infected herds. The National Bovine JD Financial and Non-Financial Assistance Package has helped owners of infected herds to eliminate JD, thus contributing to the low prevalence of JD in the beef industry. Since the scheme started in 2004, it has assisted 505 producers, many of whom have had the infected or suspect statuses of their herds resolved. A key element of the scheme

56 www.animalhealthaustralia.com.au/what-we-do/endemic-disease/market-assurance-programs-maps

57 www.animalhealthaustralia.com.au/wp-content/uploads/2016/02/BJD-Framework-Document_final.pdf

is the non-financial aspect. Two JD counsellors are employed under the program to conduct a situation assessment, assist with considering management and trading options, develop a disease management plan and liaise with the supervising veterinarian.

Dairy cattle

In southeastern Australia, the dairy industry promotes hygienic calf rearing to help reduce the incidence of JD in replacement heifers. Buyers seeking JD assurance are also encouraged to ask the seller for a written declaration of the National Dairy Bovine JD 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 have, until recently, required sellers to declare the dairy score when selling dairy cattle.

Sheep

Following a major review in 2012, a revised five-year management program for ovine Johne's disease (OJD) commenced on 1 July 2013. The main elements of the revised program are the implementation of regional biosecurity areas (groups of producers working together voluntarily to keep disease out of the area) and continued use of the National Sheep Health Statement. This is a declaration by the owner about the sheep that enables buyers to assess the risk of 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 diseases. In 2016, the sheep industry continued working with AHA and the meat-processing industry to support abattoir surveillance at several sites across southern Australia. In the 2015–16 financial year, approximately 9290 consignments, comprising 1 838 413 adult sheep, were inspected for evidence of OJD.

Goats

The goat industry has established a risk-based trading approach, which uses a National Goat Health Declaration with a nationally agreed risk-ranking system. This owner declaration includes a risk rating for JD 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 JD and CAE.

2.4.20 Pigeon paramyxovirus 1

Victoria

Pigeon paramyxovirus 1 (PPMV-1) was first identified in hobby and domestic pigeons in Victoria in 2011. It is now considered endemic in domestic and feral pigeons in Victoria. In 2016, 14 cases in domestic pigeons were reported to the Victorian Department of Economic Development, Jobs, Transport and Resources.

New South Wales

PPMV-1 is considered endemic in the New South Wales feral pigeon population and has been detected occasionally in pigeon lofts in New South Wales since 2011. It was detected in single lofts of racing pigeons in the Sydney region in July and November 2015, respectively.

Northern Territory

PPMV-1 has never been reported in the Northern Territory.

Queensland

In December 2016, Qld DAF confirmed the first cases of PPMV-1 in Queensland, in four racing pigeon lofts in Cairns. Testing at AAHL indicated that the isolates were similar to strains circulating in Victoria in 2015. Affected pigeons showed typical symptoms of PPMV infection, including neurological signs and diarrhoea. Approximately 20% of at-risk birds died. Loft owners have implemented voluntary on-site biosecurity, including movement control, and Qld DAF are providing advice on biosecurity measures, including vaccination.

South Australia

PPMV-1 was detected for the first time in South Australia in a pigeon loft in the Murraylands in January 2016. The pigeon industry was immediately advised of the outbreak with prevention advice given, including observing strict on-farm biosecurity and hygiene measures, and adequate vaccination of all birds. No specific regulatory disease control measures were implemented.

The owner had been introducing pigeons of varying ages and from various locations interstate to his pigeon loft in preparation for racing, and it was 20 of these 40 interstate birds that first became ill and died. Signs included lethargy, a full watery crop (stasis) and green diarrhoea. Necropsy revealed enlarged kidneys. Quantitative PCR testing (qPCR) of choanal swabs and multiple organ tissues were all positive for PPMV-1.

The owner was advised to implement a plan for vaccination and voluntary cessation of movement of birds from his property. Deaths continued to occur for several weeks afterwards. One other pigeon loft that had received birds from the Murraylands property was confirmed infected and the owner was advised about vaccination and containment. Although it is considered that PPMV-1 is now endemic in SA, there have been no further reports of disease since then.

Western Australia

In November 2015, DAFWA confirmed Western Australia's first case of PPMV-1 in a flock of fancy pigeons in the Perth metropolitan area. Testing at the AAHL confirmed the strain as identical to that previously isolated from Victoria. DAFWA continues to test pigeons for PPMV-1 but no cases were diagnosed in WA in 2016.

2.4.21 Small hive beetle

Small hive beetle (SHB) (*Aethina tumida)* invades honey bee hives. It can cause serious economic concern to producers through loss of bee colonies and infestation of honeycombs awaiting extraction, especially under the hot, humid conditions in which the beetle thrives. 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 have designed, tested and commercialised a chemical-based in-hive beetle harbourage (APITHOR) – a fipronil-impregnated cardboard trap – to minimise the impact of SHB. APITHOR has been approved by the Australian Pesticides and Veterinary Medicines Authority.

A research project funded by the RIRDC on the development of an external attractant trap for SHB commenced in 2015.[58]

New South Wales

SHB is widespread in New South Wales beehives.

Northern Territory

The Northern Territory continues to remain free of SHB. Surveillance of beehives in the Northern Territory in 2016 found no evidence of SHB.

Queensland

SHB is a major pest species in Queensland, where it is endemic in most coastal regions. 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 and increases after rain in the warmer months of the year. Queensland DAF provides beekeepers with information on the most efficient trapping methods. Scientific research is continuing on fungal control, yeast identification and the relationship of yeast to the SHB life cycle.

South Australia

SHB was first detected in South Australia in 2015, when it was detected in several apiaries in the Riverland area of South Australia. After consultation with industry, SHB has been removed from the list of notifiable diseases; control is now the responsibility of individual apiarists.

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. Queen bees and escorts may be imported, but must be in SHB-proof containers and accompanied by a completed health certificate declaring freedom from SHB. Entry of used beekeeping equipment, packaged bees and unmelted beeswax into Tasmania is prohibited.

Victoria

SHB is endemic in Victoria, and its occurrence is monitored by the Victorian Department of Economic Development, Jobs, Transport and Resources.

58 www.rirdc.gov.au/research-project-details/custr10_HBE/PRJ-009334

Western Australia

In September 2007, SHB was detected in Western Australia in the Ord River Irrigation Area at Kununurra. Surveillance, monitoring and tracing have contained the beetle within the Ord River Irrigation Area. Zoning under legislation has identified an SHB-infested area and an SHB-free area within the state. Targeted surveillance continues; no samples collected have confirmed the presence of SHB in the free area. Import controls to restrict entry of SHB are in place.

2.4.22 Tularaemia

Tularaemia is on the list of nationally notifiable diseases.

Tularaemia is the clinical syndrome associated with infection by the bacterium *Francisella tularensis*. Subspecies include: *F. tularensis tularensis* (Type A), *F. tularensis holarctica* (Type B), and *F. tularensis mediasiatica*, which vary in routes of transmission, virulence, geographic distribution and ecological niche. Not all subspecies have been documented as a cause clinical tularaemia in humans. Overseas, *F. tularensis* has an extremely broad host range, however is primarily a disease of lagomorphs (e.g. rabbits, hares) and rodents.

Tularaemia is a zoonosis with the potential to be transmitted to humans via contact with infected wildlife, via ticks, biting insects and mosquitoes. In 2011, a diagnosis of *F. tularensis holarctica* biovar. *japonica* was made based on PCR, supported by typical clinical presentation, in two women who were scratched and bitten by common ringtail possums (*Pseudocheirus peregrinus*) between Queenstown and Zeehan in Tasmania.[59]

In September 2016, tularaemia was detected for the first time in Australian animals, following next-generation molecular analysis of archived samples collected from two separate clusters of common ringtail possum deaths that had occurred in NSW in 2002 and 2003. Findings of *F. tularensis holarctica* were confirmed by PCR and culture and was found to be genomically very similar to that found in the

Image credit: AHA

2011 Tasmanian human cases.[60] Testing of a small number of wildlife from Tasmania has not found evidence of infection with *F. tularensis*.

Based on knowledge from overseas, it is probable that all mammal species in Australia are susceptible to *F. tularensis* infection.

59 Jackson J, McGregor A, Cooley L, Ng J, Brown M, Ong CW, Darcy C, Sintchenko V. *Francisella tularensis* subspecies *holarctica*, Tasmania, Australia, 2011. *Emerging Infectious Diseases* 2012; 18: 1484–1486.

60 Eden JS, Rose K, Ng J, Shi S, Wang Q, Sintchenko V, Holmes EC. The discovery and isolation of *Francisella tularensis* spp. *holarctica* in Australian ringtail possums, 2017. *Emerging Infectious Diseases* 2017, In press.

Image credit: APL

3

TERRESTRIAL ANIMAL DISEASE SURVEILLANCE AND MONITORING

Australia's surveillance and monitoring capability for terrestrial animal diseases is supported by a network of government field veterinary officers, government and private veterinary diagnostic laboratories, private veterinarians, researchers and livestock owners.

This network undertakes surveillance to identify and treat risks from notifiable, emerging and exotic diseases. It is supported by the National Livestock Identification System (NLIS) (see Section 1.6), 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 Australia's general surveillance for terrestrial animal diseases and key targeted national programs. It also outlines surveillance programs specific to northern Australia and public health surveillance for zoonotic diseases.

3.1 Introduction

Animal health surveillance was a key focus for Australia during 2016. Surveillance enables the identification of exotic, emerging and nationally significant endemic animal diseases. When done well, it provides the necessary information to support disease control policies, programs and reporting requirements. Surveillance is a critical element of an effective and efficient animal health system and a core competency of veterinary services as described by the World Organisation for Animal Health (OIE).

The benefits of an effective animal health surveillance system are substantial and far-reaching across governments, livestock industries and the wider community. The Intergovernmental Agreement on Biosecurity has recognised that surveillance is a shared responsibility and all parties have a role in Australia's animal disease surveillance system. With common interests and a diverse range of stakeholders, it is imperative to have a coordinated national approach to strengthening this system.

Surveillance activities support access to Australia's export markets for animals and animal products, and also support productivity and profitability of our livestock industries. A wide range of surveillance activities are undertaken across the biosecurity continuum. This enables the identification and management of risk pathways and changes in biosecurity risk profiles; the collection of data to support Australia's animal health status; and the early detection of pest and disease incursions, should they occur, to facilitate a rapid emergency response.

In 2016, key surveillance activities and initiatives included:

- Allocation of a total of $200 million, under the Agricultural Competitiveness White Paper, to improving biosecurity surveillance and analysis.
- Development of the National Animal Health and Diagnostics Business Plan, which supports the efficient and effective delivery of surveillance activities in line with nationally agreed objectives and priorities.
- Implementation of the Northern Australia Biosecurity Framework, including the development of initiatives to support biosecurity surveillance, modern diagnostics, improved surveillance data, and enhanced community engagement in Northern Australia.
- Continuing general surveillance activities, and support for these activities through funding programs, training activities and awareness campaigns.
- Ongoing wildlife health surveillance, administered through Wildlife Health Australia (WHA).
- Continuation of a range of targeted surveillance programs, including for vector-borne diseases, bee pests, avian influenza, screw worm fly and transmissible spongiform encephalopathies (TSEs).

This chapter provides further details on Australia's surveillance activities during 2016. Appendix C contains summary data for investigations of certain emergency animal diseases (EADs) and nationally notifiable animal diseases.

3.1.1 Roles and responsibilities

Australia's animal health surveillance is carried out by jurisdictional veterinary authorities, private veterinarians, industries and non-government organisations. National technical policy for surveillance and diagnostic services is endorsed by chief veterinary officers (CVOs) through the Animal Health Committee (AHC).

Animal health authorities are constantly alert to notifiable, emerging and exotic disease risks, as early detection of disease facilitates more rapid control and eradication, which is critical for maintenance of Australia's favourable animal health status. General surveillance requires close collaboration between livestock producers, industry and community organisations, livestock transport and marketing agents, private veterinarians, government field veterinary officers, veterinary laboratories, research organisations and other stakeholders.

Under the Australian constitution, individual state and territory governments are responsible for animal health matters within their boundaries, including terrestrial animal health surveillance and

monitoring. Legislation in all states and territories requires that animal owners, veterinarians and laboratories report to animal health authorities any suspicion of notifiable diseases, including endemic, emerging and exotic EADs. The laws are supported by networks of official state and territory field veterinarians with district surveillance responsibilities, diagnostic veterinary laboratory pathologists, abattoir veterinarians and inspectors, stock inspectors and private veterinarians, who diagnose and gather intelligence about notifiable diseases.

As well as administering legislation, state and territory animal health personnel conduct general surveillance and targeted research projects, and provide disease diagnostic services, particularly for cases that are not routinely managed by private veterinarians, such as detailed investigations for exotic and emerging diseases.

In some cases, private veterinarians are contracted to the government to investigate suspect notifiable diseases. In all states and territories, official government veterinarians establish relationships with private veterinarians in their districts to allow effective collaboration during investigation of unusual disease incidents. They do this by running training programs (e.g. in post-mortem techniques and exotic disease investigations), presenting case reports at branch meetings and veterinary conferences, and circulating newsletters. Through these networks, as well as through their research and extension facilities, governments obtain knowledge about the distribution and prevalence of a wide range of animal diseases, not just those that are notifiable. Consequently, official government veterinarians are able to document the status of stock in their districts with respect to notifiable diseases. This is important for domestic trade, and as a valid basis for international animal health reporting and certification (see Chapter 1 for further details on information management).

Field staff are supported by government veterinary laboratories or government-contracted veterinary diagnostic laboratories that meet prescribed standards. Laboratory diagnosis is free of charge for many categories of submission. In all cases of suspect exotic diseases and other EADs, samples are also submitted to the Australian Animal Health Laboratory of the Commonwealth Scientific and Industrial Research Organisation (AAHL). Laboratory quality assurance is maintained by compulsory accreditation of laboratories by the National Association of Testing Authorities as well as compulsory participation by laboratories in inter-laboratory quality assurance programs (see Chapter 1 for further information).

Data gathered by field and laboratory staff are recorded in information management systems to maintain disease profiles of districts and individual properties. These can be linked to mapping programs to visually display disease distribution. Property-of-origin health certificates and official reports to various authorities – including the OIE – can readily be extracted from these systems. Information collected and analysed by the state and territory animal health systems is collated through NAHIS (see Chapter 2). The information is also fed back to the veterinary networks through surveillance reports that keep state and territory field and laboratory staff, and private veterinarians, informed about disease patterns.

3.1.2 National animal health surveillance and diagnostics business plan

The National Animal Health Surveillance and Diagnostics Business Plan 2016–2019 was developed collaboratively by governments and livestock industries and endorsed by AHC in April 2016. The Business Plan is intended to guide the efficient and effective delivery of surveillance activities in accordance with nationally agreed objectives and priorities. It outlines priority activities that build on existing strengths and address areas for improvement in Australia's animal health surveillance and diagnostics system. The Business Plan identifies four key objectives, which are to:

- maintain and augment surveillance programs and activities that are focused on the highest risks
- improve the collection, management and effective use of animal health surveillance information
- strengthen the knowledge, attitudes and practices of people involved in surveillance
- cultivate effective partnerships and stewardship.

Image credit: Andrew Breed

Governments and industry are working together to implement activities under these objectives. An implementation group, made up of industry and government representatives, is overseeing the effective delivery of the Business Plan. The Business Plan will be reviewed periodically and is available on the Department of Agriculture and Water Resources website.[61]

Some activities in the Business Plan are supported by funds linked to implementation of the Agricultural Competitiveness White Paper.[62]

3.1.3 Agricultural Competitiveness White Paper

The Agricultural Competitiveness White Paper was released in July 2015 and outlines the initiatives and commitments by the Australian Government to strengthen Australia's agriculture sector. It is a $4 billion investment to build a more profitable, more resilient and more sustainable agriculture sector to help drive a stronger Australian economy.

One of the priority areas of the Agricultural Competitiveness White Paper is accessing premium markets. As part of this priority, the Australian Government has committed $200 million to improve biosecurity surveillance and analysis, including in northern Australia (see Section 3.1.4), to protect Australia's animal and plant health status.

The biosecurity investment includes the following activities:

- strengthening biosecurity surveillance by analysing and prioritising threats, developing and deploying improved surveillance methods and technologies, and conducting more urban, peri-urban and offshore surveys
- extending biosecurity scientific capability by installing updated diagnostic equipment in key laboratories around the country, and funding research into new aquatic pests and diseases and animal viruses
- reviewing import conditions on a range of commodities and working with trading partners on their market access requests
- making the best use of the information captured through surveillance by upgrading the systems used in the Department of Agriculture and Water Resources, and improving how that information is analysed through building an advanced analytics capability in the department.

The Agricultural Competitiveness White Paper has also committed funding to appoint five new overseas agriculture counsellors and modernise Australia's food export traceability systems.

The biosecurity surveillance and analysis activities funded through the Agricultural Competitiveness White Paper will provide long-term benefits to Australia, including reducing biosecurity risk, improving and helping to maintain market access, and improving our preparedness to respond to biosecurity incidents.

61 www.agriculture.gov.au/animal/health/surveillance-diagnostics

62 agwhitepaper.agriculture.gov.au

In 2015–2016, the Agricultural Competiveness White Paper supported training workshops for private veterinarians in the identification, investigation and reporting of EADs; and an avian influenza (AI) virus genome project to help better understand what AI viruses are circulating in Australia.

3.1.4 Northern Australia Biosecurity Framework initiatives

The Northern Australia Biosecurity Framework (NABF) was established in 2016 through the Developing Northern Australia and Agricultural Competitiveness White Paper to encourage collaboration between communities, industries and governments to safeguard biosecurity. The NABF expands existing collaboration to manage new and growing biosecurity risks in northern Australia. The NABF:

- develops and shares information on biosecurity prevention, detection and management, particularly on tropical plant and animal and aquatic pests and diseases
- encourages cooperation between governments, agricultural industries and research institutions on tropical biosecurity
- shares resources where possible to deliver timely and well-informed decisions about tropical biosecurity.

There are six initiatives as part of the NABF:

- Northern Australia biosecurity surveillance – augmenting plant and animal health surveillance, new aquatic biosecurity surveillance, improving biosecurity infrastructure on Torres Strait Islands and improved Torres Strait management of biosecurity.
- Modern diagnostics – to support tropical biosecurity networks, knowledge and facilities.
- Better data – to improve the accuracy and usefulness of field biosecurity data collected.
- Offshore biosecurity surveillance – including collaborative biosecurity surveys in Indian Ocean territories and neighbouring countries.
- Community engagement – expanding information and tools available to identify and report potential biosecurity threats.
- Indigenous rangers – expanding the scope, volume and remuneration of biosecurity work undertaken by Indigenous rangers.

Key surveillance achievements for 2016 to date include:

- New sentinel cattle herds were established in Gunbalanya (Northern Territory), Merepah (Queensland) and the Western Province of Papua New Guinea to monitor animal health and arbovirus activity in remote areas.
- A series of surveys and workshops were undertaken across northern Australia, Torres Strait and Papua New Guinea to inform on rabies preparedness modelling and communications.
- Agreement was reached on the five priority marine pest species and 10 aquatic diseases for northern Australia by the Western Australian, Northern Territory and Queensland governments, the Australian Government and industry.
- A marine pest monitoring program was delivered by 12 Aboriginal and Torres Strait Island sea ranger groups across northern Australian coastline.
- Two surveys were undertaken in the Torres Strait Permanent Biosecurity Monitoring Zone to gather information on vessel movements to assist in identification of pathways of highest risk, to allocate biosecurity resources. Quarantine requirements in the Torres Strait restrict the movement of specific products between the Torres Strait quarantine zones and the mainland to help manage the risk of exotic pests, disease and weeds being introduced to Australia.
- Investment was made in Torres Strait infrastructure to support surveillance operations in the Torres Strait.
- An additional 26 Aboriginal and Torres Strait Island ranger groups were recruited to undertake biosecurity work across northern Australia, increasing the number of ranger groups actively engaged in biosecurity work to a total of 66.
- Equipment and training were provided to 57 ranger groups to increase the capacity of groups to deliver biosecurity work in remote areas across northern Australia.
- A network of tropical biosecurity diagnostic specialists was established to link expertise in animal health, entomology and plant pathology.

More information on the Northern Australia Biosecurity Surveillance initiatives is available on the department's website.[63]

3.2 General surveillance

3.2.1 Private veterinarians

Private veterinary practitioners play a key role in general surveillance in Australia, by providing expertise in evaluating, clinically investigating and reporting outbreaks of significant disease in animals. All state and territory governments subsidise private veterinary practitioners in their work on relevant cases, for field investigation and/or laboratory diagnostic investigations. Participation by private veterinarians is delivered nationally through the National Significant Disease Investigation Program (NSDIP) and the National Transmissible Spongiform Encephalopathies Surveillance Program (NTSESP) (see Section 3.3.2). In addition, some jurisdictions independently fund similar complementary programs (see *Surveillance in the states and territories by private veterinarians* below). Wildlife veterinarians contribute to national surveillance for wildlife diseases through the Zoo, Sentinel Clinic and University Wildlife Disease Surveillance Programs coordinated by WHA (see Section 3.2.5).

National Significant Disease Investigation Program

The NSDIP was initiated in June 2009 to facilitate investigation of significant disease events by non-government veterinary practitioners (private veterinary practitioners), whose contributions would 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. From July 2016, the scope of NSDIP activities was expanded to include training of private veterinary practitioners in disease investigation, and to increase levels of knowledge, skill and confidence to investigate and report on disease events.

Managed by Animal Health Australia (AHA) and delivered by state and territory governments and WHA, the NSDIP is funded from livestock industry and government member subscriptions to AHA. The program aims to boost Australia's capacity for early detection of national notifiable diseases and new or emerging diseases in livestock and wildlife, by increasing the participation of private veterinary practitioners in disease investigations. By promoting effective collaboration between non-government veterinary practitioners and governments, the program improves the quality (e.g. sample submissions) and increases the quantity of significant disease events investigated.

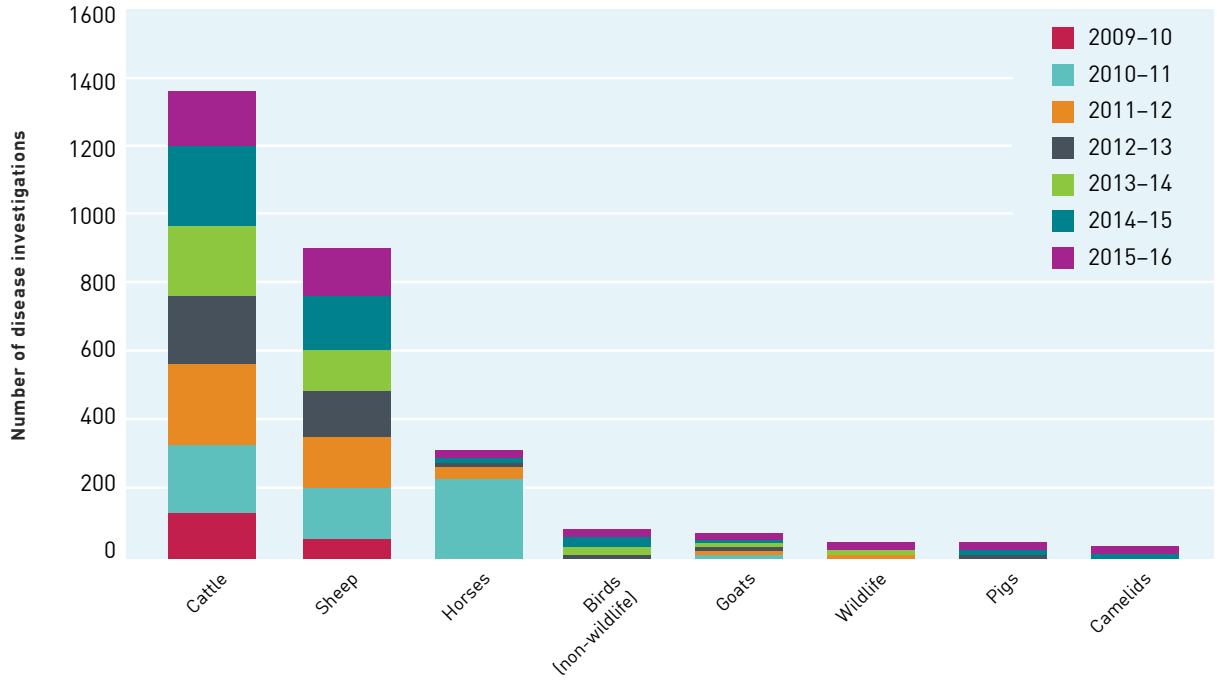


Figure 3.1 Number of investigations, by animal group and year, in the National Significant Disease Investigation Program, July 2009 to June 2016

63 www.agriculture.gov.au/biosecurity/partnerships/northern-australia-biosecurity-framework

Registered non-government veterinarians engaged in clinical veterinary medicine – including veterinary practitioners in university clinics, zoos and wildlife parks – are eligible to participate in the program. Significant disease incidents are broadly defined as those clinically consistent with national notifiable diseases not suspected to be EADs,[64] or diseases showing an increasing incidence and/or an expanding geographical or host range.

Disease investigation subsidies are available for field work (e.g. clinical evaluation, necropsy and collection of diagnostic samples), laboratory diagnostic work and follow-up field investigation, if required. When there is a genuine suspicion of an EAD, the relevant state or territory government department will lead and fund an investigation.

During the 2015–16 financial year, the NSDIP subsidised 315 investigations by private veterinary practitioners. An average of $480 per investigation was paid to private veterinary practitioners for field investigation and $650 was spent on laboratory diagnostic testing (60% of the cost was subsidised by the NSDIP for field investigation, and 25% for laboratory investigations, with the remainder funded by state and territory governments). Summary data of investigations of nationally notifiable animal disease are included in Table C1, Appendix C, and elsewhere in this report. The number of investigations by animal group and year, throughout the program, are shown in Figure 3.1.

Further information on the NSDIP is available on the AHA website.[65]

Disease surveillance by private veterinarians

New South Wales

In New South Wales, cases of suspect notifiable diseases are investigated after private practitioners submit diagnostic specimens to the State Veterinary Diagnostic Laboratory of the New South Wales Department of Primary Industries. State and district government veterinary officers collate data from these investigations, and often assist in investigating or managing cases referred by private practitioners. Private practitioners receive subsidies for laboratory testing of cases in which notifiable diseases are suspected. They also receive training in sample submission, disease investigation methods for some notifiable diseases and the use of personal protective equipment.

Northern Territory

The Northern Territory Department of Primary Industry and Resources encourages and supports the participation of private practitioners in disease surveillance. They also participate in the NSDIP and targeted disease surveillance programs, such as the NTSESP. Laboratory samples submitted by private practitioners for disease investigations in livestock and significant events in wildlife are analysed as a free service.

Queensland

Private veterinary practitioners involved in large, mixed and small animal practice in Queensland are visited or contacted by Queensland Department of Agriculture and Fisheries biosecurity officers, including veterinary officers, to discuss and, where appropriate, resolve, disease incidents in their area.

Departmental veterinary officers also work with private veterinary consultants in the intensive pig and poultry industries to manage significant biosecurity incidents. The Department's veterinary pathologists provide advice and support to private practitioners and veterinary officers investigating complex disease cases, particularly when no aetiology has been identified.

State veterinary officers are involved in structured teaching activities at Queensland's two veterinary schools. New graduates are entering the veterinary profession with a deeper appreciation of state regulatory veterinary medicine.

South Australia

Biosecurity SA, a division of Primary Industries and Regions SA, maintains close communication with rural private veterinary practitioners, who make a valuable contribution to surveillance by investigating potential incidents of notifiable diseases and significant disease events. Biosecurity SA has the Rural Practitioner Enhanced Disease Surveillance program to promote investigation of disease incidents in South Australian livestock. In partnership with the NSDIP, the program funds

64 EAD Response Agreement and Schedules. www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement/

65 www.animalhealthaustralia.com.au/programs/disease-surveillance/national-significant-disease-investigation-program

laboratory submissions for suspect infectious diseases in livestock and subsidises contracted private veterinary practitioners for costs incurred in investigating unusual disease events.

Biosecurity SA offers training and refresher courses in EAD detection and necropsy technique to practitioners, and provides ongoing technical support, when required.

Tasmania

In Tasmania, private veterinary practices provide general surveillance information via personal contacts with animal health staff from the Department of Primary Industries, Parks, Water and Environment. They also participate in the NSDIP and various targeted disease surveillance programs, such as the NTSESP.

The *Animal Health and Welfare* newsletter is produced three times per year and distributed to all private practitioners in the state. It provides information on relevant surveillance programs, reports of surveillance information from disease investigations, and data from Tasmania's Animal Health Laboratory. A dedicated webpage for Tasmania's private practitioners on the department's website enables easy access to resources for practitioner programs and promotes external initiatives, such as the Veterinary Emergency Response Team Tasmania.

Victoria

In Victoria, private veterinary practitioners make an important contribution to surveillance by providing reports of notifiable diseases and significant disease events. 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 Department of Economic Development, Jobs, Transport and Resources for reporting the investigation, and a subsidy towards laboratory investigation costs. In 2010, the department also introduced a subsidy for cattle, sheep, goat and pig owners who initiate an investigation of a significant disease event, to partially cover the cost of engaging a veterinary practitioner.

Private veterinary practitioners are also contracted by the department to undertake on-farm activities associated with endemic disease management programs, e.g. for bovine Johne's disease.

Western Australia

Western Australia's animal health surveillance capability is supported by the network established between the Department of Agriculture and Food, Western Australia (DAFWA) and livestock industry members, including private veterinarians, livestock agents, saleyard and abattoir operators and livestock owners. Private veterinarians are an integral part of the animal health surveillance network through regular contact with producers and by providing vital disease investigation services to the livestock industries.

DAFWA promotes surveillance and reporting of significant livestock disease events by everyone involved in livestock industries, particularly private practitioners, through a range of activities. These activities include networking by departmental veterinary officers, regional training workshops in disease investigation and the production of a monthly surveillance newsletter, *WA Livestock Disease Outlook* (WALDO), which is intended to improve the exchange of surveillance information, thereby strengthening the animal health surveillance network.

The DAFWA livestock disease surveillance project funds the cost of laboratory diagnostic work for cases of suspect reportable diseases or cases that are considered to be of public benefit.

3.2.2 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 investigating abortions has shown ongoing freedom from bovine brucellosis. State and territory veterinary laboratories test for *B. abortus* as part of abortion investigations and for other reasons, such as export requirements. Species other than cattle are also sampled.

3.2.3 Bovine tuberculosis surveillance

In 1970, Australia began a campaign to eradicate bovine tuberculosis (TB). Australia achieved freedom from TB in accordance with OIE standards, and was declared free from TB caused by *Mycobacterium bovis* on 31 December 1997. The last case of bovine TB was reported in 2002 in buffalo. In 2010, bovine TB surveillance data were evaluated quantitatively using a scenario-tree methodology.[66] This showed a very high level of confidence (approaching 100%) that Australia was free from bovine TB and that, if the disease were present, it would have been detected.

In the unlikely event of a case of bovine TB, eradication activities will be guided by the current *Bovine tuberculosis case response manual – managing an incident of bovine tuberculosis.*[67] This provides for an 'approved property or herd' eradication program agreed to 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.[68]

3.2.4 National Sheep Health Monitoring Project

The National Sheep Health Monitoring Project (NSHMP), which commenced in 2007, monitors lines[69] of sheep in abattoirs for several important animal health conditions.

In the 2015–16 financial year, 4 172 347 sheep, from 18 651 lines, were monitored across 18 domestic and export abattoirs; some of these abattoirs were monitored part-time.

The NSHMP currently only reports significant endemic diseases that can be identified by inspecting viscera or at the adjoining carcass-inspection stage. Lines of adult sheep are monitored by qualified meat inspectors and company-based personnel. Attention focuses on diseases that are likely to cause significant production loss, animal welfare issues, or market access concerns based on food safety or product aesthetics. The peak councils of the sheep industries, AHC and the Australian Meat Industry Council have agreed that sheep lines will be monitored for a core group of conditions: arthritis, bladder worm (*Cysticercus tenuicollis*), cancer, caseous lymphadenitis, dog bites, grass seed contamination, hydatids, knotty gut, liver fluke, melanosis, ovine Johne's disease, pleurisy, pneumonia, *Sarcocystis* spp., sheep measles (*Taenia ovis* infection) and vaccination lesions.

Data collected under the NSHMP are stored in the Central Animal Health Database, which is maintained by AHA. Business rules determine the level of access to the data for an individual or organisation. State sheep health coordinators have access to the state dataset and return this information to producers in the form of individual animal health status reports on the lines inspected. Processors are provided with a daily report for their own plants.

Monitoring livestock in abattoirs enables public health risk management for diseases such as hydatid disease. It also provides the opportunity to collect surveillance data that can be used to inform domestic animal health management decisions, and to support Australia's freedom from specified diseases. Information provided to individual producers can assist them to improve the productiveness of their flocks and fine-tune animal health programs. For processors, there is the opportunity to reduce product non-compliance, thereby lifting productivity and reducing costs.

The NSHMP has generated a comprehensive contemporary dataset that provides a good indication of the animal health status of the Australian flock. This information can be used by governments, industry groups and processors as solid evidence in support of market access and to demonstrate the quality of Australian product.

The Sheepmeat Council of Australia and WoolProducers Australia support the NSHMP because of the productivity and welfare effects of uncontrolled disease. Both recognise the

66 Martin P, Cameron A, Greiner M. Demonstrating freedom from disease using multiple complex data sources 1: a new methodology based on scenario trees. *Preventive Veterinary Medicine* 2007; 79: 71–97.

67 www.animalhealthaustralia.com.au/our-publications/ausvetplan-manuals-and-documents

68 EAD Response Agreement and Schedules. www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement/

69 A line of sheep is a group of animals purchased from a single location, although the group may contain animals from multiple vendors, as may occur at a saleyard.

importance of individual producers having access to information about the sheep they have sold, so that producers can make sound and informed animal health management decisions

3.2.5 Wildlife health surveillance

WHA administers Australia's general wildlife health surveillance system. Key elements of the system include a network of coordinators reporting in to a web-enabled national database (eWHIS) that captures wildlife health information. The network includes WHA coordinators in each state and territory, coordinators at zoo wildlife hospitals, sentinel wildlife clinics and universities. Targeted projects and several focus or working groups coordinated by WHA are also a key part of the system.

WHA coordinators are appointed by their CVO and represent each of Australia's states and territories, including the Australian Antarctic Territory. This surveillance network also includes representatives from the Australian Registry of Wildlife Health, the Northern Australia Quarantine Strategy (NAQS) and AAHL. Wildlife hospitals at 10 zoos across Australia participate in the Zoo Based Wildlife Disease Surveillance Program, a collaborative project between WHA and the Zoo and Aquarium Association. Four sentinel veterinary clinics with a large or dedicated wildlife caseload also contribute to the system. WHA is continuing to expand the national wildlife health surveillance system, with a new program involving seven university veterinary schools having commenced in late 2015.

Wildlife health reporting focuses on six disease categories: diseases listed by the OIE, bat viral diseases, mass or unusual mortality events, *Salmonella* cases, arbovirus infections, and diseases that coordinators consider unusual or interesting. In addition to surveillance, WHA 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 that could involve native or feral animal populations.

WHA promotes and facilitates collaboration around Australia in the investigation and management of wildlife health, focusing on potential risks to trade, biodiversity and human and animal health. WHA administers a 'first alert system', sending email notifications to more than 600 individuals and agencies around Australia with an interest in wildlife health issues. WHA also produces a weekly electronic digest of wildlife health information relevant to Australia. These digests are circulated nationally and to OIE member countries within the region.

In 2016, WHA's surveillance activities focused on:

- assisting Australia's states, territories and national agencies in general wildlife health surveillance and coordination for wildlife disease incidents
- contributing to the work of NAHIS
- administering national wildlife investigation funds as part of the NSDIP managed by AHA
- assisting in EAD events by providing relevant information on wildlife disease and facilitating communication with wildlife stakeholders
- 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
- collating and moderating a national dataset on Australian bat lyssavirus (ABLV) testing in bats
- 'horizon scanning' to identify issues associated with wildlife health that may affect Australia's trade, human health or biodiversity
- coordinating a network of wildlife health expertise and organising working groups with a particular focus, including:
    - a group focusing on the contribution of university research to national wildlife health issues
    - a group focusing on bat health issues in Australia
    - the Zoo Animal Health Reference Group, which focuses on the zoo industry and its wildlife hospitals
- encouraging collaboration, communication and engagement among national, state and local government and non-government agencies.

Disease events are reported to WHA by WHA coordinators, zoos, sentinel clinics, universities, private practitioners and members of the public. During the year, 902 wildlife disease investigation

events were added to the national database (Table 3.1). Approximately 38% of these events were bats (mostly submitted for exclusion testing for ABLV), wild bird mortalities accounted for a further 33% of investigations reported, and a further 18% related to marsupials.

Table 3.1 Number of disease investigations reported into eWHIS, January–December 2016[a]

Animals	Number of investigations
Bats[b]	342
Birds	297
Marsupials	163
Feral animals	53
Snakes and lizards	14
Marine mammals	11
Frogs	5
Freshwater turtles	5
Marine turtles	7
Monotremes	4
Fish	1

a Disease investigations may involve a single animal or multiple animals (e.g. mass mortality event).

b Most bat disease investigations are single bats submitted for Australian bat lyssavirus testing.

Surveillance of diseases in bats

Surveillance of diseases in bats in Australia provides a better understanding of the ecology of these diseases, with a particular focus on pathogens that have the potential to affect livestock health, public health or biodiversity. Spillover of disease agents such as ABLV and Hendra virus (HeV) from bats can have serious effects on humans and domestic animals. Diseases that threaten bat populations can interfere with the important ecological functions performed by bats, such as pollination and insect control, leading to ecological and economic losses.[70] WHA coordinates a working group that focuses on improving national coordination of issues associated with bat health.

State and territory animal and public health laboratories and AAHL continue to screen Australian bats for ABLV. WHA collates and publishes national ABLV bat testing data[71] as part of NAHIS. A total of 345 bats were tested for ABLV in 2016. Of these, 15 tested positive: three little red flying foxes (*Pteropus scapulatus*), three grey-headed flying foxes (*P. poliocephalus*), six black flying foxes (*P. alecto*), one spectacled flying fox (*P. conspicillatus*) and two unidentified flying foxes (*Pteropus* spp.).

Monitoring for diseases of biodiversity concern includes exclusion testing for the exotic disease white-nose syndrome in microbats, which has killed millions of insectivorous bats in North America.

Investigation of wild bird morbidity and mortality events

Investigation of significant morbidity and mortality events in wild birds contributes to the National Avian Influenza Wild Bird Surveillance Program (see Section 3.3.4). Diagnostic testing for wild bird mortality events includes, when appropriate, exclusion of AI, avian paramyxovirus (APMV, including Newcastle disease and pigeon paramyxovirus) and West Nile virus. In 2016, WHA received 297 reports of wild bird mortality or morbidity investigations from around Australia, ranging from single animal to multiple animal (mass mortality) events.

Findings in wild bird disease investigations included aspergillosis, avian chlamydiosis, avian pox, botulism, coccidiosis, *Macrorhabdus ornithogaster* infection, metabolic bone disease, sarcocystosis, *Salmonella* spp. infection, spironucleosis, poisoning, psittacine beak and feather disease, trichomoniasis and trauma. No wild bird mortality events were attributed to AI, APMV or West Nile virus. AI was specifically excluded by polymerase chain reaction (PCR) testing for influenza A in 77 of the events. In addition, APMV was excluded in 69 events by PCR testing specific for Newcastle disease (ND) virus and/or pigeon paramyxovirus 1. AI and APMV exclusion testing was not warranted in the remaining events on the basis of clinical signs, history, prevailing environmental conditions or other diagnoses.

70 Boyles JG, Cryan PM, McCracken GF, Kunz TH. Economic importance of bats in agriculture. *Science 2011;* 332: 41–42.

71 *ABLV Bat Stats*. www.wildlifehealthaustralia.com.au/ProgramsProjects/BatHealthFocusGroup.aspx

Other wildlife disease investigations

Examples of wildlife disease investigations reported to WHA and recorded in the national database are provided below.

In June, a short-beaked echidna (*Tachyglossus aculeatus*) was found in West Gippsland, Victoria with a moderate tick burden and a large firm mass on the ventro-lateral abdominal wall. A diagnosis of subcutaneous and pulmonary sparganosis was confirmed on the basis of gross and histology examination. In previous cases from eastern Australia, sparganosis in echidnas was considered most likely to be due to the presence of the larval stages of the cestode *Spirometra erinacei.*[72]

In May 2016, as part of routine monitoring for rabbit haemorrhagic disease virus (RHDV), RHDV-2 was detected for the first time in wild European brown hares (*Lepus europaeus*) in South Australia and Victoria.[73] It is unclear if the detections were due to a rare spillover event from rabbits to hares or whether RHDV-2 was spreading directly between hares.[74] RHDV-2 was first detected in wild European rabbits (*Oryctolagus cuniculus*) in the Australian Capital Territory in May 2015[75] and has since been detected in pet rabbits, rabbits grown for meat and wild rabbits in every state except Queensland and Western Australia.[76] Rabbit calicivirus, specifically RHDV-1 from the former Czechoslovakia (Czech 351), has been used in Australia as a biological control agent since 1996.

Other wildlife disease investigations included exclusion of *Mycobacterium ulcerans* in two brushtail possums (*Trichosurus vulpecula*) in Victoria; identification of fly larvae (maggots) from skin papillomas on a juvenile common wallaroo (*Macropus robustus*) in the Northern Territory as *Chrysomya* spp., either *C. saffranea* or *C. megacephala* but not *C. bezziana* (Old World screw-worm fly); and a juvenile male black flying fox (*P. alecto*) in Queensland with unusual neurological signs, which was negative for ABLV and suspected of hepatic encephalopathy following exposure to a hepatotoxin.

72 The national electronic Wildlife Health Information System (eWHIS). www.wildlifehealthaustralia.com.au/ProgramsProjects/eWHISWildlifeHealthInformationSystem.aspx

73 OIE WAHIS report: www.oie.int/wahis_2/temp/reports/en_imm_0000020384_20160630_165401.pdf

74 www.pestsmart.org.au/the-arrival-of-rhdv2-in-australia-and-implications-for-current-rabbit-biocontrol-initiatives/

75 OIE WAHIS Report: www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review?page_refer=MapFullEventReport&reportid=18075

76 OIE WAHIS report: www.oie.int/wahis_2/temp/reports/en_imm_0000020384_20160630_165401.pdf

3.3 Targeted national programs

Australia's general surveillance for terrestrial animal diseases is complemented by a range of targeted surveillance activities. The surveillance information generated by these programs enables animal health authorities in Australia to accurately assess the status and risk of diseases within their jurisdiction, and provide timely advice of any significant changes. The information also facilitates the development or refinement of protocols for exports and imports with trading partners. The following sections describe key targeted national programs that are of particular interest to Australian animal health authorities.

3.3.1 National Arbovirus Monitoring Program

The National Arbovirus Monitoring Program (NAMP) monitors the distribution of economically important arboviruses (insect-borne viruses) of ruminant livestock and associated insect vectors in Australia. Arboviruses monitored by NAMP include bluetongue virus (BTV), Akabane virus and bovine ephemeral fever (BEF) virus. BTV infection does not adversely affect production in Australian livestock, and disease has not been reported from areas of known viral transmission.

NAMP provides credible data on the nature and distribution of important specific arbovirus infections in Australia for use by the Australian Government and livestock exporters. NAMP supports Australian Government export certification that Australian ruminants are sourced from areas that are free from transmission of these specified arboviruses. In addition, NAMP data are available to other countries when negotiating their import health conditions for Australian livestock and their genetic material.

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 objectives:

- market access – to facilitate the export of live cattle, sheep and goats, and ruminant genetic material, to countries with concerns about BTV and Akabane and BEF viruses
- bluetongue early warning – to detect incursions of exotic strains of BTV and vectors (*Culicoides* spp. biting midges) into Australia by surveillance of the northern BTV endemic area
- risk management – to detect changes in the seasonal distribution in Australia of endemic BTV and Akabane and BEF viruses and their vectors, to support 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 other cattle herds (serosurveys) and trapping of insect vectors. Figure 3.2 illustrates the location of sentinel and serosurvey herd sites during the 2015–2016 arbovirus transmission season.

Blood samples from groups of young cattle that have not previously been exposed to arbovirus infection are tested at regular intervals for evidence of new infection with BTV and Akabane and BEF viruses. Insect traps to detect *Culicoides* spp. are positioned near the monitored herds during the period of testing or near herds where conditions are favourable for *Culicoides* spp. survival.

Most sentinel herd 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 detect any new strains of virus and to assess the seasonal intensity of infection with each arbovirus (see Figure 3.2).

Beatrice Hill in the Northern Territory is a focus for exotic BTV surveillance, and virus isolation is routinely undertaken on blood samples collected at this location. Serotyping, virus isolation and molecular testing are applied strategically in other herds in New South Wales, the Northern Territory, Queensland and Western Australia after

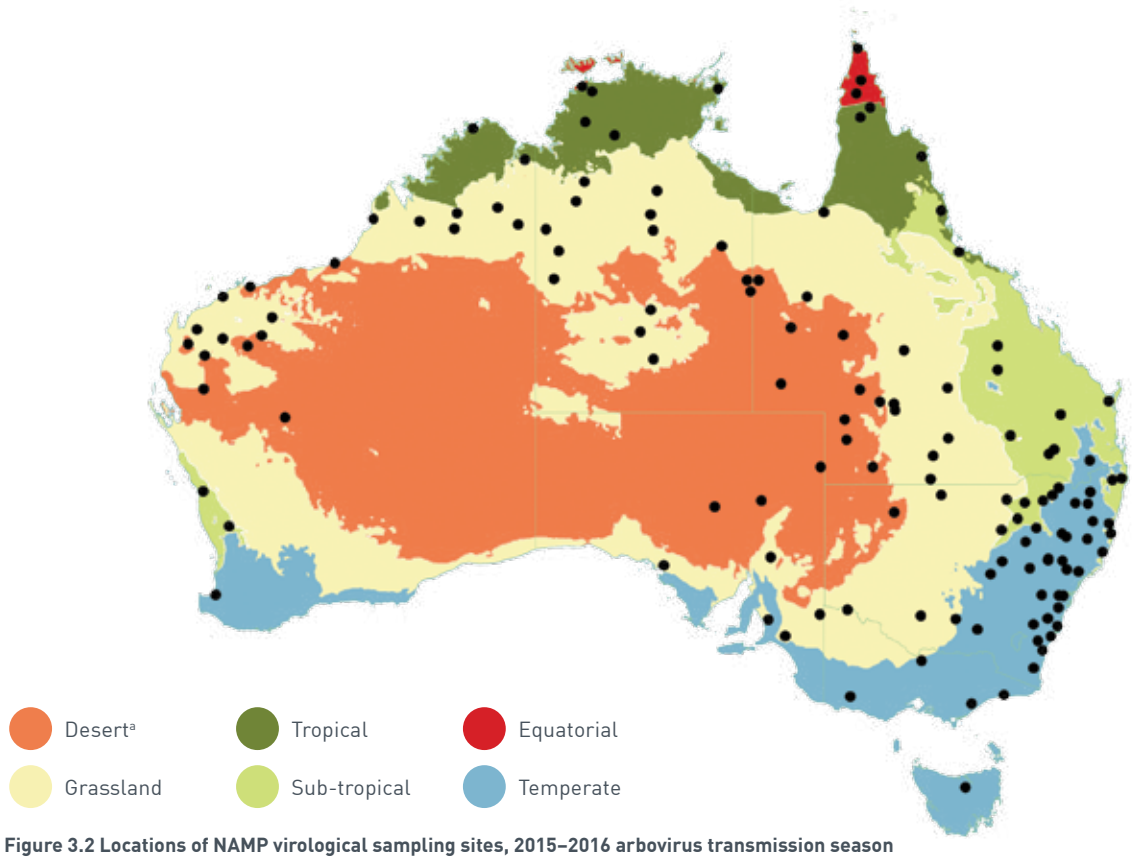


Figure 3.2 Locations of NAMP virological sampling sites, 2015–2016 arbovirus transmission season

a Köppen climate classification
http://www.bom.gov.au/climate/averages/climatology/gridded-data-info/metadata/md_koppen_classification.shtml

seroconversions are detected. NAMP surveillance data relating to early warning of bluetongue are supplemented by targeted surveillance activities conducted by the NAQS in remote coastal regions of northern Australia, including the Torres Strait Islands.

Epidemiology

BTV and Akabane and BEF viruses are non-contagious and are biologically transmitted by their insect vectors. Climatic factors (rainfall and temperature) determine the distribution of potential vectors.

Arboviruses are transmitted only if vectors are present in sufficient density.

Many regions in Australia have never recorded the presence of competent *Culicoides* vectors and are therefore free from viral transmission of arboviruses spread by this vector species (BTV and Akabane virus). BEF, which is primarily spread by some mosquito species, has a more variable distribution, particularly in southern Australia. Climatic conditions affect vector distribution and partly account for changes to the boundary between areas where viral transmission occurs and areas free of transmission.

Culicoides brevitarsis is the main vector of BTV and Akabane virus. A close correlation exists between the southern 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 than *C. brevitarsis*, are *C. actoni*, *C. dumdumi*, *C. fulvus* and *C. wadai*.

The main vector of BEF virus in Australia is putatively the mosquito *Culex annulirostris*. *C. annulirostris* has a wider distribution than *C. brevitarsis*, and also occurs in regions not affected by BTV or Akabane virus.

Monitoring results for 2015–2016

This section summarises and explains the results of vector and virus monitoring and describes the limits of distribution of BTV and Akabane and BEF viruses in the 2015–2016 arbovirus transmission season (September 2015 to August 2016).

The numbers of monitoring sites for sample collection in each state and territory are shown in Table 3.2.

Bluetongue virus distribution

The limits of BTV transmission in Australia are shown on the interactive BTV zone map,[77] which defines areas in which no viral transmission[78] has been detected for the past two years.

BTV is endemic in northern and north-eastern Australia (New South Wales, Northern Territory, Queensland and Western Australia), and remains undetected in South Australia, Tasmania and Victoria (Figure 3.3). No new serotypes were detected in Australia during 2015–2016.

Virological testing in the Northern Territory showed that BTV activity was widespread in the north, commencing late in the transmission season

Table 3.2 Number of NAMP virology monitoring sites, by state and territory, 2015–2016

Jurisdiction	No. of sentinel herds sampled	No. of serosurvey herds sampled	No. of insect traps sampled
New South Wales	40	0	33
Northern Territory	8	10	10
Queensland	16	7	19
South Australia	4	2	3
Tasmania	1	0	1
Victoria	5	0	3
Western Australia	11	10	17
Total	**85**	**29**	**86**

77 namp.animalhealthaustralia.com.au

78 Viral transmission is defined as detection of evidence of viral infection based on serological monitoring of cattle.

(January to April). BTV serotypes BTV-1 and BTV-16 were detected at the three northernmost sentinel sites, and BTV-5 and BTV-21 were detected immediately south at Katherine. The distribution of BTV remained largely stable, with the exception of evidence of BTV in a serosurvey herd at Birrindudu Station (bordering the desert in central southern Northern Territory), resulting in a small expansion of the BTV zone. This sentinel site is at the southern margins of the endemic zone and has occasionally delivered positive detections in the past.

The Northern Territory recorded below-average rainfall but above-average temperatures during each month of the arbovirus transmission season with the exception of December, which was the wettest on record for the Northern Territory. The long, dry commencement to the wet season probably contributed to the late start to BTV activity in the north. With the exception of the north, where buffalo are present, cattle are the only susceptible livestock species present in any numbers in the Northern Territory.

In Western Australia, no seroconversions for BTV were detected in the southern Kimberley region, suggesting that the BTV distribution had retracted. The absence of BTV in the Pilbara region continued, despite above average rainfall and temperature (conditions favourable to vectors) in the previous season. The wet season rainfall in the Pilbara region arrived late and the Pilbara south had a cold June with frosts (conditions unfavourable to vectors). Serotypes BTV-5 and BTV-21 were detected in two northern sentinel herds, at Kalumburu and Kununurra.

In Queensland, drought was again declared across 80% of the state by the end of the arbovirus transmission season. Mean temperatures were above average during spring–autumn and rainfall was both above and below average across different areas of the state. During winter, rainfall and minimum temperatures were above average across most of the state. Following four zone expansions in the previous season, the zone of possible BTV activity now comprises most of Queensland, with only arid south-western regions in the BTV-free zone. No changes to the zone occurred during the 2015–2016 season. Only the endemic serotypes BTV-1 and BTV-21 were detected in Queensland.

In New South Wales, rainfall was average along the coastal plain and northern regions. BTV was detected along the coastal plain from the far north coast to the northern part of the Sydney basin, extending up into the Hunter Valley and on the northern tablelands of the Great Diving Range. Only a single BTV serotype (endemic BTV-1) was detected. The absence of BTV transmission in the north west slopes and south coast regions for the past two years has resulted in an expansion of the BTV-free zone in these areas. *C. brevitarsis* was mostly restricted to the coastal region (as far south as Moruya), the tableland region and the Hunter Valley, which is consistent with the distribution of BTV activity; a single specimen was detected inland near Peak Hill (south of Dubbo) in May. The vector *C. wadai* was detected at Casino in May.

No competent vector species were detected in South Australia, Tasmania or Victoria, which is consistent with the serological evidence of virus absence.

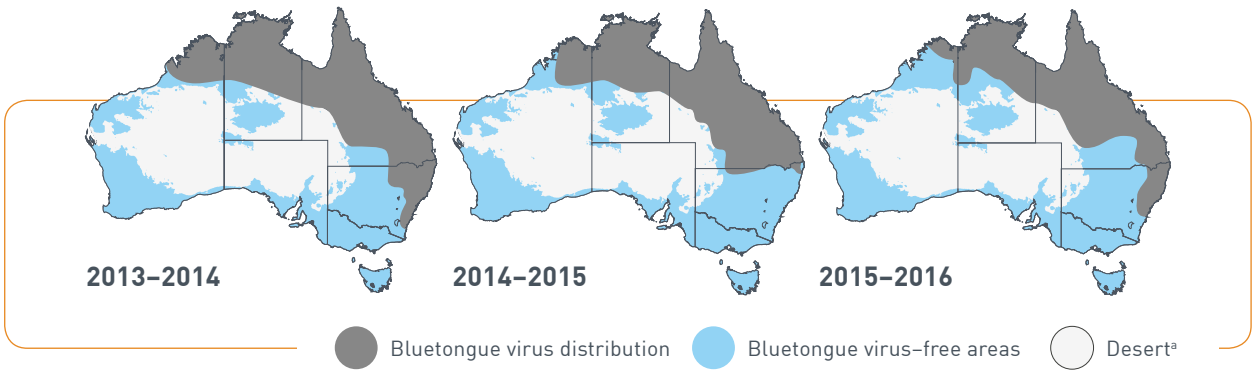


Figure 3.3 Distribution of bluetongue virus in Australia, 2013–2014 to 2015–2016[b]

a Köppen climate classification

b Virus distribution areas depicted are based on monitoring site data. Minor irregularities may occur between publication years due to design process.

Akabane virus distribution

The distribution of Akabane virus (Figure 3.4) varies within the limits of its presumed vector, *C. brevitarsis*, occurring endemically in northern Australia (northern Queensland, the Northern Territory and Western Australia) and showing a distinct seasonal spread in New South Wales and the southern parts of Queensland.

In Western Australia, Akabane virus was only detected at two monitoring sites in the north Kimberley region, which is consistent with BTV distribution (BTV shares the same vector).

In the Northern Territory, limited virological testing detected Akabane virus in the northern and central regions, but it was not detected in the south at Alice Springs.

In Queensland, Akabane virus was detected widely across the state, extending to the far southeast and far south-west.

In New South Wales, Akabane virus detection mirrored the distribution of BTV which is consistent with the season's distribution of the vector *C. brevitarsis*. The incidence of detections was low. This region is considered endemic for Akabane virus and there were no confirmed reports of Akabane-affected calves.

Akabane virus remains undetected in South Australia, Tasmania and Victoria.

Bovine ephemeral fever distribution

BEF virus is endemic in northern Australia (the Northern Territory, Queensland and Western Australia), where BEF can occur in both the dry and wet seasons (spring, summer or autumn). In New South Wales and parts of southern Queensland, occurrence of the virus is limited by the effect of cold winters, restricting the distribution of its mosquito vector (Figure 3.5).

In Western Australia, BEF virus was detected by serological testing of sentinel herds in the Kimberley and Murchison regions. In contrast to 2014–2015, BEF virus was not detected in the Pilbara and no clinical signs of BEF were reported from the other two regions this season. No serological or clinical evidence was detected in south-west Western Australia.

In the Northern Territory, BEF virus was first detected in September 2015 at Beatrice Hill in the north, and was widespread throughout north and central Northern Territory but was not detected at Alice Springs in the south. Numerous clinical cases were observed, including fatalities in recumbent animals.

In Queensland, BEF virus was again detected widely across the state, extending to the far southeast and far south-west.

In New South Wales, BEF virus serological testing was conducted on samples from sentinel herds located in inland New South Wales and south coast regions, with activity only detected at Camden in May 2016. Clinical cases of BEF were confirmed

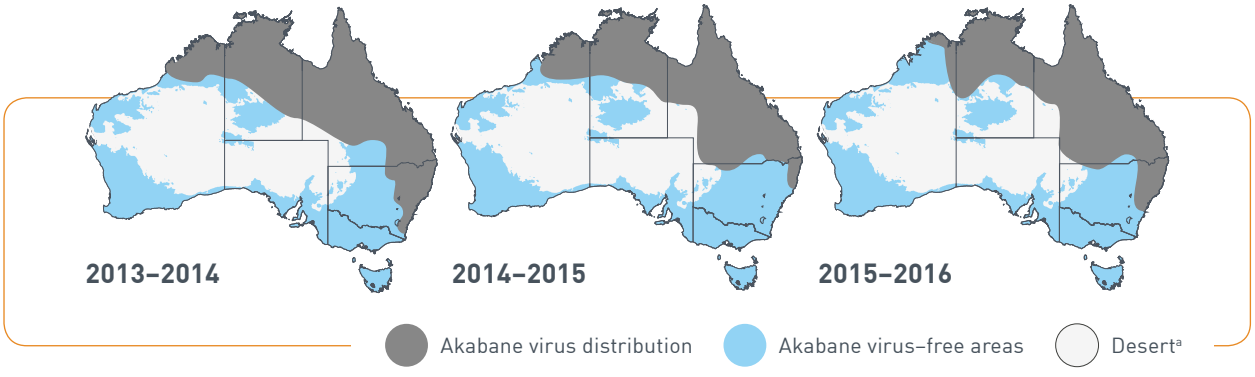


Figure 3.4 Distribution of Akabane virus in Australia, 2013–2014 to 2015–2016[b]

a Köppen climate classification

b Virus distribution areas depicted are based on monitoring site data. Minor irregularities may occur between publication years due to design process.

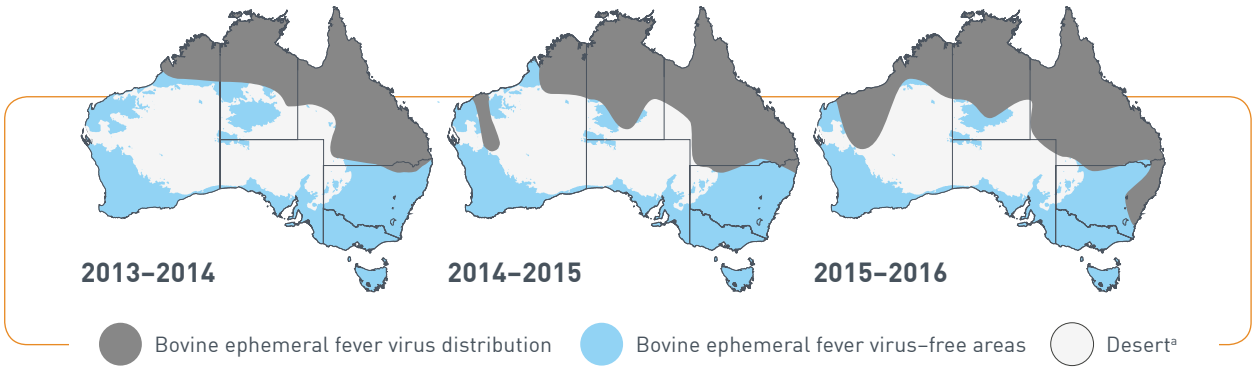


Figure 3.5 Distribution of bovine ephemeral fever virus in Australia, 2013–2014 to 2015–2016[b]

a Köppen climate classification

b Virus distribution areas depicted are based on monitoring site data. Minor irregularities may occur between publication years due to design process.

along the coastal plain from the far north coast, commencing in December 2015, extending to the Hunter Valley (January 2016) and the south coast (May 2016) regions. Single cases were confirmed inland at Dubbo and Bathurst in early to mid-autumn. To support market access to North America, BEF testing will continue in 2016–2017.

BEF virus was not detected in South Australia, Tasmania or Victoria.

3.3.2 Transmissible Spongiform Encephalopathies Freedom Assurance Program

In 2016, Australia continued to be recognised by the OIE as a country of negligible risk for bovine spongiform encephalopathy (BSE) and free from classical scrapie. These diseases are types of 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:

- NTSESP
- the Australian ruminant feed-ban scheme, including inspections and testing
- imported animal surveillance, including buyback schemes for certain imported cattle
- communications.

National Transmissible Spongiform Encephalopathies Surveillance Project

The NTSESP demonstrates Australia's 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',[79] 'fallen'[80] and 'casualty slaughter'[81] cattle and from 'clinically consistent' sheep. Details of the sampling program for cattle and sheep are provided in the NTSESP *National guidelines for field operations*.[82]

For cattle, Australia is assessed by the OIE as BSE-negligible risk. This means that Australia implements 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

79 Defined as 'an animal that is found with clinical signs considered consistent with BSE', analogous with 'clinical suspect' as in the OIE 2016 *Terrestrial animal health code*, Chapter 11.4, on surveillance for BSE.

80 Defined in the OIE 2016 *Terrestrial animal health code*, Chapter 11.4, as 'cattle over 30 months of age which are found dead or killed on farm, during transport or at an abattoir'.

81 Defined in the OIE 2016 *Terrestrial animal health code*, Chapter 11.4, 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'.

82 NTSESP Field Guidelines 2016-17 at www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/tse-freedom-assurance-program/surveillance-of-tses

aims to meet OIE recommendations to investigate all clinically consistent cattle, and ensure that cattle from the 'fallen' and 'casualty slaughter' subpopulations are tested.

For sheep, the NTSESP is a targeted surveillance program that has an annual sampling intensity designed so that there is at least a 99% probability of detecting scrapie if this disease accounted for 1% of the cases of neurological disease in sheep in Australia. 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.

AHA manages the NTSESP with funding from 10 industry stakeholders (livestock and associated industries), the Australian Government, and the state and territory governments.

Table 3.4 shows the results from the NTSESP for the 2015–16 financial year. Data for other periods are available from the NAHIS database.[83]

Table 3.4 Summary of results from the National Transmissible Spongiform Encephalopathies Surveillance Project, cattle and sheep, 2015–2016

	Cattle			Sheep	
State or territory	Number examined	Points	Number positive	Number examined	Number positive
New South Wales	247	64279.2	0	269	0
Northern Territory	39	16746.2	0	0	0
Queensland	203	68421.1	0	29	0
South Australia	45	18802.6	0	81	0
Tasmania	17	4224.4	0	20	0
Victoria	178	49563.7	0	199	0
Western Australia	32	15740.7	0	171	0
Total	**761**	**237777.9**	**0**	**769**	**0**

Australian ruminant feed-ban scheme

Since 1997, Australia has had a total ban on feeding ruminant meat and bonemeal to ruminants. In 1999, this ban was extended to cover feeding of specified mammalian materials to ruminants. Since 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, or animal oils and rendered fats.

In the 2015–16 financial year, 516 operations were inspected by jurisdictional staff, from renderers to end users. This revealed 37 instances of non-compliance, of which all except four were successfully resolved in this period. During the same period, 7364 audits were completed through industry quality assurance programs, with very high levels of compliance (only two corrective action requests were issued).

Imported animal surveillance

All cattle imported between 1996 and 2002 from countries that have experienced a native-born case of BSE have been placed under lifetime quarantine, are electronically tagged as part of NLIS for cattle, and are inspected by government authorities every 12 months. These animals may not enter the human or animal feed chains. They are slaughtered, then incinerated or buried. The Cattle Council of Australia funds the removal of these cattle from the Australian herd. As of 2016, there are 22 of these imported cattle still present in Australia.

83 www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/national-animal-health-information-system-nahis

Program communications

During 2016, TSEFAP communications included:

- a pamphlet for producers, to encourage them to report animals with TSE-consistent clinical signs for sampling under the TSEFAP
- distribution of a series of pamphlets for stockfeed manufacturers and users, promoting awareness of their responsibilities under the ruminant feed-ban legislation
- updating of the AHA webpages on the components of the TSEFAP.

3.3.3 Screw-Worm Fly Surveillance and Preparedness Program

Old World screw-worm fly (OWS; *Chrysomya bezziana*) and New World screw-worm fly (NWS; *Cochliomyia hominivorax*) are exotic to Australia, and suspicion of infestation in animals is notifiable under state and territory animal health legislation.[84] Screw-worm fly (SWF) infestation in humans is not notifiable.[85]

OWS and NWS have similar biological profiles and fill similar ecological niches in Africa and Asia (OWS) and the Americas (NWS).[86] OWS myiasis (infection with fly larva) is a significant production disease of livestock throughout its range. It is considered a greater threat to Australian livestock industries than NWS because of the proximity of the areas where it occurs to Australia and the return of livestock export vessels from Asia, where OWS is prevalent, to Australian ports.

AHA manages the Screw-Worm Fly Surveillance and Preparedness Program (SWFSPP) in consultation with a committee of industry and government stakeholders. The program aims to detect an incursion early enough to ensure a high likelihood of success of an eradication program.

A program review was completed in 2015. The review reassessed the priority of OWS for targeted surveillance as moderate and reaffirmed that the highest-risk pathways are still considered to be through Torres Strait or with returning livestock vessels. A revised program was initiated and its implementation continued through 2016.

84 www.agriculture.gov.au/pests-diseases-weeds/animal/notifiable

85 www.health.gov.au/casedefinitions

86 Spradbery P. Screw-worm fly: a tale of two species. *Agricultural Zoology Reviews* 1994; 6: 1–62.

Program in 2016

The SWFSPP comprises four areas of work:

- surveillance (see Figure 3.6)
  - by fly trapping in Western Australia (four locations), the Northern Territory (two locations) and Queensland (two locations)
  - by targeted livestock wound surveys for myiasis in Western Australia (two locations), the Northern Territory (three locations) and Queensland (four locations)
- entomology training and development of reference resources
- awareness promotion to increase general surveillance for myiasis
- monitoring of the risk profile for SWF in Australia.

During 2015–16, fly trapping occurred at eight locations, 26 sites (within locations), and a total of 278 fly trapping events[87] were conducted. Targeted myiasis monitoring was conducted at nine locations and 26 sites (within locations), comprising 155 cattle or domestic animal surveys and a total of approximately 5600 animals inspected. General surveillance (investigations of myiasis to exclude SWF) are reported in Table C1. All investigations were negative.

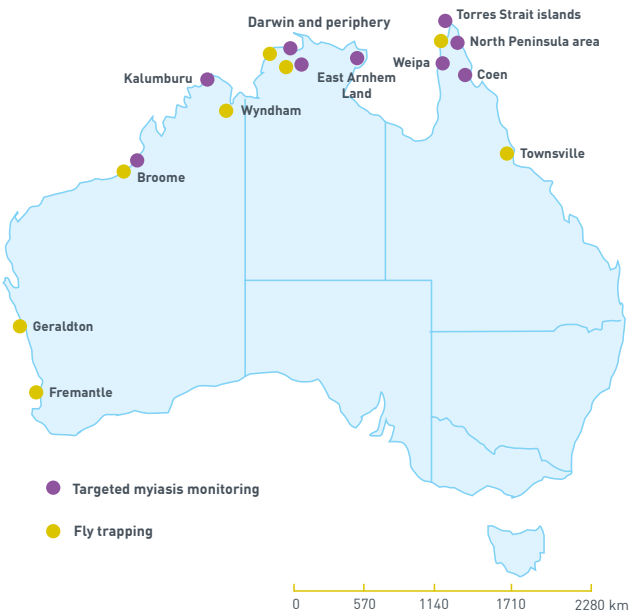


Figure 3.6 Locations of targeted myiasis monitoring and fly trapping in the revised Screw-Worm Fly Surveillance and Preparedness Program

87 One SWF trap is set for 10 days.

During early 2016, AHA conducted a national refresher training exercise for entomologists in identification of adult and immature SWFs and an evaluation of identification materials. Subsequently, Australia's laboratory manual for SWF surveillance is being revised and will include enhancements to diagnostic keys and diagnostic images of SWF using advanced photography.

During 2016, new SWF posters and maggot collection kits were developed and distributed via state and territory government agencies to veterinary practices, livestock agents, cattle producers, cattle export depots, quarantine check points, and government offices and medical practices. NAQS also continues to provide awareness material through its engagement with local communities and visitors to the Torres Strait region.

Australia monitors the risk of OWS entry via returning livestock export vessels by trapping insects on board while vessels are in Australian waters. A variety of dead insects are collected in 'insectocuters' and checked by entomologists for SWF. During 2016, no SWFs were detected.

Background

Nationally collated OWS surveillance data show that *C. bezziana* has not been detected through insect trapping and inspection of arriving international livestock vessels (data since 2003), insect trapping in Torres Strait (data since 2004) or myiasis investigations (data since 1997). The only known introduction of OWS into Australia was in 1988, when several adult flies were captured in Darwin Harbour on a livestock vessel returning from Brunei.[88]

Although surveillance indicates a low likelihood of incursion of SWF into Australia, the potential for establishment and spread across several states is significant.[89] SWFs lay their eggs in the wounds of any living warm-blooded animal, and the Australian tropical climate is favourable to their life cycle. Modelling has indicated that most of tropical northern Australia and part of the eastern seaboard offer a suitable climate for OWS survival; in the south of Australia, extremes of temperature and moisture would limit survival.[90] Figure 3.7 shows areas with suitable climatic conditions year-round for SWF survival (taking seasonality into account).[91]

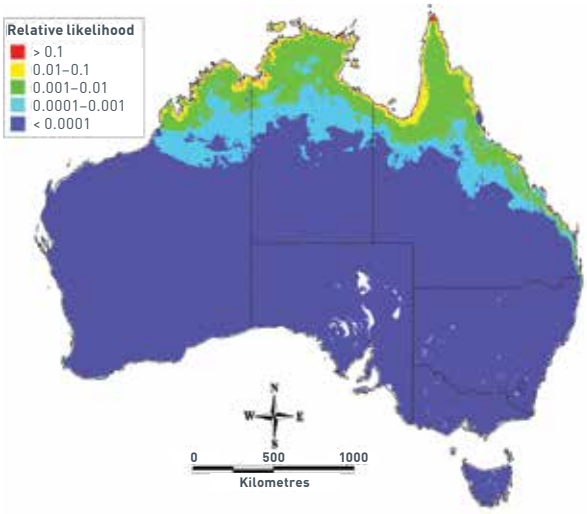


Figure 3.7 Relative likelihood of introduction and establishment of screw-worm fly in Australia under climatic extremes.

Source: Fruean S, East I. Spatial analysis of targeted surveillance for screw-worm fly (*Chrysomya bezziana* or *Cochliomyia hominivorax*) in Australia. *Australian Veterinary Journal* 2014; 92: 254.

Feral animals, livestock and wildlife would be important hosts for SWF in Australia. Targets for infestation are husbandry wounds, wounds resulting from fighting, tick bite wounds and the navels of newborns. The large feral animal populations in the north, and the large numbers of both extensively and intensively reared livestock along the eastern seaboard mean that SWF could spread widely if it entered and established in Australia.

Biosecurity practices, prompt recognition and reporting (via the Emergency Animal Disease Watch Hotline) of an incursion are critical to Australia's preparedness for a SWF incursion. Further information on the SWF program is available on the AHA website.[92]

3.3.4 National Avian Influenza Wild Bird Surveillance Program

Activities under the National Avian Influenza Wild Bird (NAIWB) Surveillance Program occur

88 Rajapaksa N, Spradbery JP. Occurrence of the Old World screw-worm fly *Chrysomya bezziana* on livestock vessels and commercial aircraft. *Australian Veterinary Journal* 1989; 66: 94–96.

89 Animal Health Australia. *Disease strategy: screw-worm fly* (version 3.0), Australian Veterinary Emergency Plan (AUSVETPLAN). 3rd edition. Canberra: Primary Industries Ministerial Council, 2007.

90 Beckett S. *Review of risk of entry of Old World screw-worm fly into Australia and surveillance requirements*. Canberra: Animal Health Australia, 2014.

91 Fruean S, East I. Spatial analysis of targeted surveillance for screw-worm fly (*Chrysomya bezziana* or *Cochliomyia hominivorax*) in Australia. *Australian Veterinary Journal* 2014; 92: 254.

92 www.animalhealthaustralia.com.au/swf

Australia-wide. Surveillance for AI in wild birds comprises two sampling components: targeted surveillance via sampling of apparently healthy and hunter-killed wild birds, and general surveillance via investigating significant unexplained morbidity and mortality events in wild birds, including captive and wild birds within zoo grounds (see Section 3.2.5). Sources for targeted wild bird surveillance data include state and territory government laboratories, universities, and samples collected through the NAQS program. Samples from sick birds include submissions from members of the public, private practitioners, universities, zoos and wildlife sanctuaries.

In 2016, targeted wild bird surveillance took place in New South Wales, the Northern Territory, Queensland, South Australia, Tasmania, Victoria and Western Australia with 4884 birds sampled. Most samples were collected from waterbirds (ducks and waders). No highly pathogenic AI viruses were identified. However, surveillance activities continue to find evidence of a wide range of subtypes of AI viruses of low pathogenicity: subtypes H2, H3, H5–H12 were detected in 2016.

The NAIWB Surveillance Program continues to provide valuable ecological and epidemiological background information that assists strategic risk management to minimise the potential effects of AI — particularly highly pathogenic AI (HPAI) — on human health, poultry industries and wildlife in Australia. Importantly, this program is a key source of samples that are positive for AI viruses, which are used to maintain and develop current and specific diagnostic primers and probes. These are essential for continued confidence that the tests being used in Australia will detect any H5 or H7 strains of HPAI in the event of an outbreak of these subtypes in poultry. The multi-agency and cross-jurisdictional approach of this project provides a forum for collaboration on technical aspects of influenza in humans, animals and wildlife.

3.3.5 National Bee Pest Surveillance Program

The National Bee Pest Surveillance Program (NBPSP)[93] is an early warning system to detect new incursions of pest bees and exotic bee pests,

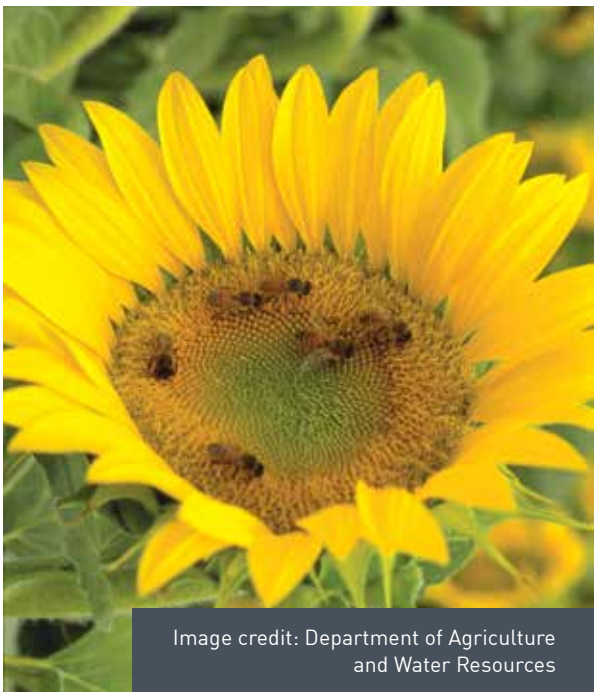


Image credit: Department of Agriculture and Water Resources

including varroa mites (*Varroa destructor* and *V. jacobsoni*), tropilaelaps mites (*Tropilaelaps clareae* and *T. mercedesae*), tracheal mite (*Acarapis woodi*), Asian honey bee (*Apis cerana*), Africanised honey bee (*A. mellifera scutella*), Cape honey bee (*A. mellifera capensis*), giant honey bee (*A. dorsata*), red dwarf honey bee (*A. florea*) and regionalised pests (Braula fly and small hive beetle). Early detection of these exotic pests is critical to eradicating an incursion and limiting the economic impact. As well as providing early detection of pest bees and bee pests, the NBPSP supplies data to support health certification for exports of queen bees and packaged bees.

Plant Health Australia (PHA) has managed the NBPSP program since 2012. On 1 July 2013, the NBPSP became a cost-shared initiative between the honey bee industry (represented by the Australian Honey Bee Industry Council), plant industries that rely on pollination (represented by Horticulture Innovation Australia[94]) and the Australian Government Department of Agriculture and Water Resources. This cost-shared funding model has continued through to December 2016.

A major focus of the year has been the project 'Statistical review and redesign of the NBPSP', funded by Horticulture Innovation Australia. The aim of this project was to prepare a risk-based statistical design to be used in the NBPSP for the

93 www.planthealthaustralia.com.au/national-programs/national-bee-pest-surveillance-program

94 Previously Horticulture Australia Limited

early detection of exotic bee pests, particularly varroa mite. The statistical redesign delivered a cost-effective and sensitive combination of surveillance methods for early detection of high-priority pests, for both eradication and containment scenarios. PHA led the project, in collaboration with CSIRO, the Queensland University of Technology, and Plant & Food Research (New Zealand). Government agencies and horticultural industry representatives were also involved.

The final report for the project was delivered in 2016 and identified a range of improvements for the next phase of the NBPSP. The recommended improvements from this project included:

- increasing the sensitivity of detecting exotic internal and external mites by improving the sentinel hive component at high risk ports (number of hives and their arrangement)
- improving catchbox sensitivity and location deployments
- increasing and improving on Asian honey bee surveillance activities (by floral sweep netting and specifically designed catchboxes)
- developing a national virus diagnostic system for surveillance of three key honey bee viruses
- conducting surveillance for Asian hornet at specific high risk ports.

These improvements will provide stakeholders with greater confidence in future surveillance efforts. The project will act as the catalyst for PHA, the honey bee industry, pollination-reliant plant industries, research and development agencies, and governments to implement a long-term funding agreement for the NBPSP from December 2016.

Another improvement for the NBPSP in 2016 was the issue of an additional minor use permit (PER14863, issued in April) by the Australian Pesticides and Veterinary Medicines Authority for use of a new miticide Mite Away Quick Strips (formic acid) in the NBPSP along with Bayvarol (flumethrin) and Apistan (tau-fluvalinate) in sentinel hives.

In 2016, 167 sentinel hives had been established and were monitored every eight weeks with a sticky mat and miticide strip. This is an increase from 166 in 2015, 146 in 2014 and 128 in 2013.

Formalised surveillance for small hive beetle (SHB) (*Aethina tumida*) across Australia continued. Surveillance using APITHOR traps (which contain the insecticide fipronil) and oil traps continued on sentinel hives in the Northern Territory and Tasmania, where SHB is currently absent, as well as in southern Western Australia, where SHB is confined to Karratha in the north of the state.

Tables 3.5 and 3.6 show sample data from sentinel hives located at Australian ports in 2016 and other surveillance activities.

Table 3.5 Samples examined for pests of bees, by state or territory, 2016

State or territory	Number of samples examined
New South Wales	168
Northern Territory	90
Queensland	184
South Australia	103
Tasmania	119
Victoria	209
Western Australia	114
Total	**987**

Table 3.6 Samples examined for pest bees and pests of bees, by agent, 2016

Agent	Number of samples examined
Pest bees (*Apis cerana, A. florea, A. dorsata*)	85[95]
Tracheal mite	157[96]
Small hive beetle	124[97]
Varroa and Tropilaelaps mite	621[98]
Total	**987**

95 The development of floral maps and coordinated floral sweep netting began to be implemented in late 2014 around Australia for the detection of pest bees. This figure is the number of floral sweep netting runs conducted in 2016.

96 Tracheal mite specimens examined included 30–60 bees from sentinel hives being randomly selected and morphologically dissected to determine tracheal mite presence.

97 Small hive beetle samples included Apithor traps, oil traps and hive inspection of sentinel hives in Western Australia, the Northern Territory and Tasmania.

98 Varroa and Tropilaelaps specimens examined is the number of sentinel hives tested with an acaricide and a sticky mat being examined.

3.4 Surveillance in northern Australia

Northern Australia's biosecurity risk profile has distinctive features that warrant dedicated and targeted surveillance. Proximity to neighbouring countries, extensive areas of land and sea, seasonal climatic conditions, significant food and fibre industries, receptive animal populations, and unregulated movement of goods and people all contribute to the region's vulnerability to pests and disease incursions of significance to animal health, production and trade.

3.4.1 Northern Australia Quarantine Strategy

NAQS, managed by the Department of Agriculture and Water Resources, is an integrated program of active and passive surveillance measures, including:

- targeted surveys and monitoring programs, including sentinel cattle herds and insect trapping
- biosecurity surveillance services delivered by Aboriginal and Torres Strait Islander ranger groups and other stakeholders
- strategic collaborations with Queensland, Northern Territory and Western Australian biosecurity agencies and other stakeholders
- collection and analysis of relevant risk data through the offshore and onshore surveillance activities
- public awareness and community reporting under the Biosecurity Top Watch initiative.

NAQS contributes to Australia's capacity to demonstrate the absence of high-risk pests and diseases. This allows access for Australian agricultural produce to important and vigilant international markets.

Surveillance measures focus on early detection and reporting of exotic pests and diseases in coastal northern Australian regions between Broome (on the west coast) and Cairns (on the east coast), including the special quarantine zones established in Torres Strait. Resources and the frequency of surveillance, established in consultation with key stakeholders and reviewed annually, target the areas of highest biosecurity risk. Target organisms are currently those that match all, or most, of the following criteria:

- organisms that pose serious threats to Australia's agricultural productivity, export markets, human health (i.e. zoonoses) or the environment
- organisms with potential to enter northern Australia from Indonesia, Papua New Guinea, Timor-Leste or other locations by unregulated pathways, such as wind or tidal movements, animal migrations or unauthorised human-assisted movements, including traditional movements
- organisms with a high likelihood of establishment and spread.

In 2016, key priorities for NAQS were:

- risk-based surveillance for detection of exotic pests and diseases, including foot-and-mouth disease (FMD), exotic strains of bluetongue virus and its biting midge vectors, classical swine fever, Aujeszky's disease, rabies, SWF and HPAI
- contributions to national surveillance programs, including NAMP, the SWFSPP, and the NAIWB Surveillance Program
- increased participation in biosecurity surveillance in Aboriginal and Torres Strait Islander communities through a community animal health reporting project and other initiatives
- improvements to rabies surveillance and preparedness in northern Australia, including reviewing risk pathways and better targeting awareness messages in remote Aboriginal and Torres Strait Islander communities.

Specific disease surveillance strategies

Host animal species

In 2016 to date, 11 animal health surveys have been completed to detect exotic diseases in potential host animal species. During these surveys, wild and domestic animals are inspected by veterinary officers, and samples are taken for laboratory testing for a range of target diseases. No exotic diseases were confirmed during 2016. Data are formally reported through NAHIS, and contribute

to Australia's capacity to demonstrate the absence of pests and diseases of significance to trading partners.

Ranger groups

Aboriginal and Torres Strait Islander ranger groups contributed to animal health surveillance through a community animal health reporting program. Land and sea ranger groups provide syndromic reports on domestic and wild animal populations to give a current picture of animal health in the region and enable emerging trends to be identified. Data are gathered either monthly or quarterly (dependent on ranger group activity plans and community location) from targeted groups within each community, including human health clinics, animal management or environmental health workers, hunters and private veterinarians. This has been an effective way of gathering data from remote communities in northern Australia and maintaining a baseline understanding of animal health in these areas for modest cost. It also promotes awareness of animal pests and diseases of concern within the community, and encourages people to report unusual signs of pests and diseases.

SWF surveillance

SWF surveillance strategy is undertaken through the SWFSPP. Adult fly traps are located on the Australian mainland in the Northern Peninsula Area of Queensland, and an increased focus on myiasis inspections throughout the Torres Strait islands and northern Cape York Peninsula, as well as across northern Australia occurred throughout 2016. Ongoing community extension and education provides additional surveillance for SWF in northern Australia.

Japanese encephalitis surveillance

Japanese encephalitis (JE) virus surveillance is conducted during the wet season in northern Queensland. JE virus is exotic to mainland Australia but is seasonally present in Torres Strait. Monthly samples from the sentinel cattle herd in the Northern Peninsula Area were tested for JE virus and related arboviruses. A novel method of surveillance that allows molecular testing of excreted saliva from mosquitoes (the primary vectors of the virus) is also used. There has been no evidence of virus circulation on the mainland since early 2004.

Biosecurity Top Watch

The Biosecurity Top Watch public awareness and education campaign included activities delivered in more than 40 remote communities and properties to strengthen general surveillance. This involved visits to schools, to health clinics, and with Indigenous ranger groups and pastoralists. The aim is to increase the capacity of residents to identify and report pests and diseases across northern Australia.

Key surveillance achievements

Key surveillance achievements for 2016 to date include:

- 11 targeted animal health surveys delivered across northern Australia, testing 671 wild and domestic animals including pigs, cattle, buffalo, horses, chickens and dogs, with no confirmed detections of exotic pests or diseases
- 740 environmental faecal samples tested for AI viruses; results included the detection of five low-pathogenic AI virus (including subtypes H5 and H9), with no HPAI viruses detected
- 51 sentinel herd visits (at six separate sites), with 750 samples tested
- 45 SWF traps set and inspected, with negative results
- 11 177 biting midges (*Culicoides* spp.) identified from 15 northern trap sites
- 50 community animal health reports received from 36 individual communities.

More information on NAQS is available on the department's website.[99]

3.4.2 State and territory animal biosecurity in northern Australia

Surveillance and awareness activities for notifiable pests and diseases are conducted across northern Australia by the DAFWA, the Northern Territory Department of Primary Industry and Fisheries, and the Queensland Department of Agriculture and Fisheries. These activities complement those of other programs, including border security and quarantine barrier activities – such as NAQS – undertaken by the Australian Government Department of Agriculture and Water Resources.

99 www.agriculture.gov.au/biosecurity/australia/naqs

Image credit: Taryn Mokotupu

They also contribute to national pest and disease surveillance programs, including:

- NAMP (Section 3.3.1)
- NTSESP (Section 3.3.2)
- SWFSPP (Section 3.3.3)
- NBPSP (Section 3.3.5).

Activities in aquatic animal health surveillance, EAD preparedness, disease prevention and control, and livestock identification and traceability also take place.

Government officers work to raise awareness about biosecurity, providing advice and guidance to the public and private sectors on:

- managing the risk of exposure to zoonotic disease, including from wildlife
- preparing for, and managing, emergency pest and disease incidents
- on-farm biosecurity planning
- investigating suspected notifiable animal diseases
- animal disease prevention strategies, including swill feeding regulations
- animal welfare
- live animal export.

Government agencies investigate reported outbreaks of disease and losses in livestock, wildlife and domestic animals that may involve a notifiable disease or EAD.

Extension programs in northern Australia during 2016 included:

- private veterinarian EAD investigation training courses
- visits by veterinary officers to private veterinary clinics to discuss procedures for investigating suspected cases of HeV and other notifiable diseases
- discussions with private veterinarians about disease investigations suitable for subsidy under the NSDIP and the NTSESP
- an EAD awareness workshop in Broome which provided regional private veterinarians with awareness of FMD and avian influenza and an insight into national surveillance activities, such as the NAMP, and how these support the livestock sector as well as on preparedness activities for regionally relevant reportable diseases
- awareness seminars for horse-owner groups and private veterinarians about HeV
- extension sessions with wildlife carers on the clinical signs of diseases with known zoonotic risk in wildlife
- extension sessions at export depots, agricultural shows and field days, focusing on biosecurity programs
- one-to-one awareness sessions with cattle producers and private veterinarians about disease awareness, including reporting or collecting maggots in wounds on cattle and other animals to exclude SWF

- presentations at remote Indigenous training workshops for environmental health workers and animal management workers, to promote the importance of biosecurity awareness, animal welfare and zoonotic diseases for Indigenous communities
- tutorial sessions at James Cook University (JCU) School of Veterinary and Biomedical Sciences, and practical field placements of veterinary science students from universities across Australia to provide the students with experience in national surveillance programs, EAD preparedness and response (including an exercise based on an avian influenza outbreak held at JCU), and on-farm biosecurity planning
- information sessions about Asian honey bee, bee pests and diseases for apiarists
- information sessions about Johne's disease for producers.

3.5 Public health surveillance for zoonotic diseases

3.5.1 Communicable Diseases Network Australia

The Communicable Diseases Network Australia (CDNA[100]) (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. Its members include the Australian Government, state and territory governments, and key non-government organisations concerned with communicable diseases. The network provides advice to governments and other bodies on public health strategies to minimise the effect of communicable diseases, and oversees the development of nationally consistent public health guidelines to guide the public health response to outbreaks of communicable diseases. The CDNA reports to the Australian Health Ministers' Advisory Council through the Australian Health Protection Principal Committee.

3.5.2 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 infect people. Notifications of these diseases and disease groups are made to the state or territory health authority, under the provisions of the public health legislation in each jurisdiction. De-identified unit records of notifications are then supplied to the Australian Government Department of Health for collation, analysis and publication. Publication channels include the NNDSS website[101] (updated daily) and the quarterly journal *Communicable Diseases Intelligence*.[102] *Communicable Diseases Intelligence is*

Table 3.7 Notifications of selected zoonotic diseases in humans

	Number of notifications		
Zoonotic disease	**2015**	**2016**	**5-year mean (2012–2016)**
Anthrax	0	0	0
Barmah Forest virus infection	628	269	1521.4
Brucellosis	19	13	18.8
Kunjin virus infection	1	0	0.8
Leptospirosis	72	117	95.2
Murray Valley encephalitis virus infection	2	0	0.6
Ornithosis	16	10	38.0
Q fever	605	411	469.2
Ross River virus infection	9553	2613	5296.0

100 www.health.gov.au/internet/main/publishing.nsf/content/cda-cdna-cdna.htm

101 www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-nndss-nndssintro.htm

102 www.health.gov.au/internet/main/publishing.nsf/Content/cda-pubs-cdi-cdiintro.htm

an online, peer-reviewed journal that disseminates information on the epidemiology of communicable diseases in Australia, including surveillance, prevention and control.

Data on five important zoonoses are also presented in *Animal Health Surveillance Quarterly*.[103]

Table 3.7 shows the number of notifications of selected zoonotic diseases in 2016 (as of 15 November 2016) and compares these data with those for 2015 and the five-year mean.

3.5.3 National Enteric Pathogens Surveillance Scheme

The National Enteric Pathogens Surveillance Scheme collates, analyses and disseminates (on request) 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.

Scientists, diagnostic and reference laboratories, clinicians and public health professionals generate and contribute data acquired from both human and non-human sources regarding pathogens such as *Salmonella* spp., pathogenic *Escherichia coli*, *Yersinia* spp. and *Campylobacter* spp.

Data for human notifiable enteric pathogens are also reported within the NNDSS. NNDSS data show that, as in recent years, the most frequently notified foodborne infections in 2016 (as of 15 November 2016) were campylobacteriosis[104] (18 518 notifications) and salmonellosis (15 522 notifications).

3.6 Applied research and other surveillance

3.6.1 Middle East respiratory syndrome coronavirus

Middle East respiratory syndrome coronavirus (MERS-CoV) is a novel coronavirus with a case fatality rate of approximately 36% in humans.

The majority of human cases of MERS have been attributed to human-to-human infections; however, camels have been implicated as a likely reservoir of the virus. A proactive surveillance study conducted in 2015 found no serological evidence for the presence of MERS-CoV in Australian camels.[105]

3.6.2 Porcine epidemic diarrhoea virus

Porcine epidemic diarrhoea (PED) is a viral disease of pigs. It is characterised by acute, rapidly spreading diarrhoea and is most severe in neonatal pigs, where morbidity and mortality can reach 100%. PED has not been reported in Australia. A national survey was conducted in 2016 as part of an assay validation study using proportional sampling of herds across the Australian pig industry. The study sampled a total of 484 animals from 28 farms and found no evidence for the presence of PED in Australian pigs.

103 www.animalhealthaustralia.com.au/our-publications/animal-health-surveillance-quarterly

104 In New South Wales, campylobacteriosis is only notifiable as a foodborne disease or gastroenteritis if it occurs in an institution.

105 Crameri G, Durr PA, Barr J, Yu M, Graham K, Williams OJ, Kayali G, Smith D, Peiris M, Mackenzie JS, Wang LF. Absence of MERS-CoV antibodies in feral camels in Australia: implications for the pathogen's origin and spread. *One Health* 2015; 1: 76–82.

Image credit: Taryn Mokotupu

4

MANAGING TERRESTRIAL ANIMAL HEALTH EMERGENCIES

This chapter describes the arrangements and initiatives that are in place to prepare for, and respond to, terrestrial emergency animal diseases (EADs). It also provides information on terrestrial animal disease incidents that occurred during 2016. Information on management of aquatic animal health emergencies and aquatic animal disease incidents during 2016 is provided in Chapter 5.

4.1 Response plans and coordination

Australia's response planning and coordination are enhanced by collaborative arrangements between governments and industry, and other key stakeholders. These arrangements include:

- the *Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease Responses* (Emergency Animal Disease Response Agreement [EADRA])[106]
- the Australian Veterinary Emergency Plan (AUSVETPLAN).[107]

Coordination of the response to EAD incidents is further enhanced by the use of established consultative committees and management groups.

4.1.1 Emergency Animal Disease Response Agreement

The EADRA is a legally binding agreement between the Australian Government, state and territory governments, livestock industries (currently 13 industries) and Animal Health Australia (AHA). The agreement minimises uncertainty over the management and funding arrangements for responses to EAD incidents, allows for all affected parties to have a say in the decision-making process and facilitates rapid and effective responses.

A world first, the EADRA establishes basic operating principles and guidelines, and defines roles and responsibilities of the parties that are involved. 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 perform the functions specified in AUSVETPLAN
- participating in decision making relating to EAD responses, through representation on the Consultative Committee on Emergency Animal Diseases (CCEAD) and the National Management Group (NMG)
- sharing the eligible response costs of EAD incursions using pre-agreed formulas.

The EADRA is regularly reviewed so that it remains relevant, flexible and functional. In 2016, only minor and administrative updates were made. The latest version of the EADRA is on the AHA website.[108]

4.1.2 Australian Veterinary Emergency Plan

The AUSVETPLAN provides the contingency planning framework for Australia's response to EADs. It contains the nationally agreed roles, responsibilities, coordination arrangements, policies and procedures for the response to EAD incidents in Australia. AUSVETPLAN has been developed and agreed on by governments and relevant industries in non-outbreak times to ensure that a fast, efficient and effective EAD response can be implemented consistently across Australia with minimal delay.

Governments are ultimately responsible for developing and implementing national disease response policies. AHA manages AUSVETPLAN on behalf of its members and works in consultation with its government and industry members, and other key stakeholders, to prepare and review the AUSVETPLAN manuals and supporting documents.

For each disease listed in the EADRA, a disease-specific response policy or strategy has been developed. These contain the agreed policy (and supporting technical information) for the response to an incident – or suspected incident – of the disease in Australia. The disease strategies and response policy briefs are supported by operational manuals, enterprise manuals, and other resource and guidance documents. The AUSVETPLAN *Summary document*[109] describes the components of AUSVETPLAN and outlines their functional relationships.

106 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement

107 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ausvetplan

108 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement

109 www.animalhealthaustralia.com.au/our-publications/ausvetplan-manuals-and-documents (note that the Summary document is in the process of being reviewed and renamed as Overview of AUSVETPLAN)

This year, AUSVETPLAN celebrated its 25th anniversary. Since its inception in 1991, AUSVETPLAN has grown from 15 manuals to a suite of 90 manuals, policy briefs and supporting guidance and resource documents, and has become renowned as the international benchmark for EAD preparedness and response. Not only does it support Australia's responses to EADs, it has been adapted by a number of other countries to form the basis of their emergency planning.

AUSVETPLAN was further celebrated in 2016 when the AUSVETPLAN Technical Review Group, convened by AHA to provide technical and scientific support to the development of AUSVETPLAN manuals and documents, received a prestigious 2016 Australian Biosecurity Award.[110] The award recognises the outstanding contribution that the Technical Review Group has made to protecting the health of Australia's animals by ensuring that the latest disease knowledge is converted into good policy.

Updating prioritised AUSVETPLAN manuals

In 2016, AHA worked with the AUSVETPLAN Technical Review Group, industry and government experts, Animal Health Committee (AHC) and scientific editors to revise and publish updated prioritised AUSVETPLAN manuals.

The updated manuals published were:

- Aujeszky's disease and African swine fever (disease strategies): updates of these disease strategies to reflect revised terminology for swill, swill feeding and disinsectisation
- equine influenza, Rift Valley fever, swine vesicular disease and transmissible gastroenteritis (disease strategies): updates of these disease strategies to the new edition 4 standardised format and generic text
- Hendra virus (HeV) (response policy brief): a major revision to update the policy to reflect new scientific understanding of the disease and its epidemiology.

Revisions continued to the AUSVETPLAN manuals for African horse sickness, Australian bat lyssavirus, avian influenza, Japanese encephalitis, Newcastle disease, porcine reproductive and respiratory syndrome, scrapie, screw-worm fly, vesicular stomatitis, and also for valuation and compensation procedures. Review of the response policy brief for swine influenza was also initiated. These revisions are undergoing formal development and approvals processes.

Two new documents published were:

- a guidance document on the risk-based assessment of disease control options for rare and valuable animals: providing the principles for defining rare and valuable animals, and assessing the risks of disease exposure and transmission for diseases that are listed in the EADRA
- a guidance document on tracing and surveillance: to serve as a resource for staff being trained to perform these functions at the state, territory or local level in an EAD response.

The development of a new response policy brief for porcine epidemic diarrhoea commenced, with the draft brief now undergoing a formal approvals process.

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 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 currently published on the AHA website[111] address topics relevant to animal disease emergencies, such as personal decontamination, collecting samples, managing stock during a national livestock standstill, and transporting carcasses, as well as generic topics such as briefing, debriefing and handovers in a biosecurity response.

110 www.agriculture.gov.au/biosecurity/australia/public-awareness/aba/aba-booklet

111 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/nationally-agreed-standard-operating-procedures

4.1.4 What happens in an emergency animal disease response?

Australia's governments, livestock and affiliated industries, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), AHA, private veterinarians and laboratories, and other animal health workers all work together to ensure successful outcomes to EAD responses.

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 emergency management and whole-of-government arrangements allow agriculture or primary industries departments to draw on resources and expertise from these agencies.

The CCEAD provides technical review of the EADRP and has responsibility for the national technical coordination of the response. The Australian CVO or delegate chairs the committee, which comprises the state and territory CVOs, the Director of the CSIRO Australian Animal Health Laboratory (AAHL), and members of the Australian Government Department of Agriculture and Water Resources. Representatives of AHA attend CCEAD meetings as observers. When cost-sharing of the response under the EADRA is sought, technical representatives from relevant industries participate in the CCEAD. Industry representatives comprise one nominee agreed to by all industry parties and one nominee from each of the affected industries.

CVOs implement disease control measures as agreed in the EADRP and in accordance with relevant legislation. They make ongoing decisions on follow-up disease control measures in consultation with the CCEAD and, where applicable, the NMG, based on epidemiological information about the outbreak.

When cost-sharing of the response under the EADRA is sought, the CCEAD provides advice to an NMG that is established for each incident. The Secretary of the Department of Agriculture and Water Resources chairs the NMG; 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 the NMG receives technical advice from the CCEAD, it 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.

The specific responsibilities of the CCEAD and the NMG in a cost-shared EAD response are documented more fully in the EADRA.[112]

4.1.5 Improved national arrangements for emergency preparedness and response

Under Schedule 7 of the Intergovernmental Agreement on Biosecurity, the Australian, state and territory governments continue to work together to improve emergency preparedness and response arrangements to allow:

- nationally consistent response arrangements
- consistent and agreed funding arrangements
- timely decisions and actions
- trained people to move between jurisdictions
- a coordinated national approach to capability and infrastructure for biosecurity emergency responses
- development and maintenance of scientific and technical capacity to support response activities
- improved communication capability between jurisdictions during an emergency.

112 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ead-response-agreement

4.2 Preparedness initiatives

4.2.1 AHA's Emergency Preparedness and Response Services business stream

AHA's Emergency Preparedness and Response Services business stream oversees the EADRA, AUSVETPLAN, EAD training and animal health surveillance programs[113] to strengthen Australia's EAD response arrangements and preparedness and response capabilities. The success of these programs is underpinned by effective collaboration between AHA and its government, industry and affiliated members.

The Emergency Preparedness and Response Services business stream also oversees a number of other preparedness initiatives on behalf of its members, such as the management of Australia's vaccine banks for foot-and-mouth disease (FMD) and anthrax.

These vaccine banks allow rapid production and delivery of FMD or anthrax vaccine, should it be required in an outbreak situation. AHA also has contracts in place for cold storage and distribution of the vaccines. The current manufacture, storage and supply agreements for the FMD vaccine bank is in place until December 2019, and for the anthrax vaccine bank until June 2018.

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 on to help eradicate or control the disease. AUSVETPLAN describes how the response to an EAD incident is to be conducted and the functions that require specific training.

The national EAD training program provides education and training in the various EAD response functions. Face-to-face EAD awareness training provides government officers, private veterinary practitioners and livestock industry members with an understanding of Australia's agreed response strategies. Formal accredited training, covering the skills and knowledge needed to perform a function during an EAD response, is available for government officers through jurisdictional training programs, and for livestock industry members through AHA.

Governance

Oversight of AHA's EAD training program is provided by the National Animal Health Training Steering Committee (NAHTSC), comprising representatives from relevant government and livestock industry organisations. It facilitates national consistency in delivery of EAD preparedness and response training, and assists in prioritising AHA's training work program.

The elements of national EAD training are delivered by different organisations, as described in the following subsections.

Team training

Each state and territory is responsible for maintaining a team of personnel capable of responding to biosecurity emergencies. This 'first response' team manages the initial response to an EAD, including staffing control centres and beginning field activities. First-response team members receive training in their response functions from jurisdictional training programs.

Professional development for trainers

AHA sponsors the delivery of professional development programs for jurisdictional and industry biosecurity response trainers. A short workshop on training and assessment is held each year at the NAHTSC's annual meeting. In addition, AHA sponsors an annual workshop to promote continued professional development for trainers. This helps to ensure that biosecurity response trainers are qualified to deliver accredited training under the Australian Qualifications Framework.

In 2016, training personnel participated in a workshop on changes to the Australian national training system and the consequences for delivery of biosecurity emergency response training and assessment. The workshop also provided the opportunity for trainers to upgrade their skills and maintain their currency as trainers.

113 More information on animal health surveillance programs is provided in Chapter 3.

Training materials

AHA facilitates the development of training resources that can be shared nationally, and are delivered by qualified and experienced trainers to government and industry response staff. Training resources include online modules, induction training modules and face-to-face workshops. AHA's online Emergency Animal Disease Foundation course[114] is a generic introduction to emergency response arrangements in Australia. It provides information on the basic principles of an EAD response, AUSVETPLAN, the responsibilities of people involved in a response, and the importance of communications and information management during a response. This course was completely redesigned and updated in 2016.

In 2016, AHA collaborated with Primary Industries and Regions South Australia and the Department of Agriculture and Water Resources to develop and conduct training for biosecurity emergency response incident controllers.

CCEAD and NMG training

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

Rapid Response Team

The national Rapid Response Team (RRT) is funded by governments and managed through AHA. It was originally developed to help smaller jurisdictions establish emergency control centres for disease outbreaks. The RRT is a group of 50 government response personnel with expertise in key control centre management positions. During their three-to-five-year membership on the team, members take part in professional development activities to maintain and develop their response skills.

This year, the RRT participated in Exercise Apollo, a functional exercise conducted by the Department of Agriculture and Food, Western Australia (DAFWA) (see Section 4.2.6).

In 2016, the National Biosecurity Committee agreed that the RRT will become a cross-sectoral cohort from 2017–18 and address professional development for participation in animal, aquatic animal and plant biosecurity responses. Arrangements for this transition are under discussion.

Private veterinary practitioner engagement

The states and territories hold regular EAD awareness workshops for private veterinary practitioners, to assist them with recognising EADs and to remind them of their reporting obligations. The Department of Agriculture and Water Resources has supported some of these workshops and AAHL contributes to their delivery.

Livestock industry training

In 2016, AHA conducted two workshops for livestock industry personnel who may be required to work in the liaison function in an EAD response affecting their industry sector.

4.2.3 Foot-and-mouth disease training

The Department of Agriculture and Water Resources continued its agreement with the European Commission for the Control of Foot-and-Mouth Disease (EuFMD) to provide real-time FMD training for Australian and New Zealand veterinarians and livestock workers, to equip them with the skills necessary to identify and manage an outbreak of FMD. Five courses were held in Nepal (where FMD is present) during 2016, and costs were shared between the Australian Government, certain state governments and industry organisations, and the New Zealand Ministry for Primary Industries. Since the courses commenced in 2012, 198 Australian veterinarians and livestock workers have participated in the program. Participants have reported more than 350 post-course activities to increase FMD awareness among veterinarians and students, producers and livestock industry organisations.

Under the same agreement, the Department of Agriculture and Water Resources commissioned EuFMD to develop and pilot an online FMD emergency preparation course targeting Australian veterinarians who have not participated in real-time training. The pilot involved 118 Australian

114 www.animalhealthaustralia.com.au/wp-content/uploads/2015/09/Enrolling-in-the-EAD-Foundation-online-course-flyer.pdf

Image credit: Taryn Mokotupu

veterinarians. The course was delivered through a portal developed in partnership with the Royal Veterinary College of the University of London.

4.2.4 International modelling studies to support planning for emergency animal diseases

During 2016, there were improvements to the new modelling platform, the Australian Animal Disease model (AADIS), to support EAD planning and preparedness in Australia. AADIS came into operation in 2015 and is a result of collaboration between the Department of Agriculture and Water Resources and the University of New England. It offers full national-scale modelling capability, and addresses the needs of disease managers to capture complex disease epidemiology, regional variability in transmission (e.g. due to different livestock movement patterns, production systems and climates) and different jurisdictional approaches to control. AADIS is being used in two projects funded by the Centre of Excellence for Biosecurity Risk Analysis: 1. 'Incorporating economic components in Australia's FMD modelling capability and evaluating post-outbreak management to support return to trade', and 2. 'Decision support tools for vector (insect) spread animal diseases'. The first is a collaborative project between the Department of Agriculture and Water Resources and the Australian National University; this project will provide sound economic evidence to support policies on the management of animals that may be vaccinated in an FMD response. The second project is a collaboration between the Department of Agriculture and Water Resources, the Australian National University, the University of Melbourne and the United States Department of Agriculture. This project will expand the department's modelling capability to include vector-borne diseases, allowing future studies to test control strategies for these diseases.

To strengthen EAD preparedness, Australia collaborates with other countries on epidemiology and disease modelling. Throughout 2016, Australia continued to contribute actively to multi-country FMD modelling studies coordinated through the EpiTeam, a subgroup of the Emergency Management Working Group of the Quadrilateral countries (Australia, Canada, New Zealand and the United States). These countries, along with the United Kingdom and the Netherlands, are involved in a study to explore reliable indices that could be used early in an outbreak to discriminate between 'small' and 'large' outbreaks so that timely decisions, such as on the deployment of additional control measures, e.g. vaccination, can be made. This year, the group also collated information about the baseline data that each country uses to support their modelling activities, to enable identification of similarities and opportunities. By involving several countries and modelling platforms, the robustness of various criteria and frameworks can be assessed in different settings.

At a national level, modelling studies are being used to support animal health policy development.

In 2016, the Department of Agriculture and Water Resources provided modelling support to jurisdictions to test FMD response and vaccination strategies. These studies include evaluating approaches to improve early detection of an FMD incursion, investigating various vaccination policies, and understanding optimal resource allocation.

4.2.5 Exercise Odysseus – Australia's national livestock standstill exercise

If an outbreak of FMD is strongly suspected or confirmed in Australia, a national livestock standstill will be implemented for at least 72 hours. The standstill will apply to all FMD-susceptible animals to reduce spread of the disease, and to allow response agencies to determine the nature and extent of the outbreak. To be effective, the standstill needs to be implemented rapidly.

Exercise Odysseus – a series of 48 discussion exercises and field-based activities – was held throughout 2014 and early 2015, to strengthen government and industry arrangements for implementation of a national livestock standstill.

Exercise Odysseus was a collaborative effort between national, state and territory government agencies, industry organisations and AHA and provided an opportunity to thoroughly assess existing response arrangements, decision making, communication and coordination for a national livestock standstill. More than 1600 people from government agencies, industry organisations and non-government organisations participated in Exercise Odysseus, with many of them taking part in more than one activity. Throughout Australia, approximately 200 staff worked a total of 3000 days to design, plan, conduct and evaluate the program.

The overall assessment of Exercise Odysseus is that it was successful in achieving its aim and objectives. It increased:

- awareness among potentially affected agencies, organisations and communities of the importance, role and potential effects of a national livestock standstill and an outbreak of FMD
- the level of preparedness by government and industry to implement and manage a national livestock standstill.

As a result of Exercise Odysseus, Australia is now better prepared to implement a national livestock standstill in the event of an outbreak of FMD.

Even so, Exercise Odysseus identified opportunities to further improve preparedness and as a result, government agencies and industry organisations are implementing actions to address the issues identified during their respective exercises.

The Exercise Odysseus final report is available on the Department of Agriculture and Water Resources' website.[115]

4.2.6 Exercise Apollo

Exercise Apollo was a national emergency response exercise held in Bunbury, Western Australia, in May 2016.

The exercise was based on a simulated livestock disease outbreak, and built on the work undertaken as part of Exercise Odysseus.

Exercise Apollo focused on disposal strategies, policies and procedures in an FMD scenario-based exercise. As part of the exercise, the establishment of a State Control Centre and a Local Control Centre was simulated. The exercise involved approximately 150 people from Australian, local and state governments, and industry. This included members of Australia's RRT (see Section 4.2.2).

Exercise Apollo allowed participants to practise and enhance their capabilities for a real-time emergency response. The outcomes of the exercise will inform preparedness for large-scale disposal in an EAD response. More information is available from the DAFWA.[116]

4.2.7 International Animal Health Emergency Reserve

Australia is a signatory to the International Animal Health Emergency Reserve (IAHER), an arrangement between Australia, Canada, Ireland, New Zealand, the United Kingdom and the United States to share personnel and resources during an EAD outbreak. In 2016, signatory countries developed a draft IAHER Operations Manual which

115 www.agriculture.gov.au/biosecurity/emergency/exercises/exercise_odysseus

116 www.agric.wa.gov.au/livestock-biosecurity/exercise-apollo-national-emergency-response-exercise

sets out agreed policies, procedures and templates that will enable personnel to be rapidly deployed.

A simulation exercise, Exercise Athena,[117] was conducted in November 2016 to promote awareness of and support for the IAHER arrangement and assess the utility of the IAHER Operations Manual. Exercise Athena was one of the first comprehensive international exercises for animal health emergencies, with all IAHER signatory countries involved its development, management, participation and conduct. The Department of Agriculture and Water Resources was the lead agency and managed the exercise with assistance from AHA. Representatives from state governments of New South Wales, Queensland, Tasmania and Western Australia also participated in the exercise.

Exercise Athena allowed signatory countries to practice their role, either as donor or recipient, under the IAHER Arrangement and it was found that the Arrangement is capable of providing signatory countries with skilled personnel, at minimal cost, during an EAD response. It also promoted awareness of and support for the IAHER Arrangement with relevant stakeholders in each signatory country.

Exercise Athena provided an opportunity to test the policies and procedures in the IAHER Operations Manual, which were found to be generally effective. Key issues identified included the need for further work, by subject matter experts, to ensure the IAHER Operations Manual has more detailed information on occupational health and safety, insurance, finance and communications arrangements.

Signatory countries will work together throughout 2017 to update the IAHER Operations Manual with this information. IAHER signatory countries have also recognised that regular testing and review of the IAHER Arrangement and the Operations Manual is imperative, not only to maintain its validity but to continue to foster and strengthen the good relations between these countries.

4.2.8 Swill feeding compliance and awareness

The Prohibited Pig Feed (Swill) Compliance and Awareness Project commenced in 2015–16. This project was developed by a working group of industry (Australian Pork Limited), Commonwealth and state and territory government representatives, facilitated by AHA. The working group also developed the *Prohibited Pig Feed Compliance National Uniform Guidelines,* which are now used for monitoring compliance and enforcement actions relating to the prohibition on feeding swill (prohibited pig feed) to pigs. In 2015–16, there were 351 industry audits within the Australian Pork Industry Quality Assurance Program (APIQ✓®) and 264 government inspections of piggeries, with no incidents of swill feeding found in any of them. Work is progressing to reflect previously agreed definitions of prohibited pig feed in state and territory legislation.

4.3 Animal health diagnostic laboratories

Australia's animal health laboratories play a crucial role in national capability and capacity to respond to a disease emergency. State and territory government animal health laboratories, AAHL, university veterinary laboratories and private veterinary laboratories all participate in, and contribute to, national EAD response programs and initiatives. AAHL and some state and university laboratories also serve as the national and/or World Organisation for Animal Health (OIE) reference centres for specific EADs, providing in-depth investigational, research and training capacities.

In 2016, the National Laboratory Task Group, consisting of members from the Australian government, AAHL, state and territory government laboratories and AHA was set up to assist AHC in managing a range of essential national laboratory functions. AHC also continued to oversee other laboratory functions which have been discretely performed or coordinated by other bodies such as AHA, AAHL and the Victorian Government.

AHA contributes to Australia's network of animal health laboratories by managing AUSVETPLAN, the National Animal Health Laboratory Coordination Program and the Australian Animal Pathology

117 www.agriculture.gov.au/biosecurity/emergency/exercises/athena

Standards Program (AAPSP).[118] These national programs meet future requirements for disease surveillance, in-depth case investigations, emergency responses, quality assurance and training. The AUSVETPLAN *Laboratory preparedness* management manual[119] details current laboratory guidelines for an EAD response, and assists laboratories to prepare a contingency plan for a disease emergency.

4.3.1 Laboratories for Emergency Animal Disease Diagnosis and Response network

The Laboratories for Emergency Animal Disease Diagnosis and Response (LEADDR) network consists of members from the Australian Government, AAHL, and all state and territory government laboratories. The network, which reports to AHC, aims to standardise or harmonise testing performance for targeted EADs of terrestrial and aquatic animals in all member laboratories. This supports a nationally coordinated approach and maximises the availability of national resources to meet demands for large-scale testing in an EAD outbreak. The AUSVETPLAN *Laboratory preparedness* management manual details LEADDR's role in the overall EAD response procedure.

Since 2009, LEADDR has progressively added targeted diseases to its quality assurance programs. They include avian influenza, bluetongue, FMD, infection with HeV, infection with ostreid herpesvirus 1 microvariant, Newcastle disease and white spot syndrome. In 2016, as part of national FMD preparedness, LEADDR has continued to harmonise its screening capability for FMD using methods that do not require live virus, to increase laboratory biosecurity and reduce biosafety risk. Additionally, the network has embarked on establishing testing capability for classical swine fever in its member laboratories.

During an EAD outbreak, the Laboratory Subcommittee – CCEAD is formed to support the CCEAD or Aquatic CCEAD (see Chapter 5). The Laboratory Subcommittee – CCEAD consists of relevant experts from the LEADDR network and other laboratories, as required. AAHL remains the national diagnostic centre for exotic EADs and transfers AHC-agreed testing capabilities to suitable network laboratories under controlled quality assurance conditions.

In 2016, the Department of Agriculture and Water Resources continued to fund LEADDR for specific development projects. In addition to participating in various proficiency testing programs as part of its quality assurance program, LEADDR members met regularly, exchanged scientific and technical information, and discussed new technical issues as they arose.

4.3.2 Australian Animal Pathology Standards Program

The AAPSP Digital Slide Archive, comprising images of endemic and exotic diseases in a wide range of terrestrial and aquatic animal species, provides training and educational materials to AAPSP members. The archive steadily grew in 2016 and currently holds thousands of histopathological slides. Slides have been contributed mainly by AAHL, the United States Armed Forces Institute of Pathology, the Australian and New Zealand Aquatic Pathology Archive, and the National Registry of Domestic Animal Pathology (held by the Elizabeth Macarthur Agricultural Institute).

State and territory government and private veterinary laboratories participate in a quarterly histopathology proficiency testing program, which was launched in 2006. The testing covers morphological descriptions and diagnosis using digital tissue sections. The assessment forms part of the performance records of accredited laboratories that are auditable by the National Association of Testing Authorities. In 2016, AAPSP successfully maintained the standards for proficiency in histopathological testing.

4.3.3 Regional and international networking for laboratories

To strengthen Australia's preparedness for, and response to, major disease emergencies, and to ensure Australia's access to specific expertise or materials that are not immediately available in Australia, the LEADDR member laboratories maintain a strong working relationship with

118 www.animalhealthaustralia.com.au/what-we-do/laboratory-services/australian-animal-pathology-standards-program

119 www.animalhealthaustralia.com.au/our-publications/ausvetplan-manuals-and-documents

various overseas veterinary and public health laboratories. The OIE National Focal Point for Veterinary Laboratories, based in the Department of Agriculture and Water Resources, has continued to support Australia's OIE Delegate on various regional and international issues relating to animal health laboratories, including laboratory capacity building for disease emergencies (see also Chapter 9).

4.4 Increasing awareness and understanding

4.4.1 National communication arrangements for biosecurity incidents

The Biosecurity Incident National Communication Network (NCN) produces nationally consistent public information in response to exotic pest and disease outbreaks that affect Australia's livestock and plant industries. Members are communication managers from the Australian, state and territory government agencies responsible for biosecurity, AAHL, the Australian Government Department of Health, the Australian Local Government Association, AHA and Plant Health Australia (PHA). Wildlife Health Australia (WHA) and the National Farmers' Federation are observers.

The NCN supports consultative committees and the NMG during biosecurity incidents. In 2016, most responses fell largely in the plant sector. However, during 2016, the NCN was actively involved in the varroa mite and white spot disease incidents that occurred in Queensland. As anthrax is an endemic disease in Australia, the 2016 incidents were managed locally by the affected state and did not involve the NCN.

Image credit: ACMF

The NCN has a mechanism in place to share communication plans and materials that have been developed for disease prevention and preparedness. A recent example has been Queensland's adoption of Victoria's communication response plan for FMD. This has been a good example of where the NCN can reduce duplicated effort and costs, and assist in developing nationally consistent messages.

The NCN continues to engage with livestock industry groups and, in 2016, met with the Australian Chicken Meat Federation, Australian Horse Industry Council, Australian Veterinary Association and Australian Lot Feeders' Association. It also met with several plant industry bodies. This engagement is valuable for the NCN in understanding how industry groups communicate with their members, and for industry representatives to understand the role of the NCN.

In 2017, the NCN's activities will include developing a biosecurity narrative that can be used across government and industry to promote a better understanding of the role everyone has in Australia's biosecurity. This work forms part of Schedule 6 under the Intergovernmental Agreement on Biosecurity.

The NCN meets twice a year face-to-face and publishes a communiqué following each meeting that is available on the NCN's page on the Outbreak website.[120]

4.4.2 Farm Biosecurity campaign

Farm Biosecurity is a national awareness and engagement program that provides information to livestock producers and related service providers about on-farm biosecurity and prevention of animal diseases and plant pests. The program is a joint initiative of AHA and PHA. It encourages producers to identify risks to their livestock and plant products, and to minimise these risks by incorporating on-farm biosecurity measures into their everyday operations.

Farm Biosecurity uses several channels to increase awareness of the six biosecurity essentials for good on-farm biosecurity. These channels include established and new electronic media, a range of educational materials and direct stakeholder

120 www.outbreak.gov.au

engagement. The program promotes use of the Emergency Animal Disease Watch Hotline[121] and the Exotic Plant Pest Hotline[122] to report unusual signs of diseases or pests.

In 2016, five key activities took place, all of which were designed to improve awareness about on-farm biosecurity:

- production and promotion of the seventh and final Farm Biosecurity 'Essentials' video – *Production Practices,* which features information on integrating biosecurity into everyday farm practices
- an external consultant review commissioned to guide the future of the program
- development of a custom-built smartphone app that allows producers to create their own biosecurity plan
- 11 monthly e-newsletters distributed to more than 1000 subscribers
- improvements and updates made to the Farm Biosecurity website and the resources it hosts, including revised animal health declarations and dedicated webpages for new and emerging livestock industries and pig feeding.

4.4.3 Strategic foresight

The Australian Chief Veterinary Officer (CVO) is the primary representative of, and adviser to, the Australian Government on matters relating to the maintenance and improvement of Australia's animal health status and the systems that support it. The Australian CVO also addresses major issues of national interest, including the threat of antimicrobial resistance. This role is becoming more challenging as the complexity of issues and their rate of change increase. Strategic foresight is useful when managing uncertainty, both now and in the future. The Office of the CVO therefore leads a team, with input from many areas of the Department of Agriculture and Water Resources, using strategic foresight to consider emerging issues with the potential to affect animal health in Australia.

Methods of strategic foresight enable robust and resilient analysis, leading to better planning and policy advice. Emerging issues and trends are scanned, identified, analysed and interpreted from a range of perspectives. From this, a range of options is developed, and preferred responses are determined. This scanning assists the Australian CVO to identify, understand and respond to significant emerging issues before they establish or become critical.

Some of the strategic foresight activities in 2016 were:

- environmental scanning in areas such as biotechnology, emerging diseases, science and society, climate change and food safety
- consideration of key emerging issues using foresight techniques, to provide insights around topical issues such as the growth of food e-commerce, the growing complexity of food chains, the rapid growth in protein demand and production in Asia, and changing global patterns of disease spread
- the Quads Foresight and Strategic Intelligence Network's project investigating *Changes to the importance and coverage of international standards*; the project's report was shared with key partners including the OIE and the Food and Agriculture Organization of the United Nations.
- participation in the Australasian Joint Agencies Scanning Network (AJASN), which consists of representatives from 16 government and academic agencies from Australia and New Zealand. The AJASN is a facilitated horizon-scanning service which is shared by agencies. Horizon scanning is the systematic gathering of insights to identify, monitor and assess the signals – weak or strong – that precede emerging issues (whether threats or opportunities) for organisations. The AJASN prepares regular horizon-scanning reports and newsletters.[123]

4.5 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.

121 Emergency Animal Disease Watch Hotline: 1800 675 888

122 Exotic Plant Pest Hotline: 1800 084 881

123 www.ajasn.com.au

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

AHA works with its members to ensure that the biosecurity plans are science-based, relevant, cost-effective and contemporary. Designed as an industry resource, the plans can be used by producers to gauge their own biosecurity requirements and implement biosecurity practices suitable for their particular circumstances. The practices listed in the plans have been incorporated as standards into an array of industry quality assurance and verification programs – these include the Australian Pork Industry Quality Assurance Program, EggCorp Assured and the National Feedlot Assurance Scheme (see Chapter 1). For these programs, a third party audits each of the participating producers annually against the standards.

All farm-level biosecurity plans can be found on the AHA[124] and Farm Biosecurity websites.[125]

4.6 Preparedness for specific diseases

4.6.1 Foot-and-mouth disease

FMD is the most important biosecurity threat to Australia's livestock industries. An outbreak in Australia could have devastating consequences for our community in lost production, trade and tourism. It could also have significant social consequences resulting from movement restrictions and response activities during an outbreak.

AHC considers that preparedness for an outbreak of FMD is a high priority, and this view is shared by peak industry bodies. In 2016, AHC members collaborated on several areas of work, including:

- entering into an arrangement with the governments of Canada, New Zealand, Mexico and the United States to consider sharing FMD vaccine in an emergency (see Section 4.2.1)
- improving the likelihood of early detection, including co-investment in a training program for Australian veterinarians and livestock handlers in the real-time detection and control of FMD, run in Nepal by the EuFMD (see Section 4.2.3)
- undertaking targeted research and development activities to inform policy, including epidemiological modelling, decision making, training module development, diagnostic technologies and studies on vaccine matching (see Section 4.2.4 and Section 10.2)
- implementing the findings of the national livestock standstill exercise, Exercise Odysseus (see Section 4.2.5)
- addressing the challenges of carcass disposal including through Exercise Apollo (see Section 4.2.6) and conclusion of a South Australian mass carcass disposal project
- raising awareness of the risks of illegal swill feeding, and developing a nationally consistent approach to legislation and compliance (see Section 4.2.8).

States and territories also worked to improve their FMD preparedness. For example, Queensland completed a three-year Biosecurity Preparedness Program (FMD), which focused on surveillance, prevention and response systems. The program developed surveillance plans, and an emergency FMD vaccination strategy, addressed some of the challenges of mass animal destruction and disposal, and increased whole-of-government, industry and community stakeholder awareness of the illegal practice of swill feeding. The program also increased awareness of the need for early FMD recognition and notification to minimise adverse socio-economic effects of an incident. Outputs from the program have been shared with other jurisdictions to improve national preparedness. South Australia also completed a three-year mass carcass disposal project funded by the Department of Agriculture and Water Resources, which has developed methods to assess different mass carcass disposal options that can be used nationally.

In July 2016, Meat & Livestock Australia obtained a $5 869 968 grant under the Rural Research and Development for Profit Program to support a project entitled 'Improved surveillance, preparedness and return to trade for EAD incursions using FMD as

124 www.animalhealthaustralia.com.au/what-we-do/biosecurity-services/biosecurity-planning-and-implementation

125 www.farmbiosecurity.com.au/toolkit/plans-manuals

a model.' This funding matches the $5 869 968 cash and in-kind contributions provided by other parties. The project will strengthen preparedness and facilitate a return to trade for Australia in the event of an EAD incursion, using FMD as a model. The project will take a strong multi-disciplinary approach, working closely with animal industries to deliver a systems-based approach to optimise EAD management systems in Australia. The diagnosis and vaccination sub-project will constitute Phase 3 of a previous FMD risk preparedness program that commenced in 2010. Initial funding was contributed on behalf of the susceptible industries (cattle, sheep, goats and pigs) by AHA, and Charles Sturt University. Research will be provided by CSIRO, Charles Sturt University, the Australian Bureau of Agricultural and Resource Economics and Sciences, the Bureau of Meteorology and Department of Agriculture and Water Resources. This is in line with the Rural Research and Development for Profit Program call for collaboration between industry, researchers and the Rural Development Corporations.

The Department of Agriculture and Water Resources and the New Zealand Ministry for Primary Industries continued their collaboration on FMD preparedness activities in 2016 under the Trans-Tasman FMD Action Plan. In addition to an increased level of information and intelligence sharing, this plan has led to:

- training of a further 10 New Zealand veterinarians under the Australian FMD real-time training program
- participation of two Australian state government officials in a New Zealand exercise in October 2016 on the management of carcass disposal in an FMD outbreak
- collaboration on an epidemiological modelling project on FMD, funded by the Centre of Excellence for Biosecurity Risk Analysis (see Section 4.2.4).

4.6.2 Avian influenza

Australia has not experienced an outbreak of highly pathogenic avian influenza (HPAI) since October 2013. On 21 February 2014, after resolution of the outbreak, Australia declared resumption of its status as a country free from HPAI, in accordance with the OIE *Terrestrial animal health code*.

Throughout 2016, reports continued of outbreaks of various strains of HPAI in wild birds, poultry and humans in Asia, Africa, Europe and North America. In the first half of 2016, France dealt with an outbreak involving multiple strains of H5 avian influenza (N1, N2 and N9 strains). In the latter part of 2016, there was widespread circulation of H5N8 in Europe and at the end of 2016, 18 countries in Europe had reported infection in poultry, captive or wild birds. In China, the LPAI H7N9 strain continued to cause human deaths in 2016. These outbreaks highlight the need for Australia to be prepared for HPAI.

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 prevent, detect and respond to disease in animals.

Although HPAI H5N1 and related viruses have never been detected in wild birds or poultry in Australia, preparedness is a high priority. Australian governments and AHA work with the Australian poultry industries to strengthen preparedness and response capacities for avian influenza on a continuous basis, and to maintain awareness of biosecurity among poultry owners. In August 2016, as part of the research project titled 'Avian influenza risk mitigation for the free-range sector of the Australian poultry industry' (funded by the Poultry Cooperative Research Centre), a national forum was held to present the results of their research. They confirmed that there is a higher risk of avian influenza infection in free-range poultry than in housed poultry. The outputs from this project are being used to update industry biosecurity manuals[126] previously developed under the EADRA.

The Department of Agriculture and Water Resources also focuses on border security activities to detect illegally imported poultry and poultry products.

Through WHA, the Department of Agriculture and Water Resources coordinates a national surveillance program for avian influenza in wild birds (see Section 3.3.4). The program provides information on the prevalence and subtypes of avian influenza viruses in wild birds, and acts as an early warning system for the poultry industry. Samples

126 www.farmbiosecurity.com.au/toolkit/plans-manuals

were taken from 4884 wild birds during 2016, and a variety of LPAI virus subtypes (including H5 and H7) were found.

In 2016, surveillance of poultry flocks for avian influenza continued. Avian influenza was not detected in commercial poultry flocks in Australia during 2016.

4.7 Emergency animal disease responses in 2016

This section details incidents and responses involving disease in bees and livestock. Significant disease events that primarily involved wildlife are discussed in Section 3.2.5.

4.7.1 Anthrax in cattle and sheep in New South Wales

Anthrax is well known to occur at irregular intervals in grazing livestock in the pastoral areas of New South Wales, northern Victoria and Gippsland (Victoria), where anthrax spores are able to persist in soils.

There were five incidents of anthrax in New South Wales in 2016. Two incidents that involved sheep occurred in March, with the death of 18 sheep and one lamb, respectively. Three incidents involving cattle occurred in February (10 deaths), March (one death) and April (11 deaths). The incidents were on separate properties (see Section 2.4.2).

In each case, control measures were implemented based on agreed national response policy, including quarantine and tracing, burning of carcasses and vaccination of livestock. The disease did not spread beyond the single affected property in each case. Human health authorities were notified, and public health precautions were implemented.

4.7.2 Hendra virus infection in New South Wales

HeV is a zoonotic pathogen that causes natural infection and disease in horses and humans. Numerous HeV incidents have occurred in Queensland and New South Wales since 1994, involving more than 90 horses (see Section 2.4.16).

Evidence of exposure to HeV has also been detected in two dogs that were in close contact with infected horses. Both dogs remained clinically normal, with no occurrence of related illness, but were euthanased to manage public health risks.

In 2016, there was a single incident of HeV infection in a horse in December near Casino, New South Wales. The New South Wales government[127] implements well established biosecurity and public health responses to HeV incidents.

4.7.3 Varroa mite in Queensland

In June 2016, an Asian honey bee (*Apis cerana*) nest was detected at the Port of Townsville. As Asian honey bees are not known to occur in Townsville, the nest was destroyed, removed, and examined. The nest was found to contain *Varroa jacobsoni* (one of several varroa mite species). Since the first detection, seven other Asian honey bee nests were found in Townsville and were destroyed and examined. Only one additional colony, found in July 2016, contained varroa mite.

Some varroa mite species are significant pests to bees and have the potential to debilitate and eventually kill untreated bee colonies. Of particular concern is *V. destructor*, which is not present in Australia. *V. destructor* is a devastating pest that attacks the honey bees A.cerana and *A. melliferawestern* (Western honey bee). If established in Australia, varroa mite could severely affect a wide range of pollination-reliant food crops and crops that support primary food production, as well as honey production.

In response, Biosecurity Queensland has implemented an eradication program. Activities include surveillance to detect and destroy feral Asian honey bee nests and swarms in the Townsville area, and examination for the presence of varroa mite. In addition, surveillance of managed and feral European honey bee nests is taking place to confirm that *V. jacobsoni* has not infested the local European honey bee population.

127 www.dpi.nsw.gov.au/animals-and-livestock/horses/health-and-disease/hendra-virus

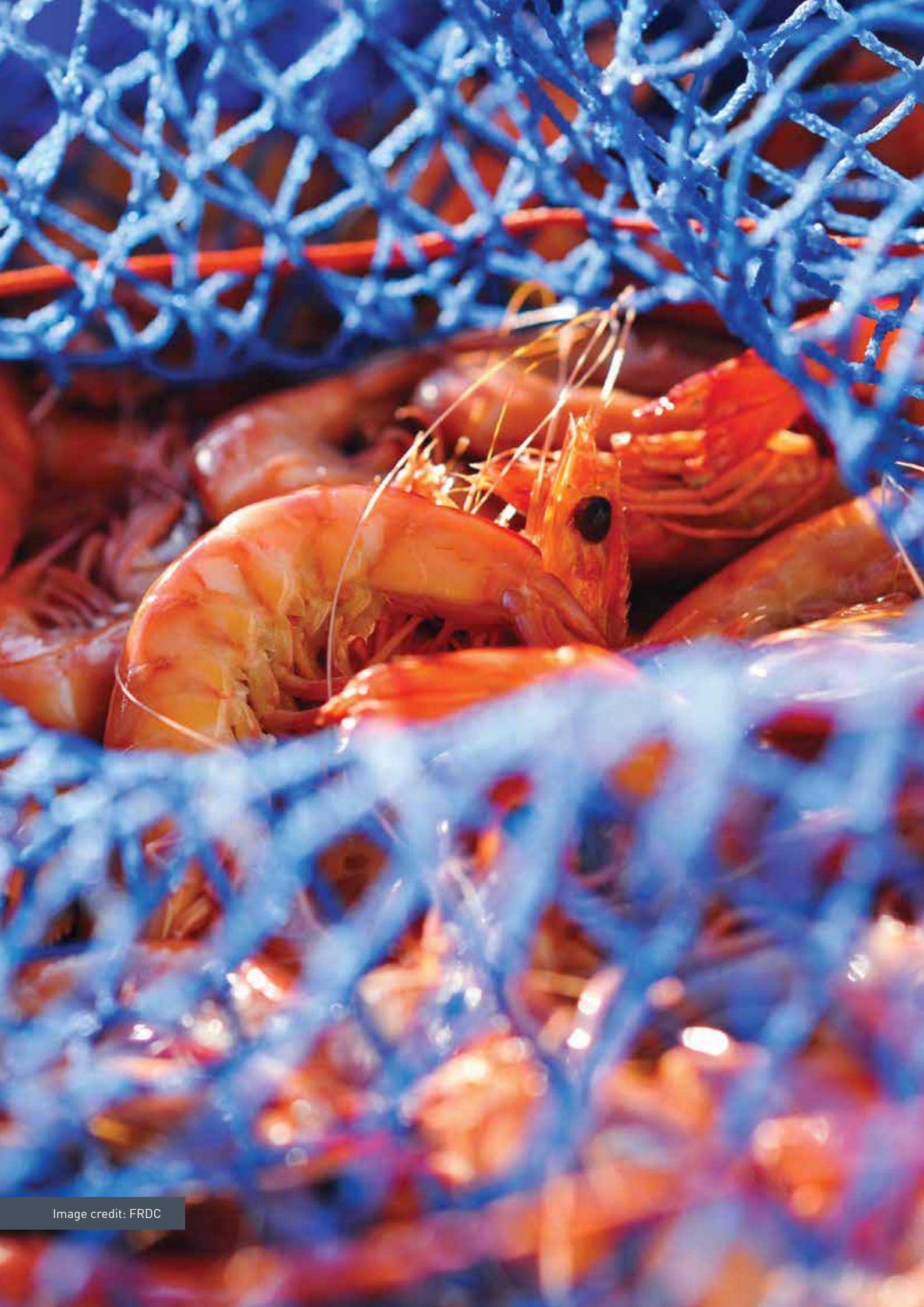


Image credit: FRDC

5

AQUATIC ANIMAL HEALTH

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

This chapter provides details on the status of aquatic animal health in Australia, including details about national aquatic animal health policy and programs, aquatic animal disease emergency preparedness, disease events in 2016, research and development, 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 significance are included on Australia's National List of Reportable Diseases of Aquatic Animals.[128]

128 www.agriculture.gov.au/animal/aquatic/reporting/reportable-diseases

In 2016, 10 fish diseases, seven mollusc diseases, 11 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 2016 is shown in Table 5.1. The distribution of OIE-listed aquatic animal diseases that are present in Australia, based on reporting by states and territories, is shown in Figure 5.1.

Other aquatic animal diseases of national significance to Australia, and their status in 2016, are listed in Table 5.2.

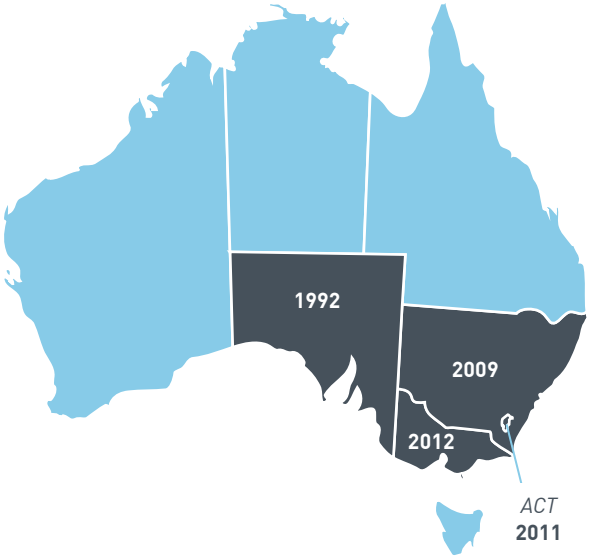
Image credit: Arthur Mostead

Table 5.1 Australia's status for OIE-listed diseases of aquatic animals, 2016	
Disease or agent	**Status**
Finfish diseases	
Epizootic haematopoietic necrosis disease	Locally present
Infection with *Aphanomyces invadans* (epizootic ulcerative syndrome)	Locally present
Infection with *Gyrodactylus salaris*	Never reported
Infection with HPR-deleted or HPR0 infectious salmon anaemia virus	Never reported
Infection with salmonid alphavirus	Never reported
Infectious haematopoietic necrosis	Never reported
Koi herpesvirus disease	Never reported
Red sea bream iridoviral disease	Never reported
Spring viraemia of carp	Never reported
Viral haemorrhagic septicaemia	Never reported
Mollusc diseases	
Infection with abalone herpesvirus	Locally present
Infection with *Bonamia exitiosa*	Locally present
Infection with *B. ostreae*	Never reported
Infection with *Marteilia refringens*	Never reported
Infection with *Perkinsus marinus*	Never reported
Infection with *P. olseni*	Locally present
Infection with *Xenohaliotis californiensis*	Never reported
Crustacean diseases	
Acute hepatopancreatic necrosis disease	Never reported
Crayfish plague (*Aphanomyces astaci*)	Never reported
Infection with yellowhead virus	Never reported
Infectious hypodermal and haematopoietic necrosis	Locally present
Infectious myonecrosis	Never reported
Necrotising hepatopancreatitis	Never reported
Taura syndrome	Never reported
White spot disease	Locally present
White tail disease	Locally present
Amphibian diseases	
Infection with *Batrachochytrium dendrobatidis*	Locally present
Infection with ranavirus	Locally present
Warble fly infestation	Free

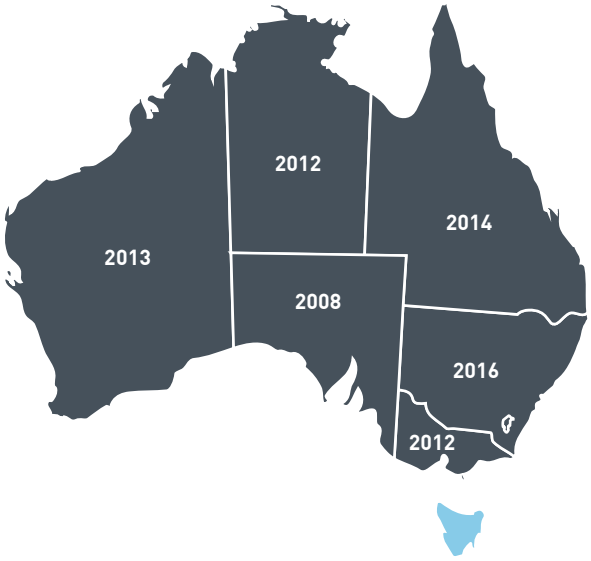
OIE = World Organisation for Animal Health.

Note: Aquatic animal diseases that were reportable to the OIE in 2016 are those listed in the 2016 OIE Aquatic animal health code.

Epizootic haematopoietic necrosis

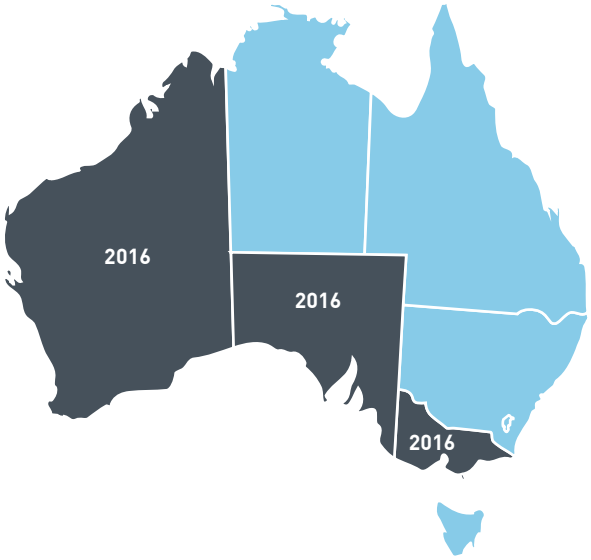


Epizootic ulcerative syndrome

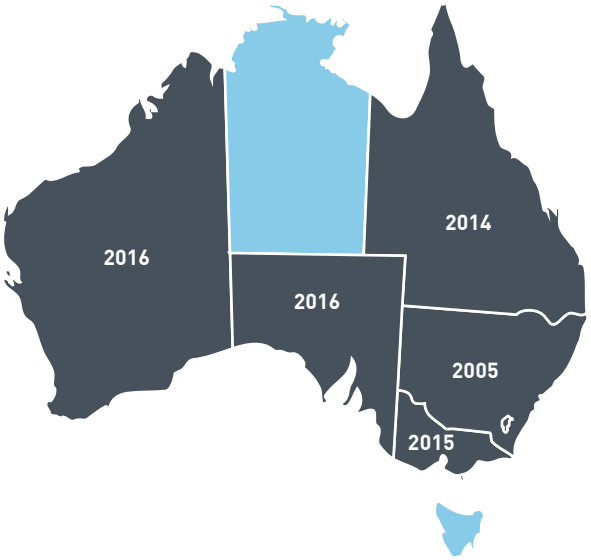


Infection with abalone herpesvirus

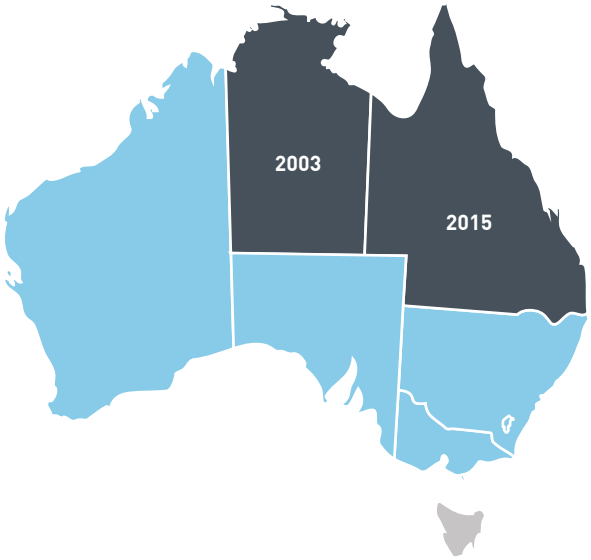
Infection with *Bonamia exitiosa*



Infection with *Perkinsus olseni*



Infectious hypodermal and haematopoietic necrosis



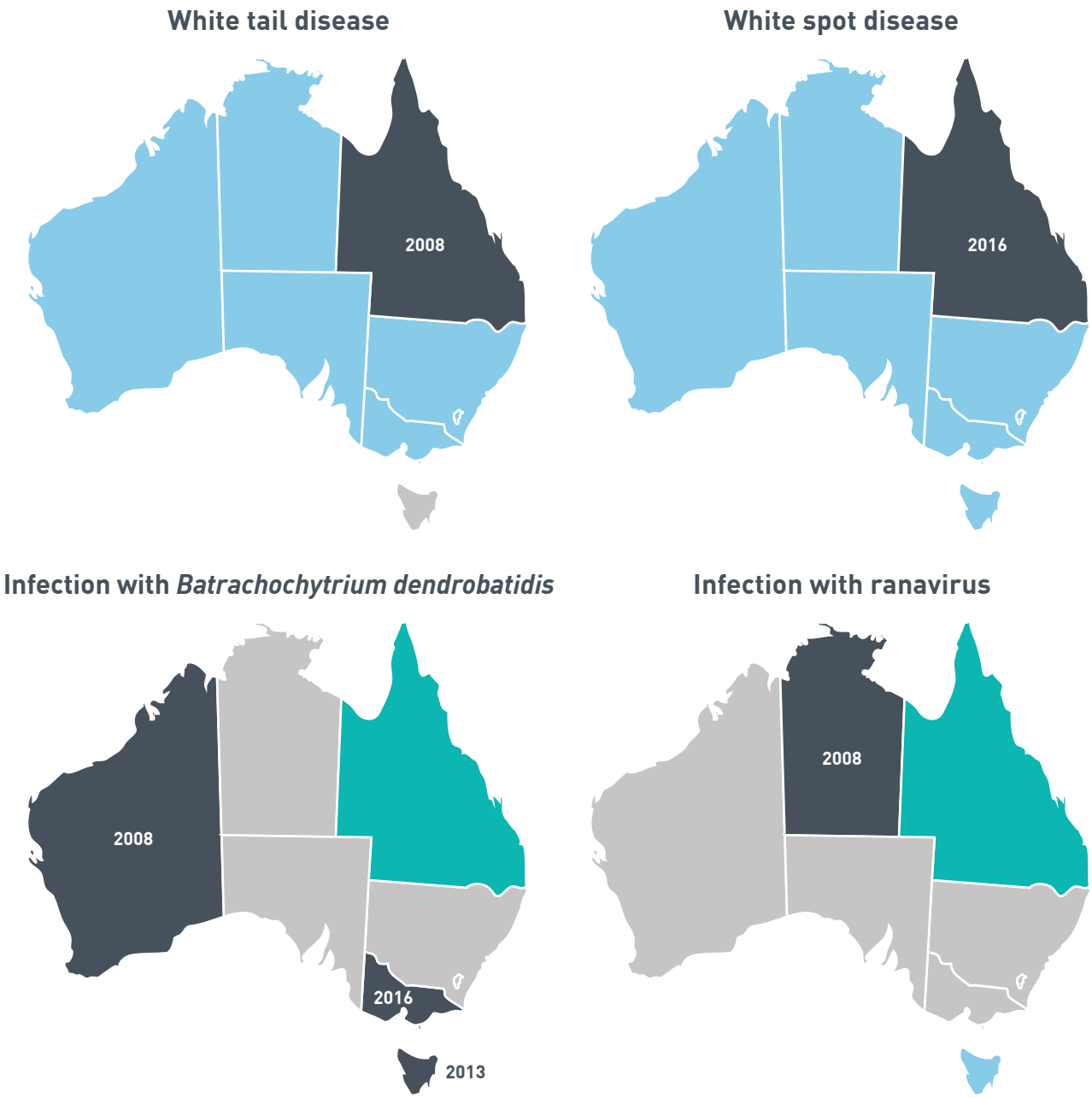


Figure 5.1 Distribution of OIE-listed aquatic animal diseases in Australia

Table 5.2 Australia's status for other significant diseases of aquatic animals, 2016	
Disease or agent	**Status**
Finfish diseases	
Aeromonas salmonicida – atypical strains	Locally present
Bacterial kidney disease (*Renibacterium salmoninarum*)	Never reported
Channel catfish virus disease	Never reported
Enteric redmouth disease (*Yersinia ruckeri* – Hagerman strain)	Never reported
Enteric septicaemia of catfish (*Edwardsiella ictaluri*)	Reported from wild native catfish in one river in 2014
Epizootic haematopoietic necrosis – European catfish virus/European sheatfish virus	Never reported
Furunculosis *(Aeromonas salmonicida subsp. salmonicida*)	Never reported
Grouper iridoviral disease	Never reported
Infectious spleen and kidney necrosis virus (ISKNV)-like viruses	Never detected in wild fish populations. Detected in imported aquarium fish
Infectious pancreatic necrosis	Never reported
Piscirickettsiosis (*Piscirickettsia salmonis*)	Never reported
Viral encephalopathy and retinopathy	Locally present
Whirling disease *(Myxobolus cerebralis)*	Never reported
Mollusc diseases	
Infection with *Bonamia* species	Locally present
Infection with *Marteilia sydneyi*	Locally present
Infection with *Marteilioides chungmuensis*	Never reported
Infection with *Mikrocytos mackini*	Never reported
Infection with ostreid herpesvirus 1 microvariant	Locally present
Iridoviruses	Never reported
Crustacean diseases	
Acute hepatopancreatic necrosis disease	Never reported
Gill-associated virus	Locally present
Monodon slow growth syndrome	Never reported

5.2 National aquatic animal health policy and programs

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

5.2.1 AQUAPLAN 2014–2019

AQUAPLAN 2014–2019[129] is Australia's third national strategic plan for aquatic animal health. It outlines the priorities to strengthen Australia's arrangements for managing aquatic animal health, and to support sustainability, productivity, market access and, ultimately, the profitability of Australia's aquatic animal industries. AQUAPLAN is a collaborative initiative that is developed and implemented by the Australian, state and territory governments, and aquatic animal industries. The Australian Government Department of Agriculture and Water Resources coordinates AQUAPLAN programs. AHC and SCAAH, in close collaboration with industry, oversee national implementation of AQUAPLAN activities and projects.

AQUAPLAN 2014–2019 has five objectives:

- improving regional and enterprise-level biosecurity
- strengthening emergency disease preparedness and response capability
- enhancing surveillance and diagnostic services
- improving availability of appropriate veterinary medicines
- improving education, training and awareness.

Each objective is supported by activities to address specific aquatic animal health management issues associated with infectious diseases of finfish, molluscs and crustaceans. The plan covers aquatic animal health issues relevant to aquaculture, commercial fisheries, recreational fisheries, the ornamental fish industry, the tourism industry and the environment.

Significant achievements in 2016 included:

- endorsement and publication of the *Aquaculture farm biosecurity plan: Generic guidelines and template*. The document is being used as the basis for development of sector-specific biosecurity plan guidelines, which will be tailored to each sector's production systems and disease hazards.
- development of a prototype mobile application for the *Aquatic animal diseases significant to Australia: Identification field guide*.
- ongoing development of industry–government response arrangements for emergency aquatic animal diseases (see Section 5.3.1).

5.2.2 Antimicrobial use and resistance issues in aquaculture

In October 2016, the Australian Government Department of Agriculture and Water Resources funded a workshop to raise awareness about antimicrobial resistance (AMR) and usage in the Australian farmed salmon industry.

The aim of the workshop was to create a common understanding, among government and industry personnel, of national and global antimicrobial issues and initiatives. Another workshop objective was to increase understanding of AMR (see also Section 1.8) and related current activities, future actions and emerging problems.

5.2.3 New biosecurity requirements for ornamental finfish – domestic approach

In 2016, the Department of Agriculture and Water Resources continued to focus on managing the biosecurity risks associated with imports of live ornamental fish. Consistent with recommendations from the import risk analysis for ornamental finfish

129 www.agriculture.gov.au/animal/aquatic/aquaplan

with respect to gourami iridovirus and related viruses,[130] new import conditions require aquatic animal health authorities of exporting countries to ensure that all fish belonging to the gourami, cichlid and poeciliid families are sourced from populations free from megalocytiviruses or, alternatively, are batch-tested and found to be free from the viruses before export. These changes to biosecurity requirements came into effect on 1 March 2016. The department worked closely with the aquatic animal health authorities of exporting countries during 2016 to ensure implementation of the new conditions with the least possible disruption to trade.

SCAAH members have developed a national policy that describes a common national approach to domestic surveillance and emergency response for megalocytiviruses that is consistent with the new biosecurity measures. This is currently under consideration by states and territories.

5.2.4 National policy guidelines for translocation of live aquatic animals

Aquatic animals are translocated for aquaculture breeding or grow-out, restocking of recreational fisheries or conservation purposes. Translocation can present risks of disease transmission, environmental impacts or issues from mixing different genetic stocks. These risks need to be managed in a way that allows translocations to occur after consideration and development of appropriate management measures. The *National policy guidelines for translocation of live aquatic organisms* (1999) are being revised to assist the development and revision of translocation policies across all states and territories. A cross-sectoral group, led by SCAAH, is considering the risks and potential impacts of translocation. The policy guidelines aim to increase national consistency in approaches to risk assessments associated with translocations, and provide clear guidelines on the assessment of proposed translocations.

5.2.5 Development of a biosecurity plan template

Activity 1.1 of *AQUAPLAN 2014–2019* involves development of sector-specific biosecurity plan templates and guidance documents. The aim is to increase access to guidance on best-practice biosecurity planning, tailored to the needs of aquaculture and fisheries sectors.

A SCAAH working group developed a generic aquaculture farm biosecurity plan template, which was endorsed by industry and governments in May 2016. The generic document will be used to develop sector-specific biosecurity plans. Projects are underway to develop biosecurity plans for Australia's land-based abalone and oyster industries.

5.3 Aquatic animal disease emergency preparedness

Australia's national system for preparing for, and responding to, aquatic emergency animal diseases (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, aquatic animal industries, universities, CSIRO, private veterinarians and laboratories.

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

- the Australian Chief Veterinary Officer (CVO)
- representatives from the Department of Agriculture and Water Resources
- the CVO (or the director of the fisheries department) in each state and territory government
- the Director of AAHL.

Technical representatives from industry may also be invited to participate.

The Aquatic CCEAD met on four occasions in early 2016, to confirm diagnosis of *Bonamia exitiosa* in native oysters, review mortalities in farmed tiger prawns in Queensland, and to coordinate the response to a disease in Pacific oysters in Tasmania. The Aquatic CCEAD met nine times in December 2016 to consider the response, surveillance and

130 www.agriculture.gov.au/biosecurity/risk-analysis/animal/ornamental-finfish

associated actions to an incursion of white spot disease detected on prawn farms in Southern Queensland. These disease events are discussed in Section 5.4.

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 brings 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.

5.3.1 Development of aquatic animal disease response arrangements

Emergency response agreements outline funding arrangements and how emergency responses to pest and disease outbreaks should be managed. Three emergency response agreements have been agreed in Australia: for animal diseases, for plant pests, and for pest and disease emergencies with predominantly environmental impacts. These are formal agreements between governments and, in the case of the animal disease and plant pest agreements, the industries that could potentially be affected by diseases or pests. Each agreement details the roles and responsibilities of participants, including who should contribute to the costs of a response, and what the contributions should be (according to agreed formulas).

The Australian Government Department of Agriculture and Water Resources is working closely with aquatic animal industries and state and territory governments to develop an Aquatic Emergency Animal Disease Response Agreement (an 'Aquatic Deed').[131] Aquatic animal industries and governments are represented through a working group, which meets quarterly to progress its work program. The four-year project (2014–2018) is being funded by the Australian Government Department of Agriculture and Water Resources and managed by Animal Health Australia (AHA).

In 2016, the working group made significant progress towards developing a draft Aquatic Deed. The working group agreed that the Deed needs to include a strong risk-mitigation focus for all parties, as aquatic animal diseases are difficult to eradicate. Other aspects of the Deed under negotiation include:

- principles to guide cost-sharing of a response that reflect the unique risks and benefits to the aquatic animal sectors
- approaches for apportioning the response costs among potentially affected parties including the Australian Government, combined state and territory governments, and combined industry parties
- approaches for how recreational fisheries might be addressed in a cost-sharing agreement.

A significant issue under consideration is the 'second tier' of cost sharing; that is, apportioning cost-share contributions among state and territory governments and between industry parties when more than one industry is affected. A draft Deed is expected to be developed by late 2017.

5.3.2 AQUAVETPLAN

The Australian Aquatic Veterinary Emergency Plan (AQUAVETPLAN) is a series of technical response plans that describe the proposed Australian approach to an aquatic EAD event. The plans provide technical information and preferred policy approaches to guide responses to a disease outbreak in Australia. AQUAVETPLAN aligns with the Australian Veterinary Emergency Plan (AUSVETPLAN), which is for terrestrial animal disease responses. Disease strategy manuals provide guidance for animal health professionals to respond appropriately to outbreaks of specific EADs in Australia. Operational manuals address important procedural issues (e.g. destruction, disposal and decontamination) and complement the disease strategy manuals.

In August 2016, a revised AQUAVETPLAN disease strategy manual for whirling disease was published online. Manuals are considered for revision every five years or in the event of significant new developments. Revisions of four disease strategies were progressed in 2016: viral encephalopathy and retinopathy, withering syndrome of abalone, crayfish plague and infectious salmon anaemia.

131 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/development-emergency-aquatic-animal-disease-response-arrangements

These disease strategy manuals are currently going through the AQUAVETPLAN manual endorsement process and will be published online in 2017. AQUAVETPLAN manuals can be downloaded from the Department of Agriculture and Water Resources website.[132]

5.3.3 Surveillance

Each state and territory in Australia is responsible for surveillance activities within its borders. Passive surveillance includes regular health monitoring, investigating unusual fish mortality events, and reporting and investigating diseases listed on Australia's National List of Reportable Diseases of Aquatic Animals. Active surveillance is conducted for specific purposes, for example, export certification for particular industries, or delimit distribution of specific diseases of importance to Australia. Approaches to surveillance follow OIE standards, or the methods necessary to meet export market requirements or internal requirements for movement of animals in aquaculture or restocking (for fishery enhancement or conservation). Quarterly surveillance results are reported through the OIE Regional Representation for Asia and the Pacific, and the Network of Aquaculture Centres in Asia–Pacific (NACA).[133]

5.4 Disease events in 2016

5.4.1 Bonamia exitiosa

The detection of *Bonamia* in farmed native oysters (*Ostrea angasi*) from Victoria was confirmed in 2015. While *Bonamia* spp. have been known to occur in Australia, further diagnostic information was required to confirm the species of *Bonamia* involved in this event. Using an alternative diagnostic approach involving in-situ hybridisation, additional polymerase chain reaction (PCR) tests and sequencing provided evidence to support the case definition for *B. exitiosa* as described in the OIE Aquatic Manual. As this was the first occurrence of the disease in Australia, an immediate notification was made to the OIE in January 2016 for the detection of 'Infection with *B. exitiosa*' in native oysters (*O. angasi*) from Victoria. Subsequent targeted surveillance detected subclinical infections of *B. exitiosa* in native flat oysters in South Australia and Western Australia.

5.4.2 Hepatopancreatitis in farmed tiger prawns

A syndrome of chronic mortalities of farmed prawns (*Penaeus monodon*) in Queensland was investigated in January 2016. This followed similar events in late 2015. Affected prawns had septic hepatopancreatitis, but some prawns showed an unusual hepatopancreatic tubule degeneration in the absence of detectable pathogens. Extensive testing excluded acute hepatopancreatic necrosis disease (AHPND) as the cause of the mortalities, and the disease did not satisfy the case definition in the draft AHPND chapter of the OIE *Manual of diagnostic tests for aquatic animals*. In February 2016, Australia made an immediate notification to the OIE of an emerging disease involving hepatopancreatitis in farmed tiger prawns (*P. monodon*) from Cardwell and Bundaberg, Queensland. Decontamination by chlorination or hydrogen peroxide followed by treatment of sediment with lime and drying was done in the affected properties. No further disease has been detected since May 2016 in subsequent crops of prawns farmed on the sites.

5.4.3 Pacific oyster mortality syndrome

Mortalities of farmed Pacific oysters (*Crassostrea gigas*) were reported in parts of Tasmania in late January 2016. PCR sequencing confirmed the detection of ostreid herpesvirus-1 microvariant (OsHV-1 µvar) associated with Pacific oyster mortality syndrome (POMS) in February 2016. To contain the disease, restrictions were placed on the movement of spat and live oysters, and equipment used in oyster production. Some areas of Tasmania remain free of POMS, while other areas are considered infected, or at risk of introduction of the disease. Tasmanian biosecurity authorities developed a surveillance strategy designed to detect the POMS virus over the summer of 2016–2017, and the disease was reported from known infected areas in December 2016. Tasmania has

132 www.agriculture.gov.au/animal/aquatic/aquavetplan

133 www.enaca.org/modules/library/publication.php?tag_id=279&label_type=1&title=quarterly-aquatic-animal-disease-report

developed a zoning system to enable movement of oysters from uninfected areas to infected or suspect areas, to minimise risk of further spread of the disease. A selective breeding program is underway to produce Pacific oysters resistant to the disease.

POMS has previously occurred in Australia. Since 2010, it has been found in three estuaries in New South Wales – the Georges River, Parramatta River and the Hawkesbury River (including Brisbane Water). As part of the strategic approach to management and containment of POMS, projects to inform response to, and management of, the disease are underway. Information on these projects is available in the *Health Highlights* newsletter on the Fisheries Research and Development Corporation (FRDC) website.[134] Passive and active surveillance in South Australia has not detected POMS (South Australia is a major producer of Pacific oysters). Movement controls on live Pacific oysters and oyster farming equipment sourced from Tasmania remain in place to minimise the risk of an incursion in South Australia. Measures to manage biofouling risks (which include Pacific oysters) associated with vessel movements are also in place in South Australia.

5.4.4 White spot disease

White spot disease was detected in farmed prawns (*P. monodon*) in southeast Queensland in late November 2016. As this was the first detection of this disease in prawns in Australia, an immediate notification was made to the OIE on 1 December 2016, following laboratory confirmation of infection with white spot syndrome virus (WSSV). Containment of all prawn farms in the area was immediately implemented, along with response and surveillance plans, with a view to eradication. Only cooked product was allowed to leave the area, under management orders which were implemented to prevent movement of any potentially infected material out of the area. Affected properties were treated according to an agreed EAD response plan. If a pond on a farm was found to be positive for the virus, the entire farm was considered to be infected and measures to treat the infection (to reduce biomass and virus load) were implemented immediately. Chlorination with 30 mg/L of chlorine has been the primary treatment method for immediate treatment of ponds. WSSV DNA was detected using real-time PCR assay in a small number of prawns collected from the Logan River on 5 December. Subsequent PCR tests on over 5000 samples of decapods (prawns and crabs) from wild populations in the Logan River have not detected WSSV DNA. Extensive surveillance of wild decapods is ongoing. Emergency response activities (including surveillance of at-risk premises, treatment of infected premises, early harvest of uninfected ponds, tracing and surveillance) continued throughout December 2016. Weekly reports were provided to the OIE during the response.

134 frdc.com.au/research/aquatic_animal_health/Pages/default.aspx

5.5 Research and development

Australia's aquatic animal health research community includes personnel in government agencies, universities and industry. It has a strong reputation for delivering high-quality research outcomes.

The Aquatic Animal Health Subprogram of the FRDC was established to provide a cohesive and national approach to aquatic animal health research and development in Australia. The sub-program's objectives are to:

- coordinate research projects (e.g. project applications, project management, communication)
- set strategic directions for aquatic animal health research and development in Australia
- facilitate the dissemination of information on, and results from, aquatic animal health research and development.

Information on the subprogram, including current projects and final reports of projects funded by the FRDC, are available on the FRDC website.[135]

135 www.frdc.com.au/research/aquatic_animal_health/Pages/default.aspx

5.6 Regional aquatic animal health initiatives

Australia collaborates with many countries, particularly its neighbours in the Asia–Pacific region, to help improve the health of their aquatic animals. 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.

5.6.1 Network of Aquaculture Centres in Asia and the Pacific

The Asia Regional Advisory Group 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 advisory group include aquatic animal disease experts, the OIE, the FAO and collaborating regional organisations. The group's 15th meeting was held in Bangkok, Thailand in November 2016. At this meeting, the group reviewed the disease situation in Asia, considered the recent changes to OIE global standards, discussed antimicrobial use and resistance in aquaculture, revised the list of diseases in the regional Quarterly Aquatic Animal Disease reporting system, and developed recommendations and action points for consideration by the NACA Secretariat and member governments. Further information is available on the NACA website.[136]

5.6.2 International standards

Australia continues to contribute strongly to the development of international aquatic animal health standards by the OIE. The Department of Agriculture and Water Resources seeks comment from a network of Australian experts on draft standards proposed by the OIE Aquatic Animal Health Standards Commission (Aquatic Animals Commission). Australia's official responses to the OIE are provided through Australia's delegate, the Australian CVO.

In May 2015, the Australian member of the OIE Aquatic Animals Commission was elected President of the commission at the OIE General Session. He participated in the two meetings of the commission held in 2016 (February and September), and in the General Session of the World Assembly of OIE delegates held in May 2016.

136 www.enaca.org/modules/library/publication.php?tag_id=362&label_type=1&title=advisory-group-on-aquatic-animal-health

Image credit: iStock

Image credit: Department of Agriculture and Water Resources

6

TRADE

This chapter outlines the import- and export-related activities of the Australian Government Department of Agriculture and Water Resources. Six divisions of the department and the Office of the Chief Veterinary Officer (CVO) support trade in animals and animal products.

The Biosecurity Animal, Biosecurity Plant and Exports divisions enable technical market access for agricultural products, including food, animal and plant by-products, live animals and plants, and reproductive material. The Trade and Market Access division supports the Department of Foreign Affairs and Trade in bilateral and regional free trade agreement negotiations with Australia's trading partners. The Biosecurity Animal, Biosecurity Plant, Compliance, and Biosecurity Policy and Implementation divisions ensure that imports into Australia are safe from the perspective of animal and plant health and food safety.

The Australian CVO provides leadership in all facets of Australia's animal health status and policy.

6.1 International standards

Australia is a member of the World Trade Organization (WTO) and a signatory to the Agreement on the Application of Sanitary and Phytosanitary Measures. This agreement aims to promote trade, while recognising the need for WTO members to protect themselves from the risks of pests and diseases and seeks to ensure that sanitary and phytosanitary measures do not unnecessarily limit trade.

The agreement requires WTO members to harmonise their measures by basing them on agreed international standards set by the following organisations:

- International Plant Protection Convention (IPPC)
- World Organisation for Animal Health (OIE)
- Codex Alimentarius Commission.

Through the WTO framework, the department works to ensure that international standards are based on scientific principles and that sanitary and phytosanitary measures are not used to impede trade.

In February 2016, the department hosted the 22nd session of the Codex Committee on Food Import and Export Inspection and Certification Systems that developed new guidelines on exchanging information between countries about food imports and exports, food safety incidences and rejected food consignments.

6.2 Opening trade opportunities – free trade agreements

Free trade agreements (FTAs) provide a range of benefits to Australian agriculture, including new market opportunities, increased price competitiveness and a more level playing field with competitors that already have FTAs. The Department of Agriculture and Water Resources worked with the Australian Government Department of Foreign Affairs and Trade to reach commercially meaningful outcomes for Australia's primary producers in the FTAs with the Republic of Korea, Japan and China.

The Australian Government supports the negotiation of comprehensive FTAs that are consistent with the WTO rules and guidelines and which complement and reinforce the multi-lateral trading system.

FTAs promote stronger trade and commercial ties between participating countries, and open up opportunities for Australian exporters and investors to expand their business into key markets. They are particularly beneficial when they seek to remove barriers in highly protected markets or gain a foothold in potential or expanding markets.

China–Australia Free Trade Agreement

China has become Australia's top market for our agricultural, food and fisheries commodities. The China–Australia Free Trade Agreement (ChAFTA) came into force 20 December 2015. It will provide Australian exporters with an early advantage over major competitors without FTAs, such as the European Union and the United States. ChAFTA will also help restore Australia's competitive position against countries with an FTA, such as New Zealand.

When the agreement is fully implemented, 95% of Australian exports will enter China duty-free. The agreement eliminates tariffs on a range of key agricultural and fisheries products, mostly within four to eight years. Tariffs of up to 25% on beef, sheepmeat, hides and skins, and tariffs on dairy products will be eliminated within four to 11 years, and tariffs on seafood will be eliminated within four years.

Australia will also receive a duty-free country-specific quota for wool.

Japan–Australia Economic Partnership Agreement

Japan has been a leading market for Australian agriculture, food and fishery products for many years. The Japan–Australia Economic Partnership Agreement (JAEPA) came into force on 15 January 2015. The agreement delivered an immediate

tariff cut, a second round of cuts on 1 April 2015 and a third round on 1 April 2016, which provide an advantage for Australia over competitors that do not have an economic partnership agreement with Japan.

Japan is Australia's third largest agricultural export market and second largest export market for beef. Through JAEPA, tariffs on beef will progressively be reduced from 38.5% for chilled beef pre-JAEPA to 23.5% for chilled beef and 19% for frozen beef. Live cattle tariffs were also reduced by 20% when the agreement came into force. Exports of beef to Japan have increased in value by 15 per cent.

JAEPA provides Australia with country-specific quotas across a range of dairy products, including duty-free quotas on natural cheese for processing and cheese for shredding. It eliminates tariffs of up to 8.5% on casein, lactose, albumen and milk protein concentrates.

The agreement also eliminated tariffs on a range of seafood exports, including abalone, prawns and rock lobster. Prawn exports have increased in value from $16 million in 2014 to $26 million in 2015.

Korea–Australia Free Trade Agreement

Korea is one of the top five destinations for Australian agriculture, food and fishery exports. The Korea–Australia Free Trade Agreement (KAFTA) came into force on 12 December 2014. Australian exporters benefited from an immediate tariff cut, a second round of cuts on 1 January 2015 and further cuts on 1 January 2016.

KAFTA has been in place for over two years and promotes Australia's competitive position by eliminating tariffs across a range of agricultural and fisheries commodities, including removing a 40% beef tariff over 15 years. This is equivalent to the terms gained in 2012 by the United States, Australia's major competitor in this market, and will help maintain Australia's market share.

Korea will also progressively eliminate its 22.5% tariff on all sheep and goat meat by 1 January 2023. Tariffs on key pork exports of 22.5–25% will be progressively eliminated between 1 January 2018 and 1 January 2028.

Agricultural Trade and Market Access Cooperation program

Cooperative activities are an integral part of maintaining strong bilateral trade relationships. Projects that address regional biosecurity risks, influence regional and international policymaking, and help Australia's agriculture sector realise export opportunities can result in real gains in access, providing additional returns to Australian farmers and food producers.

The Agricultural Trade and Market Access Cooperation program has been established under the 'Accessing premium markets' initiative of the Agricultural Competitiveness White Paper. The program objective is to open, improve and/or maintain access to overseas markets for Australian agricultural products by building stronger relationships with trading partners, neighbouring countries and international organisations.

The funding priorities for 2016–17 are for projects that help realise market access opportunities created for Australian exporters under recently ratified FTAs, and contribute to the negotiation of protocols for new and improved market access.

6.3 Exports

The Department of Agriculture and Water Resources provides export services for animal genetic material, live animals, foods derived from animals and animal by-products under the *Export Control Act 1982 (Cwlth)*.[137]

6.3.1 Managing Australian exports

Export certification and inspection services for live animals and reproductive material

The department regulates and issues export certification and documentation for a wide range of live animals (including livestock, companion animals and zoo animals) and reproductive material being exported from Australia.

The Tracking Animal Certification for Export system supports the electronic submission of applications for export of livestock and reproductive material.

137 www.agriculture.gov.au/biosecurity/legislation#export-legislation

Assessment, inspection and certification processes include:

- verifying that Australian legislation and the importing country animal health requirements have been met
- inspecting livestock to confirm fitness for travel in accordance with the *Australian standards for the export of livestock* and the importing country's animal health requirements
- issuing animal health certificates and export permits to Australian exporters of live animals and animal reproductive material
- licensing exporters of livestock
- registering and approving premises for the pre-export assembly, preparation and isolation of livestock intended for export
- auditing and approving facilities and personnel for the collection, processing and storage of animal reproductive material
- accrediting veterinarians for the preparation and inspection of livestock for export
- auditing licensed livestock exporters, operators of registered premises and accredited veterinarians.

Livestock export reform

The department continues to deliver on the Australian Government's election commitments to cut red tape and reduce regulatory burden on livestock exporters by improving the efficiency of the Exporter Supply Chain Assurance System (ESCAS). All livestock exporters will have an 'approved arrangement' in place by 1 January 2017 that will reduce unnecessary regulations and cost burdens on both the exporter and the department, while meeting the animal welfare objectives of the ESCAS framework. Approved arrangements will bring the export of live animals into line with the export of other products.

Export certification for edible animal products and animal by-products

The department is responsible for regulating the export of edible animal products and animal by-products prescribed under the Export Control Act, such as meat, dairy, fish and eggs. The department regulates the export of these commodities through:

- the licensing of meat exporters
- the registering of businesses involved in the production of edible animal products for export and businesses that export these products
- a requirement for all registered establishments to have approved arrangements; these are food safety plans, based on hazard analysis and critical control points principles, that ensure the safety of the product and compliance with the requirements of the importing country
- audit of export establishments or verification of their performance, as appropriate

When it is an importing country requirement, the department is also responsible for the oversight of exports of non-prescribed goods, such as wool, skins and hides, processed pet food, processed foods and honey.

Image credit: Department of Agriculture and Water Resources

The department issues export certification on the basis of the systems that are in place to ensure that products have been produced in compliance with Australian export and importing country requirements.

Australia's export food and animal by-product establishments are subject to audit by trading partners. Several audits are hosted each year (see Section 6.3.2).

6.3.2 Negotiating market access

The department negotiates with trading partners to maintain and improve market access, and to open new markets for edible animal products (such as meat, fish, dairy and eggs) and animal by-products (such as rendered meals, pet food, skins and hides, wool, and technical and pharmaceutical goods). This includes responding to challenges associated with trade disruptions and changes in importing country requirements, including changes in food safety requirements and changes in animal or public health status.

For example, in 2016, the department worked closely with Thailand officials to implement their new requirements for bovine spongiform encephalopathy, as a measure to protect human and animal health. The department negotiated with Thailand to adopt regulations that are harmonised with international scientific standards and facilitate ongoing, mutually beneficial trade.

The department also manages visits by competent authorities of trading partners, who regularly audit or inspect Australia's export systems and establishments. The department writes submissions, including pre-visit submissions, advises visiting delegations on the Australian production and export system, and responds to audits and other findings.

6.3.3 Residue monitoring

Australian animal and plant 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. Results from residue and contaminant monitoring are assessed against relevant Australian standards. Where a non-compliance is found, a traceback investigation by the relevant state or territory authority identifies and resolves the source of the non-compliance. The results of monitoring programs provide confidence for Australian consumers and overseas markets that Australian agricultural products meet residue standards. Peak industry councils are consulted to ensure that monitoring programs address trading partner requirements, as well as Australian standards.

The National Residue Survey (NRS), within the Department of Agriculture and Water Resources, runs residue monitoring programs for the cattle, sheep, goat and pig industries, and for camels, deer, horses, kangaroos, poultry, ratites (ostriches and emus), wild boar, honey, eggs and aquatic species. Results of NRS monitoring programs are available on the department's website.[138]

The National Association of Testing Authorities accredits laboratories involved in residue monitoring. For programs managed by the NRS, laboratories undergo proficiency testing before being contracted and throughout the contractual period.

The Australian Milk Residue Analysis (AMRA) 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 dairy industry. The AMRA survey plays an important role in the Australian dairy industry by gathering and compiling information on the chemical residue status of Australian milk. In doing so, it assesses the effectiveness of the control measures that are in place for the use of chemicals in the dairy industry to ensure food safety outcomes.

6.3.4 Animal health requirements for market access

In 2016, the Department of Agriculture and Water Resources assisted with 40 issues relating to animal health requirements involving more than

138 www.agriculture.gov.au/ag-farm-food/food/nrs/nrs-results-publications

40 countries. These included negotiating animal health requirements for the export of:

- barramundi to Canada
- barramundi fingerlings to Bahrain
- live birds to Japan
- bovine embryos to Brazil, Columbia, India, Indonesia, Mexico and Peru
- bovine semen to Argentina, Brazil, Columbia, Guatemala, India, Indonesia, Mexico, Paraguay, Peru, South Africa, Uruguay and Vietnam
- canine semen to New Zealand
- buffalo for breeding purposes to Cambodia, Indonesia and Malaysia
- buffalo for slaughter to Malaysia
- cattle and buffalo semen to Brazil
- cattle for breeding purposes to Cambodia, Indonesia, Japan, Lebanon, Malaysia, Mexico and Taiwan
- feeder and slaughter cattle to Egypt, China, Mexico, Papua New Guinea and the United States
- cats to Taiwan
- day-old chicks to Indonesia
- day-old chicks and hatching eggs to the Czech Republic and Thailand
- live coral to China
- live crayfish to the United Kingdom
- live clams to the United States
- dogs and cats to Brazil, the European Union and the United Arab Emirates
- equine semen and embryos to New Zealand
- live fish fingerlings to Singapore
- an endangered white faced gibbon to the United States
- live honey bees to Canada and Japan
- live honey bee queens to Fiji, the Republic of Korea and the United States
- horses to Dubai, Indonesia, Republic of Korea, Malaysia, South Africa and Taiwan
- livestock germplasm to China
- ornamental fish to Vanuatu
- Pacific oysters to Japan
- live pigeons to the United Arab Emirates and Zimbabwe
- breeder pigs to Indonesia
- cooked prawns to Thailand
- rabbits to New Zealand
- ruminant germplasm to Chile, China and Peru
- salmon eggs to China and the United Kingdom
- sheep and goat semen to Peru
- sheep and goat semen and embryos to Argentina, China, Mexico, New Zealand, Paraguay and Uruguay
- sheep and goats for breeding purposes to Canada, the Republic of Korea and Russia
- feeder and slaughter sheep to Lebanon
- sheep semen to the Falkland Islands
- small ruminant germplasm to the Eurasian Economic Union
- Tasmanian devils to Japan as part of the 'save the Tasmanian devil program'
- zoo mammals to Japan.

6.3.5 Agricultural export regulation review

The Minister for Agriculture and Water Resources announced on 3 December 2015 that the Australian Government would make improvements to agricultural export legislation following a review of Australia's agricultural export legislation in 2015.

The review involved evaluating the existing legislation and a comprehensive stakeholder consultation process across industries nationwide. Several submissions were received during the consultation period and can be found on the Department of Agriculture and Water Resources website along with the consultation report.[139]

The review found scope to make improvements to enable better support for exporters, farmers and other primary producers in this changing trade environment. The existing legislation has served its purpose over the last 30 years and is due to 'sunset' (cease to be law) in April 2020. The Government is using this opportunity to make improvements to the agricultural export legislations and create a less complex regulatory framework.

The improvements to the legislation will include:

- a simpler legislative structure with a single set of requirements that can be applied flexibly depending on the commodity (for example, a single set of audit provisions)

139 www.agriculture.gov.au/market-access-trade/export-regulation-review/aerr-discussion-paper-submissions

- a graduated enforcement regimen to provide a proportionate response to non-compliance
- clearer provisions for the performance of verification activities (such as audits and inspections) across the supply chain
- clearer requirements relating to the appointment and obligations of authorised officers who perform functions and exercise powers under the legislation.

The improved legislation will provide the flexibility to cover existing commodities, as well as new and emerging commodities, while maintaining Australia's commitment to upholding our reputation as a high-integrity exporter.

The improved legislation will continue to underpin the same robust level of regulatory oversight and intervention expected by our trading partners.

Parts of the agricultural export system that are, or have been, the subject of separate reforms such as cost recovery, livestock export certification and the allocation and administration of quotas, will be incorporated into the improved legislation.

Consultation on the draft legislation will be undertaken during 2017. Engaging with our international trading partners is a priority to ensure the changes are understood and there is no subsequent impact on market access.

The improved legislation will be implemented before 1 April 2020. To find out more, and to register your interest, visit the departmental website.[140]

6.4 Imports

Importation of animals and animal products into Australia is regulated by the Department of Agriculture and Water Resources under the *Biosecurity Act 2015* (Cwlth) and its subordinate legislation, and by the Australian Government Department of the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) and its subordinate legislation.

On 16 June 2016, the *Quarantine Act 1908* (Cwlth) was replaced by the Biosecurity Act. The Biosecurity Bill 2014 and supporting legislation received royal assent from the Governor-General on 16 June 2015 and commenced 12 months after that date.

140 www.agriculture.gov.au/export-regulation-review

The 12-month delay in commencement allowed the department to ensure that clients, staff and other stakeholders understood their rights and responsibilities under the new Act, and that the legislative transition was smooth.

6.4.1 New Post Entry Quarantine facility

The Post Entry Quarantine build taskforce oversaw the construction of a new post-entry quarantine facility at Mickleham, Victoria. The new 144-hectare facility has replaced ageing post-entry quarantine stations at Eastern Creek (New South Wales), Byford (Western Australia) and Knoxfield (Victoria). Torrens Island (South Australia) and Spotswood (Victoria) will be closed once avian, camelid and ruminant capability is available at Mickleham. A single site enables greater efficiencies in operations and consolidation of staff expertise, and will better meet Australia's post-entry quarantine needs.

Construction commenced in early 2014 on phase 1 of the project, which has delivered facilities for the quarantine of plants, bees, dogs, cats and horses. The new Mickleham site was officially opened by the Hon. Barnaby Joyce, Minister for Agriculture and Water Resources, on 26 October 2015. The bee facility, plant compounds, horse compounds, and the first stage of the dog and cat compounds were operational in late 2015.

Phase 2 is scheduled for completion between December 2016 and the end of 2018. This will extend the cat and dog capacity by March 2017 and provide quarantine facilities for fertile poultry eggs, live pigeons and alpacas by late 2018.

6.4.2 Biosecurity import risk analyses

The department undertakes a range of risk analyses in response to market access requests from other countries, or proposals from Australian importers to import new animals, plants and/or other goods into Australia.

These analyses may be regulated under the Biosecurity Act, or may be undertaken as a policy review by the department.

Biosecurity Import Risk Analyses (BIRAs) are legislated in the Biosecurity Act and subordinate legislation. BIRAs are undertaken by the department

to assess the level of biosecurity risk that may be associated with the importation of a good, and identifies appropriate ways to manage these risks in order to achieve the Appropriate Level of Protection (ALOP) for Australia. Australia's ALOP is expressed as providing a high level of sanitary and phytosanitary protection aimed at reducing risk to a very low level, but not to zero.

The term 'biosecurity risk' refers to the likelihood of a disease or pest entering, establishing or spreading in Australian territory, and the potential for the disease or pest causing harm to human, animal or plant health, the environment, economic or community activities.

BIRAs are consistent with Australian Government policy, the obligations of the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS agreement), and the standards developed by the OIE and the IPPC.

The Biosecurity Import Risk Analysis Guidelines 2016 provide further information on how the risk analysis process is conducted and are available on the department's website.[141]

6.4.3 Policy reviews and competent authority evaluations

The Department of Agriculture and Water Resources made progress on the following reviews of animal biosecurity policy in 2016:

- A policy review for honey bee semen was finalised in June 2016, allowing honey bee semen to be imported from approved countries.
- A policy review for fresh (chilled or frozen) beef from Japan, the Netherlands, the United States, New Zealand and Vanuatu, which began in late 2015, continued throughout 2016. The department released a draft report in December 2016.[142]
- The review of the biosecurity risks associated with importing cooked turkey meat from the United States, which began in December 2014, continued throughout 2016. The department released its draft report to stakeholders in August 2016 for comment by October 2016 (subsequently extended until November 2016). The department is considering the submissions received and plans to issue a final report in the first half of 2017.
- A policy review of psittacine birds (household pet and non-commercial) commenced in May 2016 in response to requests that the department consider allowing imports of pet birds. The department intends to release a draft report in 2017.
- A policy review for captive non-human primate imports for zoos progressed to publication of a draft report in May 2016 for comment by June 2016. The department intends to release a final report in early 2017.
- The department released a draft report on its policy review for frozen bovine in-vitro produced embryos from Canada and the United States in November 2016 for comment by December 2016. The department intends to release a final report after comments have been received and considered.

The department evaluates the animal disease status of trading partners and potential trading partners, and the competency of their veterinary and aquatic animal health authorities. The evaluations are typically comprehensive desk assessments, and may be followed by on-site (in-country) verification visits. To gain access to Australian markets, the competent authorities of trading partners must demonstrate their ability to manage biosecurity risks in their country and to comply with Australia's import requirements for the commodities that they want to export to Australia.

In 2016, the department's competent authority assessment program included evaluations of chicken meat, pig meat, salmon, prawns, ornamental fish and marine finfish.

6.4.4 Imports of biological products, live animals and reproductive material

The Department of Agriculture and Water Resources is responsible for assessing, granting and varying import permits for biological commodities, live animals and reproductive material. Commodities include products derived from animals and microbes, such as foods, human and animal therapeutics, laboratory materials, animal feed, veterinary vaccines, horses, dogs, cats, fertile eggs, live birds, aquatic animals, laboratory animals, zoo animals, ruminants and bees.

141 www.agriculture.gov.au/biosecurity/risk-analysis/guidelines

142 www.agriculture.gov.au/biosecurity/risk-analysis/animal/fresh-chilled-frozen-beef

The Biosecurity Act regulates the importation of animals and biological products into Australia, prohibiting the importation of many of these commodities unless an import permit is granted. Import permits are issued for specific products following an assessment of the associated risks. This assessment takes into account:

- the biological components of the product
- the relevant animal health status of the country of origin
- manufacturing processes that might mitigate risk
- the proposed end use of the product.
- The department works across the biosecurity continuum to manage biosecurity risks from imported biological products by:
- seeking policy advice from within the department and from other agencies
- developing import conditions for commodities, based on policy advice
- auditing overseas facilities to verify the integrity of manufacturers' systems for sourcing raw materials, processing, preventing contamination and tracing products
- assessing information provided with each application to decide whether the ingredients used in each product and the processing undertaken create an acceptably low biosecurity risk
- liaising with international veterinary authorities
- granting import permits, if the relevant conditions are met
- applying conditions to each import permit that reduce the biosecurity risk to an acceptable level.

Import permits may be suspended, revoked or amended if there are changes to the biosecurity risk, for example, an outbreak of an exotic disease in a country from which biological components are sourced.

Australia imports live animals, including dogs, cats, horses, ruminants, fertile eggs, live pigeons, zoo animals, laboratory animals, ornamental fish and bees, for the improvement of genetic stock in agricultural industries, for racing purposes, or for use as assistance, military or companion animals.

The department implements import policies for live animals and reproductive material. Before importation, the department provides advice to prospective importers on processes and requirements for importing live animals and reproductive material, assesses applications to import animals and their reproductive material, and issues import permits with appropriate conditions. For some animal species, the department inspects and approves overseas pre-export quarantine facilities. It liaises with overseas competent authorities to verify that certification is consistent with Australia's import conditions and international standards for the live animal trade.

In 2016, the department granted approximately 5300 import permits for biological products and 5200 for live animals.

During 2016, the department continued to work closely with stakeholders on biosecurity issues and regulation across the biosecurity continuum, and helped importers and users of imported products comply with Australia's biosecurity requirements. Consultation with stakeholders is a two-way process which informs and seeks opinion and industry advice on the design of effective biosecurity systems and regulations. This improves the management of biosecurity risk. Stakeholders include government agencies, importers, industries, community interest groups, producers, processors, consumers and users of imported products, research and development organisations, and travellers.

Stakeholder engagement is central to the ongoing implementation of the *Biosecurity Act*. Active stakeholder engagement on the new legislation includes multiple opportunities for stakeholders to become informed on the changes to the legislative framework, and to understand their obligations and any changes for their businesses and organisations.

Initial engagement on the Biosecurity Act included an industry forum, national roadshows, targeted meetings, industry notifications, factsheets, social media, media releases and information on the department's website. Stakeholders also provided feedback through a formal submissions process.

Biological product stakeholders are represented on the Biological Consultative Group, which met in March and September 2016. The group provides the department and industry with a consultative forum that ensures effective biosecurity outcomes are delivered without unnecessary impediments to trade.

Image credit: Department of Agriculture and Water Resources

7

CONSUMER PROTECTION – FOOD

Food must be safe, whether it is imported, exported or traded domestically. The Australian Government, state and territory regulatory authorities, and the food industry work together to ensure the safety of food consumed in Australia or exported.

Food Standards Australia New Zealand (FSANZ),[143] the Australian Government Department of Agriculture and Water Resources,[144] the Australian Government Department of Health,[145] state and territory government authorities, and Animal Health Australia[146] all undertake activities to protect public health and safety. Activities that help to protect consumers include:

- nationally consistent Australian food standards, based on international food standards
- monitoring of microbial pathogens, chemical residues and environmental contaminants in products
- systems in place that deliver hygienic food products to the marketplace
- identification, surveillance, prevention and control of outbreaks of foodborne illness.

143 www.foodstandards.gov.au

144 www.agriculture.gov.au

145 www.health.gov.au

146 www.animalhealthaustralia.com.au

7.1 National arrangements and consultation

The Australian domestic food regulatory system covers three distinct areas: 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. A treaty between Australia and New Zealand provides for many common food standards in the two countries.

Policy agreed by the Australia and New Zealand Ministerial Forum on Food Regulation is taken into account by FSANZ when it develops food standards for the Australia New Zealand Food Standards Code (the Code). The forum is chaired by the Australian Minister for Health (or delegate) and consists of representatives from the Australian, state and territory, and New Zealand governments.

Australian food safety policies focus on a 'farm to fork' 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 improves levels of food safety for the consumer.

7.2 Food standards

7.2.1 Australian and New Zealand standards

The food standards in the Code cover the use of ingredients, processing aids, colourings, additives, vitamins and minerals. They also contain requirements relating to the composition of some foods (such as dairy, meat and beverages etc.), requirements to minimise potential contamination in foods, and to cover new technologies. The standards include labelling requirements for both packaged and unpackaged foods, including specific mandatory warnings or advisory labels. An example is mandatory declarations of certain substances in food (e.g. allergens), which are required for all packaged foods containing a defined list of substances as ingredients, food additives or processing aids.

The Code also contains Australian-only standards. An example is Chapter 3, which contains food safety standards that place obligations on all Australian food businesses to produce food that is safe and suitable to eat. The standards, which also contain health and hygiene obligations for food handlers, aim to lower the incidence of foodborne illness.

In Chapter 4 of the Code, that is an Australian-only standard, FSANZ has developed separate standards for certain sectors involved in primary production and processing that extends the evidence-based standard-setting process to the primary production sector. They aim to strengthen food safety and traceability throughout the food supply chain, from paddock to plate. Standards, as relevant to animal health, are in place for seafood, meat and meat products (including game meat, ready-to-eat meat and poultry meat), dairy products (including raw milk dairy products), eggs and egg products.

7.2.2 International standards – Codex Alimentarius Commission

The Codex Alimentarius Commission is the international body for setting food standards; it was established by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO). Codex develops internationally recognised food standards, guidelines, codes of practice and other recommendations relating to foods, food production and food safety. These aim to protect the health of consumers and ensure fair practices in international food trade.

Australia plays a strong leadership role in developing international evidence-based food standards through Codex and its subsidiary bodies. Australia also contributes to the work of Codex committees dealing with export inspection and certification, food additives and contaminants, animal feed, residues of veterinary drugs and pesticides, food hygiene, food labelling, nutrition and food for special dietary uses. In 2016, Australia's participation continued to ensure that Codex outcomes are based on the principles of sound scientific analysis and evidence.

7.2.3 Scientifically based risk analysis process

Changes in food supply as a result of new technologies, expanding trade opportunities, ethnic diversity in the population and changing diets mean that government, industry and consumers must be vigilant to maintain food safety.

Food regulators aim to ensure that health and safety risks from food are negligible for the whole population, and that consumers can make informed choices. This maintains public confidence in the effectiveness of food regulation.

FSANZ uses an internationally accepted risk-analysis process to develop standards, and to assess, manage and communicate food-related health risks. This applies to monitoring and surveillance activities, assessing food technology practices and considering emerging food safety issues. Use of the risk-analysis process ensures effective regulatory decisions and encourages communication between all interested parties, including consumers.

The FSANZ risk analysis process (Figure 7.1) includes:

- risk assessment: determining the likelihood and severity of hazards
- risk management: weighing and selecting management options of greatest net benefit to the community in a consultative decision-making process
- risk communication: ensuring that stakeholders are aware of, and understand, the risk being addressed and the control measures.

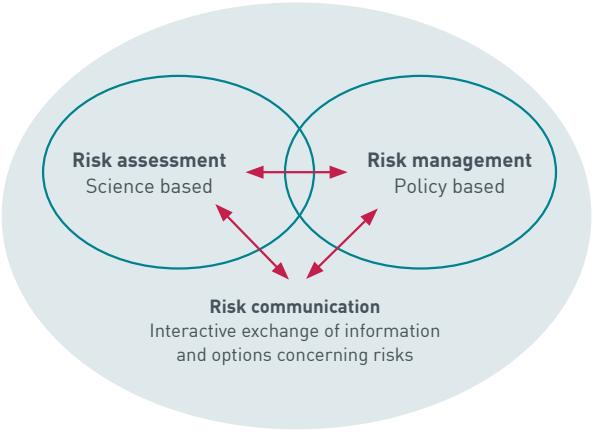


Figure 7.1 Risk analysis process[147]

147 www.foodstandards.gov.au/publications/riskanalysisfoodregulation/Documents/risk-analysis-food-regulation-full-pdf.pdf

7.2.4 FSANZ applications and proposals

The Australian food industry is very innovative and regularly applies to FSANZ for changes to the Code to accommodate new foods and food substances, and new production processes. Any individual or organisation can apply to FSANZ to have the Code amended. Applicants need to provide evidence to support their reasons for requesting an amendment, according to a published application handbook. FSANZ also initiates action to amend the Code, mainly for public health and safety reasons. These changes are made through proposals.

7.3 Microbiological limits, maximum residue limits and contaminant levels

7.3.1 Microbiological limits

FSANZ recently initiated a project to review the role of microbiological testing and the use of existing microbiological limits in food safety management. The project will use internationally recognised principles, such as those of Codex, to review microbiological criteria and establish criteria for food safety and process hygiene.

Guidance is currently being developed on applying microbiological criteria in the context of through-chain controls (i.e. food safety standards and primary production and processing standards already in the Code) to:

- support and verify effective application of controls
- provide information to food business operators on microbiological levels that should be achieved when best practices are applied
- assist in identifying situations (products and processes) requiring investigative and/or control action.

7.3.2 Maximum residue limits

FSANZ and the Australian Pesticides and Veterinary Medicines Authority have shared responsibilities for establishing the maximum residue limits (MRLs)

Image credit: Department of Agriculture and Water Resources

for agricultural and veterinary chemicals listed in Standard 1.4.2 and Schedule 20 of the Code. This is an Australia-only standard.

MRLs are set using internationally recognised methodology, consistent with Codex guidelines, for specific combinations of chemicals and food commodities. This involves a rigorous risk assessment including case-by-case dietary exposure assessments (see Section 7.10). The process is methodical, streamlined and transparent, and includes public consultation. MRLs, including those arising from requests from stakeholders for import tolerance purposes, are included in the Code only if the level of chemical residue in the food does not pose any health risks or safety risks to consumers.

7.3.3 Contaminant levels

FSANZ sets maximum levels for specified metal and non-metal contaminants and natural toxicants in nominated foods in Standard 1.4.1 of the Code. However, regardless of whether or not a maximum level exists, the 'as low as reasonably achievable' principle applies to levels of contaminants in all foods. The levels set are based on international methodologies and best practice, such as those of the Joint FAO/WHO Expert Committee on Food Additives and the Codex Committee on Contaminants in Food, and are consistent with public health and safety requirements.

7.4 National response framework

The entire food regulatory system needs to be able to respond rapidly to food emergencies resulting from a variety of food safety risks.

A food incident is defined as 'any situation within the food supply chain where there is a risk or potential risk of illness or confirmed illness or injury associated with the consumption of a food or foods.' A national food incident is defined as 'a food incident that could, or is expected to, impact on multiple government jurisdictions...'.[148] A food incident can be identified in several ways, for example, food recalls; investigation of a multi-jurisdictional disease outbreak; and intelligence from industry, local or state government agencies, or international agencies. When a food incident occurs, action is coordinated through the Bi-National Food Safety Network, which comprises the Australian, state and territory, and New Zealand food enforcement agencies, and FSANZ.

Responses to food incidents are implemented under food laws and response plans or protocols in the states and territories, and the New Zealand Ministry for Primary Industries. In some cases, the National Food Incident Response Protocol will be triggered.

148 National Food Incident Response Protocol: www.foodregulation.gov.au/internet/fr/publishing.nsf/Content/incident-response

The Protocol provides guidance on the response to national food incidents linked to microbiological, chemical, radiological, physical or unknown hazards. It provides a link between the protocols of the Australian, state and territory government agencies that are responsible for food safety.

It is vital that government and industry work together during an incident. The appropriate government and industry groups need to be alerted as early as possible to an emerging issue, so that necessary action can occur; this is critical to maintaining the confidence of consumers and trading partners, and reducing the flow-on effects on resources. One of the main ways that industry can be prepared for an incident is to have a recall plan that clearly defines roles and responsibilities, and ensures that businesses can respond quickly when necessary.

FSANZ has maintained close contact with Australia's international partners, and has been an active participant in the FAO/WHO International Food Safety Authorities Network (INFOSAN).[149]

Recent domestic and international food incidents have highlighted the importance of traceability. The complexity of supply chains makes the process of product tracking slow and inefficient in times of crisis. Chapters 3 (Food Safety Standards) and 4 (Primary Production and Processing Standards) of the Code specify requirements for food businesses to ensure that they can trace food that they receive and sell. These requirements are consistent with international (Codex) principles of being able to trace food products 'one step back' and 'one step forward' in the food supply chain.

7.5 Food recalls

A food recall removes food that may pose a health or safety risk from distribution, sale and consumption. FSANZ coordinates and monitors food recalls in Australia. Recalls occur as a result of consultation between state and territory governments and a sponsor (usually the food product's manufacturer or importer).

A food recall may occur because of a report or complaint from a manufacturer, wholesaler, retailer, government or consumer. It may also occur as a result of internal testing and auditing by a food business. Food recalls can be at the trade or consumer level.

A food withdrawal, which is different from a food recall, removes food from the supply chain for reasons other than protection of public health and safety, for example, if the food is underweight compared to label information.

When a food safety issue is identified, food businesses must be able to quickly remove unsafe food from the marketplace to protect the health and safety of consumers. FSANZ helps food businesses to recall unsafe food in Australia by communicating recall information to state and territory government agencies and industry groups. Food businesses are responsible for ensuring that the public is notified of a recall.

7.6 Bovine spongiform encephalopathy control for beef imports

Bovine spongiform encephalopathy (BSE) is a transmissible and fatal neurodegenerative disease that affects cattle. Variant Creutzfeldt–Jakob disease, a rare and fatal human neurodegenerative condition, results from exposure to the BSE agent by consuming beef or beef products that are contaminated with the agent. Since BSE was identified as a major risk to human health in 1996, Australia has had comprehensive arrangements in place to protect consumers from exposure to the BSE agent through contaminated food. Clause 12 of Standard 2.2.1 of the Food Standards Code specifies that only bovine meat and meat products derived from animals free from BSE can be sold in Australia.

In 2009, the Australian Government announced a revised policy on BSE that established new requirements for imported beef and beef products. Under this policy, which was implemented in March 2010, countries wishing to export beef to Australia must apply to the Australian BSE Food Safety Assessment Committee for a country BSE food safety assessment. FSANZ completes the assessment, which includes, when necessary, an in-country inspection. An in-country inspection

149 www.who.int/foodsafety/areas_work/infosan/en

examines the effectiveness of BSE-preventive measures in the exporting country to ensure the safety of beef and beef products to be exported to Australia. In addition, the Department of Agriculture and Water Resources implements import certification requirements at the border.

Under the revised policy, FSANZ has received applications from 17 countries. As of January 2017, FSANZ had completed BSE food safety assessments for Argentina, Brazil, Chile, Croatia, Japan, Latvia, Lithuania, Mexico, New Zealand, the Netherlands, Sweden, the United States and Vanuatu. The BSE risk status assigned to these countries, together with the full assessment reports, can be found on the FSANZ website.[150] Applicant countries assigned Category 1 or Category 2 BSE food safety risk status are eligible to export certain beef products to Australia (e.g. heat-treated, shelf-stable beef and beef products). These countries are required to provide an annual update of BSE surveillance and BSE control information to FSANZ.

7.7 Imported food risk assessment

The Department of Agriculture and Water Resources inspects imported food to check that it meets Australian public health and safety requirements, and that it complies with the Code. There are biosecurity restrictions on food such as meat, fruit, eggs, vegetables and dairy products from certain countries; any foods that do not meet biosecurity requirements are not allowed into Australia.

FSANZ provides risk assessment advice to the Department of Agriculture and Water Resources on the level of public health risk associated with imported food. The department uses this risk advice to determine appropriate risk-management measures at the Australian border for imported food products.

FSANZ has recently completed a review of its risk advice on 'risk category' foods (i.e. medium–high risk, as listed in the Imported Food Control Order 2001). The review process identified that the food safety risks of certain food–hazard combinations have changed from previous advice as a result of new scientific and import compliance data, as well as refinements to some food categories and hazards. The completed risk statements for the risk category foods (61 in total) are published on the FSANZ website.[151]

7.8 International engagement

Collaboration with international agencies involved in ensuring food safety is becoming increasingly important as the food supply expands and becomes more global. FSANZ collaborates with many international scientific and regulatory bodies to develop methods for data collection and analysis. Although food-related risks around the world may vary, sharing of information, data and best practices on food science regulation can promote consistent approaches to analysing risk.

The Asia–Pacific Economic Cooperation Food Safety Cooperation Forum seeks to build robust food safety systems in the Asia–Pacific region. The forum, whose members represent food safety regulators, is co-chaired by Australia (FSANZ) and China.

Australian Government representatives, including from FSANZ and the Department of Agriculture and Water Resources, actively lead and participate in various Codex committees (see Section 7.2.2).

FSANZ also supports the work of WHO and the FAO by participating in expert committees and meetings. These include the Joint FAO/WHO Expert Committee on Food Additives and the Joint FAO/WHO Meeting on Pesticide Residues. FSANZ is also a WHO Collaborating Centre for Food Contamination Monitoring.

In addition, FSANZ collaborates extensively with other international risk-assessment and regulatory agencies through established networks such as the International Food Chemical Safety Liaison Group, the International Microbiological Food Safety Liaison Group, the Food Safety Regulatory Economics Working Group and the Social Sciences International Liaison Group, which comprise international experts in their given areas.

150 www.foodstandards.gov.au/industry/bse/bsestatus/Pages/default.aspx

151 www.foodstandards.gov.au/consumer/importedfoods/Pages/FSANZ-advice-on-imported-food.aspx

Image credit: iStock

7.9 Dietary exposure assessment

Dietary exposure assessments are a key part of FSANZ's risk-assessment and risk-analysis process, which contributes to evidence-based decision making. A dietary exposure assessment estimates how much of a food chemical a population, or population subgroup, consumes. FSANZ uses internationally accepted dietary modelling techniques for the dietary exposure assessments. These assessments consider the potential exposure of the Australian and New Zealand populations to chemicals such as food additives, pesticide and veterinary chemical residues, and other chemical contaminants, as well as nutrients, food ingredients and other substances that have a nutritional or health purpose.

Dietary exposure to (or intake of) food chemicals is estimated by combining the amount of food consumed with the concentration of the food chemical, and includes all foods that contain the chemical of interest. The estimated dietary exposure to a food chemical is compared with a known health-based guidance value to determine the potential level of risk to the population. Health-based guidance values indicate the amount of the substance that can be consumed daily, weekly or monthly without adverse health effects. An example of a health-based guidance value is an acceptable daily intake, which is used for pesticides and veterinary drugs.

The food consumption data used for dietary exposure assessments are derived from the latest national nutrition surveys in Australia and New Zealand. The data contain information from individual records about specific foods and amounts consumed over either one or two days. Concentrations of food chemicals in both plant-based and animal-based products consumed in the diet are obtained from several sources. These may include analysis of foods through food surveys or monitoring programs, food manufacturers' levels of use of food additives, agricultural trials, and/or maximum levels established in the Code.

Estimated dietary exposures and information about the main dietary sources of food chemicals provide essential information for standards setting, and enable targeted planning for food survey and monitoring programs to better ensure consumer health and safety. In some instances, FSANZ may provide consumer advice on consumption of certain foods, for example, advice on mercury in fish.

7.10 Monitoring safety of the food supply

The Australian Government, and state and territory food safety authorities provide consumer protection through audit, inspection and monitoring. Good hygienic practices and food safety systems, based on the principles of hazard analysis and critical control points (HACCP), 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 these types of foods for export must be registered with the Department of Agriculture and Water Resources.

FSANZ and other Australian and New Zealand government agencies continuously monitor the food supply to ensure that it is safe, and that foods comply with standards for microbiological contaminants, pesticide residues and chemical contamination. FSANZ monitors nutrients in the Australian food supply, compiling the results in databases that are available to the public.

FSANZ also collects food surveillance data, including the results of general compliance testing and targeted surveys conducted by public health units in jurisdictions across Australia and New Zealand. Australia's most comprehensive assessment of consumers' dietary exposure to (intake of) pesticide residues, contaminants and other substances is the Australian Total Diet Study (formerly the Australian Market Basket Survey). This assesses consumers' estimated dietary exposure to a range of pesticide and veterinary drug residues, contaminants and other substances found in food every two to three years. Through this major study, FSANZ monitors the national food supply to ensure that existing food regulatory measures adequately protect consumer health and safety.

FSANZ may also undertake surveys as part of its work on the Code, for example, when it develops food additive standards or in response to emerging issues and national food incidents.

Other Australian food regulatory agencies undertake regular monitoring activities that may inform FSANZ's process for setting standards. For example, under the National Residue Survey, the Department of Agriculture and Water Resources tests food for export for residues of agricultural and veterinary chemicals and environmental contaminants.

7.11 Foodborne disease surveillance

7.11.1 OzFoodNet

In 2002, the then Department of Health and Ageing, in collaboration with state and territory health agencies, established OzFoodNet to improve the national surveillance of 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 provided fortnightly to the Communicable Diseases Network Australia (CDNA) and are published in *Communicable Diseases Intelligence*, a quarterly publication of the Department of Health.[152]

OzFoodNet identifies outbreaks, and provides early warning, of foodborne illnesses in Australia. It ensures a consistent national response to such outbreaks, and reduces the number of incidents and spread of foodborne illness by prompt preventive action.

7.11.2 Communicable Diseases Network Australia

The CDNA[153] 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 non-government organisations concerned with communicable diseases. The network provides advice to governments and other bodies on public health strategies to minimise the effect of communicable diseases, and oversees the development of nationally consistent public health guidelines to guide the public health response to outbreaks of communicable diseases. The CDNA reports to the Australian Health Ministers' Advisory Council through the Australian Health Protection Principal Committee.

152 www.health.gov.au/internet/main/publishing.nsf/Content/cda-pubs-cdi-cdiintro.htm

153 www.health.gov.au/internet/main/publishing.nsf/content/cda-cdna-cdna.htm

Image credit: iStock

Image credit: AHA

8

ANIMAL WELFARE

The Australian, state and territory governments work with the Australian livestock industry to improve the productivity and profitability of the industry, and farm gate returns.

The strong link between animal welfare and livestock industry profitability results in improved animal welfare that contributes to:

- increased productivity: improved animal welfare practices lead to contented, healthier animals that produce a higher-quality, higher-value and safer product
- improved competitiveness: systems that are underpinned by robust animal welfare arrangements are likely to improve access of products to domestic and export markets, and achieve higher prices
- increased sustainability: community acceptance of livestock animal welfare arrangements leads to better market access, higher prices and greater long-term sustainability of livestock industries.
- The success of Australia's livestock industries will be increasingly influenced by research, development and strategies that improve animal welfare outcomes.

8.1 Jurisdictional updates

8.1.1 Australian Government

Australia's three tiers of government each have animal welfare responsibilities, which vary between jurisdictions.

Legislative responsibility for animal welfare in Australia rests primarily with state and territory governments and local governments. The Australian Government's responsibilities for animal welfare arise from specific powers in relation to external trade and treaties that encompass some animal welfare issues.

The Australian Government:

- administers a regulatory framework to ensure that animals in the live export trade are handled and slaughtered in accordance with standards set by the World Organisation for Animal Health (OIE), and that export abattoirs meet state and territory requirements and animal welfare laws
- issues export certificates for all live animals – including commercial livestock species, companion and assistance animals (including greyhounds), and horses – to meet importing country requirements; these include ensuring that the animal is fit to travel
- participates in international animal welfare matters by engaging at the global, regional and country levels
- supports the development of nationally consistent animal welfare arrangements, such as animal welfare standards and guidelines, biosecurity arrangements, and national approaches to policy matters such as reducing the incidence of farm trespass
- works with state and territory governments, which are responsible for domestic animal welfare legislation, including for livestock; animals used in research and teaching; aquatic animals; native and introduced wildlife; animals used for work, recreation, entertainment and display; and companion animals
- supports livestock industries in improving animal health and welfare through matched funding for research and development
- supports the implementation of the Australian Animal Welfare Strategy as the national blueprint for sustainable improvements in animal welfare.

Cosmetic Testing

The Australian Government has committed to implement a ban, effective 1 July 2017, on the testing of finished cosmetic products on animals in Australia, the testing of cosmetics ingredients on animals in Australia, and the sale of cosmetic products and ingredients that have been tested on animals.

The government commenced consultation with industry, consumers, and state and territory government stakeholders to gather views and information to assist in the design of implementation of the announced ban.

8.1.2 Australian Capital Territory

In 2016, the Australian Capital Territory (ACT) Government has undertaken a significant body of work aimed at achieving increased positive welfare outcomes for animals. This body of work has included a number of legislative reforms in relation to animal welfare. The *Animal Welfare Amendment Act 2016* (ACT) was passed by the ACT Legislative Assembly, resulting in several amendments to the *Animal Welfare Act 1992* (ACT), including the insertion of a duty of care provision which imposes on a person in charge of an animal a duty to care for that animal. Under this provision, people are required to take reasonable steps to provide for their animal's basic needs. These amendments commenced on 31 May 2016, and ensure that the animal welfare regulatory regimen in the ACT sends a clear statement about responsible ownership of animals.

Efforts to ensure the ACT Government delivers a consistent and consolidated approach to promoting improved outcomes for animal welfare and management are reflected in the development of a long-term strategy for the welfare and management of animals in the ACT. This strategy will be used to guide future government decision making and outline all actions in a single document that can be easily accessed by the community. The strategy is being developed in collaboration with the ACT Animal Welfare Advisory Committee, the Royal

Image credit: iStock

Society for the Prevention of Cruelty to Animals (RSPCA) ACT, ACT Wildlife, ACT Veterinary Surgeons Board, and the ACT Rural Landholders Association.

8.1.3 New South Wales

The New South Wales Government Department of Primary Industries is the contract manager on behalf of the Animal Welfare Task Group for the review of the Model Code of Practice for the Welfare of Animals: Domestic Poultry (see Section 8.4.4). The department is also leading the project to develop national standards and guidelines for livestock at processing establishments.

The department continued to coordinate the project on national standards and guidelines for exhibited animals and has submitted a final draft to the Animal Welfare Task Group for endorsement.

An updated version of the General Standards for Exhibiting Animals in New South Wales was published and prescribed under the Exhibited Animals Protection Regulation 2010 (see Section 8.4.2).

The New South Wales Animal Welfare Advisory Council is working on the implementation of the recommendations of the NSW Joint Select Committee regarding the Companion Animals Breeding Practices Inquiry.

The state Code of Practice for the Welfare of Animals Used in Rodeo Events is currently under review and is close to being finalised.

A guideline document has been drafted for the assistance of animal research establishments, and summarises common problems found on inspections. The document was drafted by the Animal Research Review Panel, which was created by the *Animal Research Act 1985* (NSW) to provide a mechanism for representatives of the scientific and broader community to participate in monitoring the self-regulatory process that was established within institutions by the Act. It is a statutory body that provides advice to the Minister on the use of animals in research and teaching.

8.1.4 Northern Territory

The Animal Welfare Branch, the regulatory arm of the Animal Welfare Authority, is part of the Northern Territory Department of Primary Industry and Resources (DPIR). The *Animal Welfare Act 2000* (NT) came into effect in March 2000 with the following objectives:

- ensure that animals are treated humanely
- prevent cruelty to animals
- promote community awareness of animal welfare.

The Northern Territory Government has devised a two-stage approach to amending the Act, with the first stage involving drafting amendments to strengthen provisions of the existing Act. In February 2013, the *Animal Welfare Amendment Act 2012* (NT) was passed by the Northern Territory Legislative Assembly.

The second stage of the reform process is the full review of the current Act. In February 2014, a discussion paper, the *NT Animal Welfare Act Review* was released for public consultation, targeting specific stakeholder and industry groups, as well as the broader public. Twenty formal comments were received, and submissions and drafting instructions have been prepared in readiness for amendments to be introduced in the March 2017 parliamentary sittings.

This second stage of the reform process will ensure that the Northern Territory's animal welfare legislation is contemporary and reflects national best practice. A full regulatory impact statement is being prepared for assessment.

Adoption of the relevant standards in the Australian animal welfare standards and guidelines for cattle, for sheep, and for livestock at saleyards and depots, under the *Livestock Act 2016* (NT), is being considered to align with current implementation of the land transport of livestock welfare standards. These standards are principally enforced by livestock biosecurity officers.

8.1.5 Queensland

Several pieces of legislation in Queensland support good welfare outcomes for animals. The *Animal Care and Protection Act 2001* (Qld) is the core animal welfare legislation in Queensland and is supported by subordinate legislation.

A new Animal Welfare Advisory Board was established under the Act to provide expert and impartial advice to the Queensland Minister for Agriculture and Fisheries on animal welfare matters to improve the welfare of animals in Queensland. Amendments were made to the Animal Care and Protection Regulation 2012 to limit time sows are kept in farrowing crates. From April 2017 sows may only be confined in gestation stalls for the first six weeks of any pregnancy.

In May 2016, an Act to introduce mandatory dog breeder registration and restrictions on the supply of dogs was passed, the *Animal Management (Protecting Puppies) and Other Legislation Amendment Act 2016* (Qld). These measures will provide lifetime traceability of a dog to the breeder by imposing registration obligations on dog breeders in addition to regulating the supply of dogs and providing for the sharing of information about dog breeders with agencies that are responsible for animal welfare.

In July 2016, the *Exhibited Animals Act 2015* (Qld) commenced. The new legislation identifies animal welfare as a key exhibition risk which must be managed. The legislation supports world-class wildlife experiences for tourists and the community.

A project to deliver a new Indigenous teaching resource to increase students' understanding of animal welfare and empathy for animals continued. The *Seven* series of educational books raises awareness of welfare issues in Indigenous communities.

The Queensland Government continues to work with scientific users of animals to implement the current edition of the *Australian code for the care and use of animals for scientific purposes*.[154] The Queensland Government contributed to various national processes throughout 2016, including representation on the Animal Welfare Task Group and at reference group meetings for Australian animal welfare standards and guidelines for livestock at processing establishments, for poultry, and for livestock at saleyards and depots.

8.1.6 South Australia

During 2016, policy and legislation amendments have been implemented or progressed relating to livestock, companion animals, animals in the wild, and animals in research and teaching.

The Animals in Emergencies SA Framework has been finalised. This defines roles and responsibilities to government and non-government agencies in the event of major incidents, emergencies and disasters. It has been developed by Primary Industries and Regions SA in consultation with all stakeholders.

The South Australian Animal Welfare Advisory Committee has been reappointed.

The South Australian Oiled Wildlife Response Plan has been completed and endorsed by the South Australian State Marine Pollution Management Committee. This is consistent with the Western Australian Oiled Wildlife Response Plan and industry response plans. It will be underpinned by regional plans which will be developed over the next 12 months.

154 www.nhmrc.gov.au/guidelines-publications/ea28

A policy decision has been made and implemented not to collect statistics on animals used for research and teaching in South Australia because they could not be validated, the statistics collected were inconsistent and the database to make collection possible required replacement. The data were not used for any practical purpose and different jurisdictions required different data reported, so they could not be compared or collated. This is a red tape reduction initiative. Institutions may continue to collect and report statistics if they wish to.

Draft South Australian *Standards and Guidelines for the Breeding and Trading of Dogs and Cats* have been developed for consideration by the South Australian Government. If they are adopted, they will be regulated by reference in Schedule 2 of the Animal Welfare Regulations 2012.

Regulations mandating the Australian animal welfare standards and guidelines for cattle and for sheep have been drafted and settled and are likely to come into effect from early to mid-2017. South Australia has contributed to the development of the Australian animal welfare standards and guidelines for poultry, for livestock at processing establishments, and for livestock at saleyards and depots.

With the uptake of the National Livestock Identification System, the *Brands Act 1933* (SA) has been repealed.

8.1.7 Tasmania

A review of the animal welfare system in Tasmania commenced in late 2016. This review will cover the way the Tasmanian Animal Welfare Advisory Committee operates, as well as the interactions between various elements of the animal welfare system within the state. It will also look at Tasmania's role in the national framework.

Animal welfare compliance in Tasmania is delivered through a partnership between the Department of Primary Industries, Parks, Water and Environment, and RSPCA Tasmania. The RSPCA receives all reports of animal cruelty, and undertakes investigation and compliance activity in most instances. When commercial livestock are involved, the matter is referred to the department for investigation. Random inspections of intensive piggeries and poultry farms continue, as well as inspection of vehicles used to transport livestock within Tasmania. Biosecurity officers at the border inspect animal trucks and trailers for animal welfare issues as they enter the state.

The Tasmanian Government's Animal Welfare (Dogs) Regulations 2016 were finalised, and came into effect on 1 January 2017. The Regulations operate in two parts: one that applies to all dogs, and another that applies only to dogs kept in domestic animal enterprises, such as commercial breeding establishments. This approach effectively bans 'puppy farms' that operate with substandard conditions, and ensures the welfare of all dogs in Tasmania.

8.1.8 Victoria

In September 2016, the Victorian Government announced a major reform project for animal welfare with the release of a draft action plan, *Improving the Welfare of Animals in Victoria*, for public comment. The draft action plan includes three priority action areas:

- reviewing Victoria's animal welfare legislation to ensure Victoria's legislation is contemporary and takes a proactive approach to animal welfare
- using collaborative approaches and partnerships to underpin improvements to animal welfare
- ensuring Victoria's compliance and enforcement framework is efficient and effective.

The final Victorian Animal Welfare Action Plan is expected to be released in early 2017 and will set the direction for animal welfare in Victoria for the next five years.

The Prevention of Cruelty to Animals (Domestic Fowl) Regulations 2016 were remade. The Regulations impose requirements on persons in charge of domestic fowl, including the provision of adequate food, shelter, health and wellbeing. The new regulations introduce obligations around ranges and pre-emptive measures relating to power failure and alarm testing.

The *Racing and Other Acts Amendment (Greyhound Racing and Welfare Reform) Act 2016* (Vic.) introduced a range of amendments in response to the Chief Veterinary Officer's report into the welfare and management of racing greyhounds. Work has commenced on a new mandatory code of practice covering all greyhounds registered with Greyhound Racing Victoria, and their offspring.

Work continues on the delivery of key election commitments to reform the dog breeding and pet shop industries in Victoria.

8.1.9 Western Australia

The Department of Agriculture and Food Western Australia (DAFWA) is responsible for administering the *Animal Welfare Act 2002* (WA). General and scientific inspectors appointed under the Act enforce the provisions relating to offences against animals and the use of animals for scientific purposes. General inspectors employed by the RSPCA Western Australia and the Livestock Compliance Unit within DAFWA are the main providers of compliance and enforcement activity. However, public sector officers in the Department of Parks and Wildlife and some local governments are also appointed as general inspectors. All Western Australian police officers have the powers of a general inspector.

DAFWA takes the lead in commercial livestock matters through regular inspections at aggregation points such as saleyards, ports and abattoirs. The RSPCA is responsible for receiving and assessing public complaints about animal cruelty, and providing an enforcement service primarily for non-commercial livestock and companion animals.

In late 2015, an independent panel appointed by the then Minister for Agriculture and Food reported on its review on the investment in and administration of the Animal Welfare Act. The final report made 19 recommendations, all of which were supported by the Western Australian government. DAFWA is in the process of implementing the recommendations of the review.

During 2016, DAFWA continued work on clarifying roles and responsibilities for the welfare of companion animals, livestock and wildlife during an emergency such as bushfire or flood.

8.2 Industry updates

8.2.1 Australian Chicken Meat Federation

The Australian Chicken Meat Federation (ACMF) is the industry's peak body representing chicken farmers and chicken meat processing companies.

Image credit: iStock

The ACMF represents the industry at the national level in matters regarding international trade, quarantine, animal health, biosecurity, food standards, environmental issues, food safety, animal welfare and industry relevant research.

Animal welfare is a priority for the chicken industry and therefore a priority area for the ACMF.

The industry has developed auditable industry animal welfare standards for all steps in the chicken meat production process and many companies integrate the standards into their in-house quality assurance (QA) systems.

Most chickens farmed with access to an outside range area are accredited under the Free Range Egg and Poultry Australia (FREPA) certification program. Compliance with FREPA standards is independently assessed.

Most chickens produced in Australia are grown on farms that are accredited under the RSPCA Approved Farming Scheme. RSPCA staff assess compliance with scheme standards. The ACMF actively engages with the RSPCA in the periodic review of these standards.

More than 70% of all chickens produced in Australia are accredited under one or other of these two programs, sometimes both.

Chicken meat processing companies are also required to meet the standards required by their major customers, such as the major supermarket chains and quick service restaurants. These standards include animal welfare and animal health. In many cases, compliance with the standards is independently audited.

All major meat chicken processors have instituted closed-circuit television surveillance of live animal handling areas at processing plants to ensure the humane treatment of the birds at all times.

The ACMF has also actively engaged in the development of welfare codes of practice and standards and guidelines (most recently, the development of poultry welfare standards and guidelines) and over many years has encouraged the industry to adopt not just the standards (or 'musts' in codes of practice), but the enhanced practices described in guidelines.

8.2.2 Australian Dairy Industry Council

The Australian Dairy Industry Council is the peak body representing dairy farmers and dairy processors. It has in place a National Dairy Industry Animal Welfare Strategy, and a vision that 'every dairy animal is well cared for'.

To support this vision, the Strategy sets out husbandry principles and practices to guide farmers in the care of their animals. In fostering improvements in animal husbandry practices, the strategy aims to:

- ensure that farmers have adequate information to enable them to understand and adopt good animal welfare practices
- provide governments, the community and consumers with confidence in Australian dairy husbandry practices and welfare outcomes
- ensure that effective processes are in place to identify priorities and respond to animal welfare issues.

The strategy highlights priority areas to support farmers in achieving high standards of animal health and wellbeing. These priority areas drive the industry's objectives and action plans, and have clear performance goals. The dairy industry focus includes:

- legislation, standards, assurance and training
- calf management across the supply chain
- minimising lameness
- phasing out routine calving induction
- eliminating tail docking
- minimising pain associated with horn removal
- managing sick and injured cows.

The Australian Dairy Industry Council has endorsed a series of targets and performance measures under the Australian Dairy Industry Sustainability Framework, including a target for animal welfare 'to provide the best care for all animals'. To assess whether the industry is making progress against this target, the following 2020 performance measures have been established:

- 100% of industry complying with legislated animal welfare standards
- 100% of industry adopting relevant industry-recommended practices for animal care
- a 25% increase in the number of consumers who believe that dairy farmers do a good job in caring for animals.

8.2.3 Australian Egg Corporation Limited

The Australian Egg Corporation Limited (AECL) is the industry services body for the egg industry, providing research, development and extension (RD&E) and marketing for the egg industry. Through its continued implementation of the Hen Welfare RD&E Plan, egg farmers and AECL are working to ensure that hens have a good quality of life.

Key achievements in hen welfare by AECL in 2016 include:

- At the conclusion of 2016, over 90 egg farmers will have completed their Certificate III in Agriculture (Commercial Egg Production) which provides practical training in areas such as hen handling, health and welfare. AECL also launched a new training program, EggStart, which supports worker induction on farm, including hen health and welfare.

- Through the industry QA program, Egg Corp Assured has over 50 businesses registered and has a strong focus on ensuring that egg farms are meeting welfare standards above those required in the Model Code of Practice for the Welfare of Animals: Domestic Poultry. This focus on welfare is also being incorporated into the new industry QA program, Egg Standards of Australia.
- Publication of research outcomes from the University of Melbourne project, *Free range hen welfare: characterisation of 'outdoor' and 'indoor' hens and physical features in the range*. This report highlights the complex nature of hen welfare research and has given us a greater understanding of how many hens make use of a range and for how long, behaviour patterns inside and outside a shed and physical features that can be used to attract hens to the range.
- AECL has been involved in supplying data and information for the Model Code review and regulatory impact statement process. The Model Code will be updated to reflect current best practice and is being converted to standards and guidelines for incorporation into state legislation. AECL has been a supporter of this process in order to see the best outcome for hens and farmers that is based on scientific evidence and welfare best practice.
- Continued participation in the National Primary Industries Animal Welfare RD&E Framework (see Section 8.5), which includes AECL's support of a welfare researcher position, as well as various cross-sectoral collaborative projects such as a welfare research capability audit, an online discussion platform for the public on welfare-related topics and a toolkit to guide livestock animal welfare contingency planning.

8.2.4 Australian Livestock Exports Council

Australia's livestock exports were worth $1.782 billion in the 2015–16 financial year, and independent analysis of the industry shows that the live trade generates employment for up to 10 000 Australians per year.

According to the OIE, Australia continues to be the world leader in animal welfare practices in the global livestock export trade, ahead of 100 other exporting countries. Australia is the only country which has implemented a supply chain-based welfare assurance system for livestock exports, the Exporter Supply Chain Assurance System (ESCAS), and the only country investing directly in infrastructure and training.

Since it was established in 1998, the industry's service provider, LiveCorp, has worked in partnership with Meat & Livestock Australia (MLA) through the Livestock Export Program (LEP), driving the industry's research program to address key risks, including animal health and welfare.

Since implementation of ESCAS in 2011, LEP programs have delivered training to 11 000 participants across our international markets. Although the management of supply chain presents ongoing challenges, experience shows that working with and supporting people to modernise practices and change attitudes is the best way of improving livestock handling and slaughter practices.

The biggest budgetary commitment in the industry's service provision continues to be on animal welfare programs, with over three-quarters of the LEP's RD&E expenditure for 2016 having been budgeted for animal health and welfare improvements.

As an example of how this work translates into real in-market welfare progress, an estimated 95% of Australian cattle in Indonesia are now stunned before slaughter, compared with five years ago when the figure was less than 10%.

In the past 12 months, exporters have continued to introduce new vessels to the Australian livestock fleet, representing investment worth hundreds of millions of dollars in the latest feeding, water, ventilation and mechanical systems. Alongside this commercial commitment, research has continued into further improving conditions for animals on board vessels, and a review of the Australian Standards for the Export of Livestock (ASEL) is due to commence in 2017, complementing ongoing dialogue with stakeholders such as Australian Government Accredited Veterinarians (AAVs) and animal welfare groups.

As a result of industry's commitment to continual improvement, mortality rates within the trade have declined substantially over time. In the first six months of 2016, of the 590 993 cattle exported, there were 839 on-board mortalities (0.14%), while

in the same period, 829 860 sheep were exported with 4301 on-board mortalities (0.52%).

The Livestock Global Assurance Program (LGAP) project was the industry's most significant R&D investment for the year. LGAP has been built on the broad objectives of developing and delivering a certified, independent conformance program for the Australian livestock export industry to enhance the long-term sustainability of the live export trade, while maintaining high levels of animal welfare. The project has been piloted in Jordan, Malaysia and Indonesia.

The development of a modified live salmonella vaccine has continued, with studies demonstrating a high level of vaccine safety and efficacy with minimal toxicity. It is hoped a vaccine will be available commercially by 2019.

Other research projects completed in 2015–16 include investigating management strategies for heat and inanition in sheep, and the development and assessment of livestock welfare indicators for the industry. Further work focused on cattle morbidity and mortality resulted in two published scientific papers in the *Journal of Veterinary Diagnostic Investigation*, along with a necropsy DVD and a veterinary handbook.

8.2.5 Australian Lot Feeders' Association

The Australian Lot Feeders' Association (ALFA) is the peak body for the cattle feedlot industry. A key strength of the Australian cattle feedlot industry is its systems, including the National Feedlot Accreditation Scheme (NFAS), that underpin its reputation as a producer of grain-fed beef that is free from disease, safe and healthy, and produced with the use of world-leading animal husbandry practices. NFAS, the industry's QA program, provides an effective tool for feedlots to demonstrate their commitment to meeting community, market and government expectations including in animal health, welfare and biosecurity. Every accredited feedlot is independently audited annually to ensure they comply with NFAS standards. In addition, accredited feedlots are expected to undertake an annual internal full audit and a specific internal animal welfare audit. In 2016, following Government endorsement of the Australian Animal Welfare Standards & Guidelines for Cattle, these were adopted under NFAS, and all accredited feedlots are now expected to meet them.

In addition to NFAS, the cattle feedlot industry has comprehensive training and RD&E arrangements in place to manage and improve animal welfare on feedlots:

- The cattle feedlot industry invests significantly in animal welfare research and development (R&D). In 2016, this work, undertaken by MLA, included the initiation of a significant R&D project, the National Feedlot Animal Health Program, to provide feedlots with access to evidence-based infection-prevention and control measures, and ensure when animal health treatments are required, that they are used appropriately and prudently. Other animal welfare related R&D projects that the industry invested in during 2016 included improving the industry's understanding and management of heat stress, cattle acclimation, wet pen and dag management, backgrounding and objective measures of animal welfare.
- ALFA uses the expertise of Australian and international feedlot veterinarians to deliver informal workshops and training that provide practical information on best-practice management of animal health and welfare on feedlots. In 2016, ALFA delivered a second series of accredited Animal Welfare Officer training courses, held around Australia. The two-day training, with additional assessment requirements, targets people employed on feedlots who have overall responsibility for monitoring and supervising animal welfare practices on feedlots. There are now over 250 trained Animal Welfare Officers on Australian feedlots.
- ALFA and MLA also develop extension materials, including DVDs, fact sheets, manuals and suggested templates, to deliver information on animal health, welfare, biosecurity and other matters to lot feeders. In 2016, extension information distributed to feedlots included comprehensive manuals addressing humane euthanasia and best-practice management of bovine respiratory disease.

- Through prestigious annual awards, the industry recognises feedlot excellence in areas such as animal welfare, thereby encouraging continuous improvement within the sector. The feedlot industry also recognises the value of encouraging tertiary students to get involved in the feedlot industry. In 2016, a new Communicate Your Research Competition was launched at the feedlot industry's premier conference, BeefEx 2016, to promote scientific professionalism for the advancement of communication between tertiary institutions and the Australian feedlot industry, providing students with the opportunity to share their research with the industry, in relevant animal and veterinary science disciplines.
- In 2014, ALFA appointed a technical services officer to provide free on-the-ground assistance to all lot feeders, to ensure they have access to the latest developments in legislation, best-practice management and NFAS. By the end of 2016, the technical services officer had visited over 300 feedlots and provided advice and support to numerous others on feedlot matters, including animal health, welfare and biosecurity.

8.2.6 Australian Pork Limited

The pig industry continues to be proactive in its approach to animal welfare. The pork industry assists in maintaining high welfare standards through the implementation of research outcomes that address the needs of the animals and are in keeping with the expectations of the community.

Key projects in the Australian Pork Limited welfare R&D program include:

- welfare methodology
- welfare interventions
- consumer and community attitudes
- extension priorities.

Welfare methodology

Being able to measure animal welfare allows assessment of the impacts of various production procedures and tasks on pigs. APL has commissioned several research projects to ensure that methods used to measure welfare are robust and scientifically based.

Welfare interventions

This project encompasses assessment or development of all activities that will result in better welfare for the pig when introduced on-farm, including pain relief, carbon dioxide (CO_2) stunning standards, on-farm welfare assessment and enrichment. For example, some husbandry procedures, although they are necessary, may result in varying levels of animal discomfort. Research in this area will provide remedies to reduce pig discomfort and pain.

Under the National Primary Industries Animal Welfare RD&E Framework (see Section 8.5), a review of novel pain biomarkers to measure pain in animals was conducted. An extensive list of biomarkers were identified from studies using rodent models and pre-clinical models of human pain. The study concluded that there should multiple biomarkers available to measure pain in animals. The development of multiple biomarkers to measure pain in pigs is a research priority for the Australian pork industry.

One of the most important activities in this area focuses on being able to assess and measure pig welfare on-farm, so that pig producers can determine when welfare has improved. This program has evolved from being a research review, to an on-farm project, to on-farm trials. Currently a producer group is involved in implementing an on-farm pilot program. The goal is to use the information generated in the pilot program to assist other producers to implement on-farm assessment.

Investment in post-farmgate welfare interventions has also been made. The welfare of pigs just before and during slaughter is also important. CO_2 stunning is the most common method of stunning for pigs in Australia. A national research project is currently investigating CO_2 stunning procedures with a view to developing standard operating procedures that safeguard animal welfare outcomes.

Consumer and community attitudes

Projects in this area commissioned by APL investigate community expectations of animal welfare, to improve our understanding about what consumers expect from farmers.

Extension priorities

The industry has a duty of care to our animals and expects that APL will provide research outcomes

that assist producers to continue to improve animal welfare on farms. ProHand is a computer-based training program that specifically targets key attitudes and behaviours known to have a direct effect on animals' fear of humans. ProHand uses a cognitive–behavioural technique to target and change the attitudes of stock-people towards animals. For some time, ProHand provided the means to train staff and inform them about pig welfare and the impact that their behaviour has on pigs. The ProHand program and delivery platform has been upgraded to ProHand 2.0, which makes on-farm training and assessment easier.

Another area of risk identified and addressed by APL in 2016 is domestic abattoir compliance relating to animal welfare. This was partially completed in the 2015–16 financial year, with the development of an animal welfare questionnaire that is likely to be rolled out in 2016–17. APL is now represented on the Standards and Guidelines for Livestock at Processing Establishments Stakeholder Advisory Group.

Similarly, following concerns raised with APL in relation to animal welfare and other issues, an investigation to determine whether saleyards are fit for purpose and compliant with state government animal welfare and biosecurity laws. Standards and guidelines for saleyards, pigs and transport were completed late in the financial year. APL will consider the report's recommendations in 2016–17.

8.2.7 Cattle Council of Australia

National adoption of the Standards and Guidelines for Cattle,[155] which was expected in 2016, has been delayed until 2017, as jurisdictions adopt them in their respective regulations.

Following adoption of the Standards, use of the dropped ovary technique (DOT) for spaying cattle must only be done by accredited operators, and flank spaying will continue to require a veterinary surgeon. In anticipation of this, Cattle Council of Australia has overseen the development of a formal unit of competency for lay spayers. Spayers who have been performing this operation for some years with excellent results can use their 'prior learning' status as a path to formal accreditation. The accreditation unit is currently being trialled for a formal launch in early 2017.

In partnership with MLA, Cattle Council continues to strive for the replacement of surgical procedures with non-surgical methods for sound cattle management. Success has been achieved in the area of dehorning, with the discovery of the poll gene, and wider use of the current genetic test for poll-ness is being pursued. The test has been commercially available for six years and currently has an accuracy rate of 99% in Brahmans and between 72% and 74% in other tropical breeds. Other areas of research are alternatives for surgical castration, spaying and fire branding. Although good animal welfare is a primary motivator, successful outcomes will most likely come from the change being presented as a positive-value proposition, so economic analyses will prove very important.

In the meantime, Cattle Council is pursuing widespread use of pain relief to accompany essential surgical management procedures such as dehorning and DOT spaying. A major step in this process has been encouraging the Australian Pesticides and Veterinary Medicines Authority to recognise the urgent need for registering particular analgesics for use in cattle and having these accessible for non-veterinarians.

Animal welfare is closely linked with animal health. With this in mind, MLA has recently commissioned a study into prioritising endemic diseases in terms of their impact on the wellbeing of Australian cattle and the resulting economic losses.[156] Of particular interest from the 17 cattle diseases studied have been the high rankings of parasites (cattle tick, buffalo fly and internal parasites) and the low ranking of Johne's disease. The results of this study have already begun influencing policy decisions relating to socialised expenditure on national programs, with a reduction in focus on Johne's disease in cattle being the biggest change.

8.2.8 Racing Australia

The Racing Australia Board introduced new rules for the registration of thoroughbred foals and their owners in July 2016.

155 www.animalwelfarestandards.net.au/files/2016/02/Cattle-Standards-and-Guidelines-Endorsed-Jan-2016-250116.pdf

156 www.mla.com.au/Research-and-development/Search-RD-reports/RD-report-details/Animal-Health-and-Biosecurity/Priority-list-of-endemic-diseases-for-the-red-meat-industries/2895

New Australian Rules of Racing and Stud Book Rules make acceptance into the stud book conditional on foals being registered within 30 days of foaling and their beneficial owners being declared within a further 30 days. In doing so, foals and owners come under the Australian Rules of Racing.

The implementation of these reforms has strengthened ownership transparency and traceability, leading to improved integrity and animal welfare in the thoroughbred industry.

Stewards will now have access to studs and farms to test for anabolic androgenic steroids in young horses, prohibited substances in racehorses and to monitor the health and welfare of horses generally.

Welfare is of paramount importance to everything the industry does, and the Australian racing industry is setting standards for world's best practices.

The new rules ensure that there is traceability of all thoroughbred horses from birth until they are rehomed when they are no longer involved in the thoroughbred racing industry.

8.2.9 Sheepmeat Council of Australia

The sheep industry is committed to continued improvements in animal health and welfare within the sheep industry and across the agriculture sector. This not only leads to improved sheep health and welfare but also increases on-farm productivity and profitability.

The Sheepmeat Industry Strategic Plan 2015–2020 has several themes which include improvement of the wellbeing of the animals within our care. The Plan is expected to reduce losses in the national flock, including marking rates increased by 5% and ewe mortality rates decreased by 1%.

Underpinning this are key performance indicators, including:

- measurable improvements in animal welfare across the entire livestock supply chain
- maintenance and regular testing of preparedness plans and communications for an emergency disease outbreak
- measurement of performance against National Livestock Traceability Performance Standards for sheep
- reduction of the cost of endemic diseases, including internal and external parasites, by $3 million by 2020 and $69 million by 2030.

Through an annual investment of $7.6 million, it is estimated that a net increase in industry income of $148 million by 2020 ($760 million by 2030) will be delivered. The overall benefit cost ratio is 4.3:1 at 2020 (9.2:1 at 2030).

The Sheepmeat Council also represents sheep producers on numerous sheep industry health and welfare initiative groups which consider research on and development of strategies that can be implemented by producers on the farm, including investigating new pain relief products and vaccinations to prevent disease. The industry is also developing a nationally consistent biosecurity strategy and an animal wellbeing strategy to promote the highest standard of husbandry practices.

8.2.10 WoolProducers Australia

WoolProducers Australia is the peak industry council for wool growers, developing policy and advocating on their behalf. Animal health and welfare are key components of the work done on behalf of growers, including ongoing improvement while supporting productivity and profitability.

Key initiatives undertaken by WoolProducers include:

- funding of the Sheep Cooperative Research Centre wellness program for the development and delivery of wellness parameters for on-farm use that will enable growers to improve the health and welfare of their flock
- support for the National Wild Dog Action Plan via the stakeholder consultative group
- development of a shearing shed welfare poster outlining joint responsibility for sheep welfare at shearing time
- facilitating a cross-industry welfare workshop including the shearing associations, contractors, the industry R&D corporation, other sectoral wool-growing groups and state farming organisations

- development of mulesing accreditation training with industry stakeholders
- ensuring the Australian perspective is clearly represented in the International Wool Textile Organisation welfare specifications.

In Australia, the sheep blowfly, *Lucilia cuprina,* presents a unique set of challenges to wool growers. On behalf of wool growers, the industry R&D corporation Australian Wool Innovation has invested in genetics research and tools, alternatives to mulesing, and pain relief options to help reduce the impact the sheep blowfly has on the Australian merino flock.

8.2.11 Zoo and Aquarium Association

The Zoo and Aquarium Association (ZAA) launched its Animal Welfare Position Statement (AWPS) in 2013,[157] with the support of the Australian Animal Welfare Strategy. The purpose of the AWPS is to outline future directions for the welfare of animals managed within the zoo and aquarium industry in Australia and New Zealand. It describes the Association's contemporary understanding of animal welfare, which recognises that good welfare ('positive welfare') is achieved when an animal's negative experiences are minimised and positive experiences are promoted.

Underpinned by the AWPS, the ZAA's accreditation program provides an industry-specific approach for assessing zoo animal welfare. Since accreditation is a condition of membership of the ZAA, the opportunity for development and awareness in this area is ongoing. A first for the zoo sector, the purpose of the accreditation program is to validate and highlight an organisation's achievements in promoting positive animal welfare. The program supersedes the previous practice-focused system, targeting care, husbandry and management.

At the end of 2016, the ZAA completed its first three-year cycle of accreditation, with close to 100 members reviewed. The lessons learned have been numerous, and include enhanced understanding, improved articulation, and practical application and assessment of positive welfare findings. In addition, the program has produced workshops, a training program, preparation resources and assessment materials. A self-assessment component allows members to assess their own animals and practices, with their findings externally sighted and reviewed. Welfare knowledge among members continues to develop through ZAA support, guided learning, and consolidation of reference points, definitions and language.

The primary benchmark for assessment is focused on establishing the subjective experiences of the animal, which provides an even platform for all animal care facilities. Other benchmarks in the program are in the areas of proactive care, alignment with natural living and the opportunity to engage in a full range of species-appropriate behaviours. These are integral elements of positive welfare, well beyond a quality of life where negative welfare is merely minimised.

Interest in this program has been received from other regional associations and animal care facilities. The international interest received serves as a strong indicator of the practicality and success of the program.

8.3 Animal Welfare Task Group

The Agriculture Ministers' Forum and the Agriculture Senior Officials Committee were formed in 2014 to deal with issues of national significance. The role of the Animal Welfare Task Group is to deliver priorities referred to it by the Agriculture Senior Officials Committee. The task group comprises representatives from each Australian state and territory, and New Zealand.

The Animal Welfare Task Group focuses on animal welfare issues that support improved long-term and sustainable economic, social and environmental outcomes; are informed by community expectations; and are of national interest or concern. The task group oversees the development of national animal welfare policies across the broad scope of animal sectors covered by the Australian Animal Welfare Strategy, with a focus on livestock industry sectors.

157 www.zooaquarium.org.au/index.php/press-releases/position-statements

8.4 Standards and guidelines

The Animal Welfare Task Group continues to oversee the development and implementation of Australian animal welfare standards and guidelines for poultry, exhibited animals, and livestock at saleyards, depots and abattoirs.[158]

8.4.1 Australian animal welfare standards and guidelines for cattle and sheep

The cattle and sheep standards and guidelines were approved by the agriculture ministers in December 2015. Each state and territory must now implement them, as appropriate.

8.4.2 Australian animal welfare standards and guidelines for exhibited animals

The proposed Australian Animal Welfare Standards and Guidelines for Exhibited Animals will create improved and nationally consistent rules for the care and management of animals kept for exhibition purposes at facilities such as zoos, fauna parks, wildlife parks, aquariums and museums with live animal exhibits.

The New South Wales Government continued to coordinate the project. The final draft standards and guidelines are ready to be considered by governments for approval.

8.4.3 Australian animal welfare standards and guidelines for saleyards and depots

The proposed Australian Animal Welfare Standards and Guidelines for Saleyards and Depots will replace the existing *Model Code of Practice for the Welfare of Animals: Animals at Saleyards*. The standards and guidelines will apply to the main livestock species (cattle, sheep, pigs, goats and horses).

The standards and guidelines aim to better inform all those involved in the saleyard process of their responsibilities along the supply chain. Animal welfare risks include livestock handling, penning density, pre-sale inspection and selection as fit for sale, the humane management of any unfit animals, and water and feed requirements.

The final draft standards and guidelines are being considered by governments for approval.

8.4.4 Australian animal welfare standards and guidelines for poultry

The development of Australian animal welfare standards and guidelines for poultry began in June 2015. The standards and guidelines will cover all aspects of the welfare of poultry, including poultry for meat processing, and ducks, turkeys, geese, pheasants, guinea fowl, partridge, quail and pigeons.

The New South Wales Government continued to coordinate the project. The draft standards and guidelines continue to be developed in consultation with stakeholders from industry, animal welfare organisations, agriculture regulators and other interest groups.

Through a public consultation process, the community, industry, government and any other relevant stakeholders will be given the opportunity to comment on the draft standards and guidelines documents.

8.4.5 Australian animal welfare standards and guidelines for livestock at processing establishments

The proposed Australian Animal Welfare Standards and Guidelines for Livestock at Processing Establishments will create improved, nationally consistent rules for Australian establishments that undertake commercial processing of livestock to produce meat and meat products for human consumption. They will be complementary to Part 7 of the current *Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption* (AS 4696: 2007). They will also be used to provide guidance wherever slaughter is performed, including on-farm slaughter.

158 www.animalwelfarestandards.net.au

The New South Wales Government continued to coordinate the project. The draft standards and guidelines continue to be developed in consultation with stakeholders from industry, animal welfare organisations, agriculture and food safety regulators and other interest groups.

8.5 National Primary Industries Animal Welfare Research, Development and Extension Framework

The National Primary Industries Animal Welfare Research, Development and Extension Framework encourages greater co-investment and collaboration on a national basis to improve the efficient use of RD&E resources in the field of animal welfare.

The Framework is overseen by a steering committee that guides the development of strategies. The steering committee comprises 17 major funding partners and providers of animal welfare research relating to the Australian farm sector, including representatives from the Victorian and South Australian state governments.

Recently completed projects commissioned in the Framework include the following:

- *Public views*: the Animal Welfare Science Centre, University of Melbourne, developed and tested a web-based forum that can be used to address specific issues. The project will help identify current or future issues surrounding a particular topic. Observing and measuring the discussion within groups can also provide information on the amount of divergence between stakeholders.
- Toolkit to guide livestock animal welfare contingency planning: Robor Pty Ltd developed a business contingency planning toolkit to assist livestock businesses develop a single plan encompassing all risks and hazards to their business, with the emphasis on managing an on-farm animal welfare crisis situation. An implementation plan and a promotional plan will be developed that will include generic and industry-specific promotional documentation and farmer educational material.

On 25 August 2016, the 6th National Animal Welfare RD&E Strategy Forum was held at the Victorian Department of Economic Development, Jobs, Transport and Resources at Attwood. More than 60 participants from industry groups, governments and research providers met to develop a greater understanding of current Australian RD&E projects in the area of primary industry animal welfare and to consider future RD&E priorities.

Image credit: Taryn Mokotupu

8.6 International animal welfare

8.6.1 World Organisation for Animal Health

Since May 2005, the World Assembly of the World Organisation for Animal Health (OIE), representing the 180 member countries of the OIE, has adopted 12 animal welfare standards in the OIE *Terrestrial animal health code* and four animal welfare standards in the OIE *Aquatic animal health code*.

Australia supports the OIE's development of scientifically based international animal welfare standards and guidelines. These standards and guidelines are not intended to strengthen non-tariff barriers to international trade through prescriptive animal welfare requirements. The Australian Government consults closely with the livestock industries and non-government organisations when developing Australia's positions on issues being discussed in the OIE forum.

The Australian OIE focal point for animal welfare attended the OIE Global Conference on Animal Welfare in Guadalajara, Mexico from 6–8 December 2016.

OIE Collaborating Centres are appointed by the OIE as centres of expertise in a specific sphere of competence. The OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis is a partnership between:

- the Animal Welfare Science and Bioethics Centre at Massey University (New Zealand)
- AgResearch (New Zealand)
- the Animal Welfare Science Centre (University of Melbourne)
- the Centre for Animal Welfare and Ethics (University of Queensland)
- CSIRO Animal, Food and Health Sciences (Armidale, New South Wales).

In April 2014, the OIE Collaborating Centre Management Committee published a scientific and technical review on the future of animal welfare, titled *Animal welfare: focusing on the future*.[159]

The committee has also cooperated with partners in southeast Asia to build animal welfare science capacity in the region through a training program: the OIE Standards & Guidelines (Slaughter & Transport) Collaborative Project South East Asia.[160] This project has funding from the Australian, Malaysian and New Zealand governments; Universiti Putra Malaysia; the European Union; and World Animal Protection (formerly the World Society for the Protection of Animals). The project now enters the data analysis phase, and the aim is to produce some research papers.

8.6.2 Regional Animal Welfare Strategy: Asia, the Far East and Oceania

The first teleconference for the newly formed OIE Regional Animal Welfare Strategy (RAWS) Advisory Group was held on 22 November 2016. The RAWS Advisory Group also met face to face at the OIE Global Conference on Animal Welfare in Guadalajara, Mexico, 6–8 December 2016. During these discussions, the Advisory Group:

- reviewed and updated as necessary the group's Terms of Reference and *Modus Operandi*
- discussed the development of the third edition of the RAWS and associated action plan and key performance indicators.

Members of the RAWS Advisory Group were appointed by the Director-General of the OIE. The purpose of the Advisory Group is to drive the implementation of the OIE animal welfare standards within the region.

159 www.oie.int/doc/en_document.php?numrec=4357203

160 www.animalwelfarestandards.org/About/About-the-Project

Image credit: Taryn Mokotupu

Image credit: Andrew Breed

9

REGIONAL ANIMAL HEALTH INITIATIVES

Australia collaborates with many low and middle income countries to improve livestock health and thereby human livelihoods.

Regional animal health activities focus on raising the awareness of emerging and re-emerging exotic infectious diseases, including zoonotic diseases, thus improving early warning of disease incursions and supporting the development of regional preparedness and control strategies.

This chapter summarises Australia's main areas of international engagement in terrestrial animal health in the Asia–Pacific and African regions. Information on regional aquatic animal health initiatives is provided in Chapter 5.

Australia supports surveillance, capacity-building, and aid and research activities in neighbouring countries in the Asia–Pacific region and some African countries. These activities occur in collaboration with overseas government agencies, veterinary associations and private organisations. Regional animal health initiatives aim to improve the control of animal diseases, including zoonoses, thereby improving livelihoods in partner countries. Aid and research activities are primarily resourced through the Australian Government Department of Foreign Affairs and Trade (DFAT[161]) and the Australian Centre for International Agricultural Research (ACIAR[162]).

Australia also provides leadership, technical advice and financial assistance at global and regional levels. It supports 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), including the FAO Animal Health and Production Commission for Asia and the Pacific, and the Secretariat of the Pacific Community. Australia's support for overarching international and regional strategies ensures that projects address animal health issues and requirements that are important for both the collaborating countries and Australia.

161 dfat.gov.au/aid

162 www.aciar.gov.au

9.1 Regional representation

The Australian Chief Veterinary Officer and Delegate to the OIE, Dr Mark Schipp, is Vice President of the OIE World Assembly, where he represents the OIE region for Asia, the Far East and Oceania. Consultation undertaken by Dr Schipp on issues to be presented to the OIE Council for consideration has resulted in increased engagement and cooperation within the region.

9.2 Pre-border surveillance and capacity building

9.2.1 Papua New Guinea and Timor-Leste

Australia assists its near neighbours Papua New Guinea (PNG) and Timor-Leste with field surveillance for significant animal diseases and capacity-building activities to support exotic animal disease awareness, preparedness and response. The Australian Government Department of Agriculture and Water Resources undertakes these activities in collaboration with the PNG National Agriculture Quarantine and Inspection Authority (NAQIA) and the Timor-Leste Ministry of Agriculture and Fisheries (MAF).

Image credit: Andrew Breed

In 2016, joint animal health surveys took place in West Sepik Province in PNG, and in the Ermera, Ainaro and Manufahi Municipalities of Timor-Leste. Survey participants developed skills in surveillance and communication via increased public awareness, thus improving animal health management in the region. They also increase the capacity of the PNG NAQIA and the Timor-Leste MAF to identify and respond to animal disease emergencies, thus helping to mitigate exotic animal disease threats to Australia.

The Australian Government Department of Agriculture and Water Resources also funded:

- development of rabies response plans in PNG and Timor-Leste
- establishment of a sentinel cattle herd in PNG to provide early warning for significant animal diseases
- support for the PNG response to the detection of pigs with antibodies to Aujeszky's disease
- public awareness activities for biosecurity in border villages in Timor-Leste
- preliminary work on establishing a sentinel cattle herd in Timor-Leste to provide early warning for significant animal diseases
- data kits for use in PNG and Timor-Leste to improve data quality from surveillance activities
- preliminary work to develop core biosecurity and surveillance knowledge training for animal health staff in PNG and Timor-Leste.

These activities provide information about the presence and distribution of animal diseases that are important to Australia and its near neighbours, including risk factors for disease spread.

9.2.2 Solomon Islands

As part of the Solomon Islands Biosecurity Development Project 2013–2016, the Australian Government Department of Agriculture and Water Resources collaborated with the Solomon Islands Ministry of Agriculture and Livestock (MAL) to deliver a terrestrial animal health survey in early 2016. The survey covered areas of Guadalcanal and Malaita provinces. The activity provided useful information about the status of animal diseases important to both Australia and the Solomon Islands. This was the first general animal health surveillance activity performed in the Solomon Islands in nearly 20 years.

9.3 Overseas aid

Zoonotic emerging and re-emerging infectious diseases, such as Middle East respiratory syndrome and avian influenza viruses, are ongoing regional health challenges. Outbreaks of such diseases, along with growing resistance to formerly effective antimicrobial medicines, have adverse economic, health and social impacts, particularly for human and animal health systems in low-resource settings.

The Australian Government's Health for Development Strategy 2015–2020, released in June 2015, prioritises improved regional health security underpinned by strong health systems. The strategy acknowledges the need to strengthen links between the human and animal health systems to prevent, promptly detect, and respond to emerging diseases that can pass from animals to people.

To achieve these strategic outcomes, Australia employs DFAT's diplomatic, trade and aid functions as well as DFAT investments in overseas development assistance. The work of the Asia Pacific Leaders Malaria Alliance is an example of the use of health diplomacy to achieve regional collaboration on malaria elimination, including the zoonotic *Plasmodium knowlesi*.

Australia regards implementation of the WHO International Health Regulations (IHR) (2005) as an important means of ensuring WHO member states are capable of responding effectively to emerging global health threats. Recent developments include a new IHR monitoring and evaluation tool, the Joint External Evaluation (JEE), which includes an assessment of a country's capacity to prevent, detect and rapidly respond to public health threats, including zoonoses. Australia has contributed technical experts to assist in conducting JEEs in participating countries, including in Vietnam, Bangladesh and Cambodia. Australia also announced voluntary funding of $6 million to the WHO Health Emergencies Programme, including $1 million to the Emergency Medical Teams initiative, at the World Health Assembly in May 2016.

Australia is participating in the United States-initiated Global Health Security Agenda as a contributing country to the action package on antimicrobial resistance (AMR), a key international health security priority for both human and animal health. Australia is engaged in several international fora with active agendas relating to AMR, including the United Nations, the G20, the Organisation of Economic Co-operation and Development and the OIE.

Australia has also made regional and bilateral aid investments that are helping to strengthen human and animal health systems in the Asia–Pacific region, and continues to be committed to improving animal health systems and linking them to human health systems to prevent zoonotic diseases.

9.3.1 Stop Transboundary Animal Diseases and Zoonoses initiative

The Australian-funded Stop Transboundary Animal Diseases and Zoonoses (STANDZ) initiative in southeast Asia was launched in September 2011 and is being implemented by the OIE. Its goal is to reduce the impact of emerging infectious diseases (EIDs), transboundary animal diseases and zoonoses on food security, human health and livelihoods. STANDZ supports regional and in-country foot-and-mouth disease (FMD) control efforts, rabies prevention and control through One Health approaches, strengthening of national veterinary services, sub-regional program management and OIE representation.

In 2016, DFAT approved a no-cost extension and a sustainability strategy for STANDZ which will see the investment continue until December 2017. The Department of Agriculture and Water Resources continues to provide technical and governance support to DFAT for the STANDZ initiative.

STANDZ funding supported the following activities to control FMD and rabies in 2016:

- FMD vaccination projects in high-risk districts in northern Lao People's Democratic Republic (PDR) (with no reported outbreaks in control sites) and central Myanmar (with a significantly reduced number of outbreaks reported in control sites), including post-vaccination monitoring
- publication of a revised South-East Asia and China Foot-and-Mouth Disease (SEACFMD) Campaign Roadmap
- technical support to national partners drafting FMD action plans consistent with the revised SEACFMD Campaign Roadmap
- rabies control and prevention activities in Myanmar, Cambodia and the Philippines, as well as providing technical support and rabies vaccines to Indonesia
- a gender assessment of veterinary services across southeast Asia, reviewing barriers and opportunities for both male and female veterinarians

Early sustainability and resource mobilisation outcomes were also reported, including increased funding contributions to the SEACFMD Campaign (from China), investments to FMD control in Lao PDR and Myanmar (from New Zealand) and improved veterinary service capacity in the region.

9.3.2 Community-based emerging infectious disease risk-reduction in the Mekong

Australia, through a partnership with the United States Agency for International Development (USAID), is contributing funding to community-based EID risk-reduction projects in the Mekong region. The DFAT contribution is directed towards regional interventions, including in Cambodia, Lao PDR, Myanmar and Vietnam. The total value of the DFAT investment is $5.9 million (2012–2019).

In 2016, funding supported the Live Animal Marketing and Production (LAMP) activity for implementation between 2016 and 2019. The program aims to 'strengthen emergency preparedness for highly pathogenic avian influenza (HPAI)–LAMP practices'. The LAMP program supports the preparedness of target countries to prevent and control the emergence and spread of zoonotic influenza and other zoonotic EIDs at the national and regional level. The activity contributes to strengthened multi-sectoral coordination for effective management and control of HPAI, regional epidemiology capacities and networks, and evidence-based risk management along the livestock production and market chain.

LAMP interventions commenced with initial in-country field assessments, risk management and marketing practice analysis activities. Assessments will inform risk-based surveillance at country and cross-border levels to identify critical points of virus transmission, as well as contribute to the ability of veterinary services to regularly update and interpret Asia-specific data along value chains. Value chain data will improve epidemiological information sharing through networks at the national and regional levels. LAMP interventions will contribute to regional coordination, particularly when situations are no longer manageable or when outbreaks involve more than one country, while FAO country-level projects have a complementary focus on activities to improve the capacities of countries.

9.3.3 Australia Indonesia Partnership for Emerging Infectious Diseases: Animal Health Program

The objective of the Australia Indonesia Partnership for Emerging Infectious Diseases (AIP-EID) animal health program is to strengthen the Indonesian government's veterinary services to prevent and control EIDs. Guided by the principles of partnership and sustainability, the AIP-EID program is delivering outcomes of mutual benefit to Australia, Indonesia and the region. These outcomes support animal health and biosecurity, public health, food security and economic development. The program is implemented by the Australian Government Department of Agriculture and Water Resources in partnership with the Indonesian Ministry of Agriculture.

The AIP-EID Phase I was completed on 30 June 2015. Its significant achievements generated a strong bilateral relationship, cementing Australia's reputation as leaders and experts in biosecurity and disease management, as a safe and reliable trading partner, and as a global player in economic development.

The AIP-EID Phase 2 is a smaller program than Phase 1. It continues to build on the successes and achievements of Phase 1, and is more targeted in terms of capacity building activities.

Activities under Phase 2 are focused on the following areas:

- strengthened emergency management
- an improved integrated national animal health system (iSIKHNAS), and the effective use of information to support surveillance, veterinary service delivery, policy development and advocacy
- strengthened leadership and management by Indonesia's veterinary service.

The key activities and projects completed in the past 12 months are:

- finalisation of an emergency management manual for supporting animal disease incidents
- establishment of the whole-of- government Emergency Management Working Group for disease emergencies
- development of procedure documents and guideline documentation for managing an animal disease incident
- a review into emergency funding arrangements for supporting emergency disease incidents
- development of routine disease reports from iSIKHNAS for the Indonesian Ministry of Agriculture (MoAg)
- technical input into a range of animal disease policy and operational documents
- coordination of the commencement of Incident Command System (ICS) training to Indonesian government animal health officers, aimed at introducing ICS concepts into emergency planning and preparedness
- extension of iSIKHNAS by developing new training modules for improving the effectiveness of Indonesian extension officers
- delivery of the Indonesian veterinary leadership course to the third cohort of Indonesian government animal health officers, as well as some condensed short courses for senior officers of the Indonesian Government MoAg
- development of training packages to program managers and vaccination teams working on the rabies control and eradication program in Bali, in partnership with the Directorate of Animal Health, MoAg, FAO and other non-government organisations.

9.3.4 Government Partnerships for Development Program

The DFAT-funded Government Partnerships for Development program is funding the Timor-Leste Village Poultry Health and Biosecurity Program until February 2017. This is a joint initiative between the Australian Government Department of Agriculture and Water Resources and the Timor-Leste MAF, in association with experts from the University of Sydney and the Northern Territory Department of Primary Industry, through the Berrimah Veterinary Laboratory. The program aims to improve the availability of human dietary protein in three pilot villages by controlling poultry diseases through Newcastle disease vaccination, and by supporting improved poultry management techniques. Additionally, the project has assisted in cold-chain management and activities to strengthen current biosecurity arrangements in Timor-Leste, with a focus on poultry disease risks.

Achievements to date include:

- delivery of seven Newcastle disease vaccination campaigns in each pilot village, and technical support for the scale-up of poultry vaccination plans for a further 200 villages in Timor-Leste
- capacity building in cold-chain management for MAF staff in Dili, the pilot villages and their municipal offices, resulting in the development of standard operating procedures and record management and an improved understanding of the importance of a sustainable cold chain in maintaining vaccine effectiveness
- laboratory training to improve staff diagnostic capacity for Newcastle disease
- a review of Timor-Leste's biosecurity system, including policy development and operational training, which has led to development of a training program for the National Directorate for Quarantine and Biosecurity of MAF.

9.4 International animal health research

Australia funds international animal health research through several agencies, including ACIAR and DFAT. Since 1982, ACIAR has supported research on animal health and production livestock, and created partnerships in many countries in the Asia–Pacific region and Africa. Research projects of between three and five years are funded to meet the priorities of partner countries and Australia in order to have the widest possible impact. ACIAR's animal health projects are linked with other research programs, particularly those of other Australian organisations (e.g. DFAT and the Australian Government Department of Agriculture and Water Resources), and international organisations such as the FAO, OIE and the International Livestock Research Institute (ILRI).

9.4.1 ACIAR animal health program

The animal health program of ACIAR supports research organisations in Australia and partner countries to use multi-disciplinary approaches to solve problems in animal production and health. The program focuses on Cambodia, Indonesia, Lao PDR and PNG, but has increasing emphasis on Myanmar and several African countries, as well as on regional cooperation in the SEACFMD countries. Progress and final reports of projects are published on the ACIAR website[163] and via other media.

Animal disease management in Indonesia

Important animal diseases in Indonesia include anthrax, highly pathogenic avian influenza, brucellosis, classical swine fever and rabies. Research is currently being undertaken to support strategies to manage these diseases, including improving:

- decentralised veterinary service delivery
- livestock movement and disease control in eastern Indonesia
- sustainability of sweet potato and pig production systems in highland Papua and West Papua provinces.

Health and production of village pigs and cattle in Lao PDR and Cambodia

Diseases of livestock have a major impact on household income in Lao PDR, and trade in cattle is increasingly important for Cambodia. Current

163 www.aciar.gov.au

Image credit: Australian Centre for International Agricultural Research

ACIAR projects conduct research on:

- best-practice health and husbandry of cattle and buffalo
- improving livelihoods by developing pig-based enterprises in upland Lao PDR
- improving resource management and marketing systems for cattle in southern Lao PDR
- development of domestic and international markets for high-value cattle in southeast Cambodia.

Smallholder livestock systems in Myanmar

A new project in Myanmar aims to improve the livelihoods of smallholder livestock producers in the central Dry Zone by enhancing the management, nutrition and health of small ruminants, indigenous cattle and village poultry. The project will explore the technical constraints and opportunities for smallholder livestock development in the central Dry Zone and develop and adapt improved animal health and production practices.

Livestock movement and transboundary disease control in SEACFMD countries

A new project, implemented through the OIE, is examining livestock movement and the control of transboundary animal diseases in SEACFMD countries. The project will describe cattle market value chains and disease risks for transboundary animal diseases (FMD and haemorrhagic septicaemia) in SEACFMD countries. The project builds on earlier ACIAR research on understanding livestock movement and the risk of spread of transboundary animal diseases in Lao PDR and Cambodia.

Systems to monitor and respond to livestock diseases in PNG

Building on a previous syndromic surveillance project in PNG, a new project will use a One Health approach to explore the effect of animal health service delivery on improving the health, nutrition and income of smallholder livestock producers and their communities.

Smallholder livestock systems in eastern and southern Africa

In Botswana, a new project implemented through ILRI aims to enhance the competitiveness of smallholder livestock producers. It will examine the various constraints on smallholder livestock producers, and explore how livestock-related marketing systems can be improved.

In Tanzania and Zambia, a new project aims to demonstrate that improvements to poultry health and production by the control of Newcastle disease can be increased by closer integration of family poultry and crop value chains.

Image credit: Department of Agriculture and Water Resources

10

RESEARCH AND DEVELOPMENT

The Commonwealth Scientific and Industrial Research Organisation (CSIRO), the cooperative research centres, Australia's veterinary schools, and industry-based research and development corporations have active research programs in livestock health.

10.1 National Animal Biosecurity Research, Development and Extension Strategy

Biosecurity is the management of risks to the economy, the environment and the community from pests and diseases entering, emerging, establishing or spreading in Australia. Australia's livestock, fisheries and aquaculture sectors remain free from many of the pests and diseases that can affect agriculture, natural environments and people. This favourable biosecurity status enables Australia to produce agricultural goods in a safe, efficient and sustainable manner. However, ongoing investment and collaboration in biosecurity research, development and extension (RD&E) are crucial to ensure that Australia has the capability and resources to prepare for, respond to and recover from disease, pest and weed incursions.

Innovation and RD&E are key drivers to improving productivity and competitiveness in the primary industries sector, and making best use of Australia's natural resources under a changing climate. To address animal biosecurity RD&E needs, the Australian Government engaged Animal Health Australia (AHA) to develop and coordinate the implementation of the National Animal Biosecurity RD&E Strategy. This strategy serves a dual purpose that meets the requirements of the National Primary Industries RD&E Framework and Schedule 8 of the Intergovernmental Agreement on Biosecurity.

The National Primary Industries RD&E Framework aims to promote a more collaborative national RD&E model. It is designed to facilitate greater coordination among the Australian, state and territory governments; the CSIRO; rural research and development (R&D) corporations; industry; and the university sector. This will enable these organisations to better harmonise their roles in RD&E relating to primary industries and work together effectively to maximise net benefits to Australia. The framework strengthens national research capability to better address sector and cross-sector issues (including animal biosecurity), and focuses RD&E resources so they are used in a more effective, efficient and collaborative way, thereby reducing capability gaps, fragmentation and unnecessary duplication.

Published in July 2013, the National Animal Biosecurity RD&E Strategy has been endorsed by all stakeholders – the Australian Government, state and territory governments, nine animal-based R&D corporations, seven universities with veterinary schools and CSIRO – and is supported by AHA's industry members. The strategy establishes the future direction for improving the focus, efficiency and effectiveness of RD&E in supporting biosecurity in Australia's animal industries, wildlife and recreational sectors over the next five years.

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10.2 CSIRO

With increasing global trade and connections, Australia is facing a greater challenge in protecting itself against biosecurity threats. Diseases, pests, invasive animals and plants can inflict damage on Australia's livestock, crops, farm profits, unique environment and human health. CSIRO assembles strong multi-disciplinary research teams – spanning animal, plant and environmental sciences – that focus on tackling major national and international biosecurity challenges that confront Australia's agricultural sustainability, and environmental and human health. The overall aim is a biosecurity system that is pre-emptive, responsive, resilient, and based on cutting-edge surveillance, informatics and new technologies for integrated responses.

Australia's high-containment facility – the CSIRO Australian Animal Health Laboratory (AAHL) – is designed to allow scientific research into the most dangerous infectious agents in the world. As a national facility, AAHL's responsibilities to industry and government stakeholders include:

- diagnosis, surveillance and response: to identify, monitor and respond to outbreaks of disease

- research: to understand and help manage new and emerging infectious diseases that affect both animals and people
- policy advice and training: to state and territory, national and international biosecurity and health agencies on disease diagnosis, management and mitigation.

CSIRO's research expertise extends across the disease and science spectrum – from pathogenesis and epidemiology to virus characterisation.

AAHL has become a world-leading One Health laboratory through its substantial work on zoonotic agents (disease agents that can pass from animals to humans). CSIRO scientists using the facility work extensively on avian influenza, and were instrumental in identifying and characterising Hendra and Nipah viruses; they also helped identify that the virus responsible for severe acute respiratory syndrome originated in bats.

CSIRO Health and Biosecurity scientists also have expertise in working with, and understanding, foot-and-mouth disease (FMD). Since research with live FMD virus is not permitted in Australia, this work is done with collaborators in other countries, including Argentina, Canada, the Netherlands, Thailand, the United Kingdom, the United States, Singapore and Vietnam. The FMD risk-management project, funded by the livestock industries and Meat & Livestock Australia (MLA) Donor Company, focuses largely on testing vaccines in the Australian vaccine bank against FMD viruses currently circulating in southeast Asia.[164] Studies in cattle, sheep and pigs have investigated whether or not the vaccines protect animals against FMD, and how the virus behaves in the different animal models. For example, this work has determined the disease-causing potential of the viruses tested and the extent to which virus can be shared via saliva, nasal fluid and faeces from infected animals. It also demonstrated that in most cases, the vaccines in the Australian FMD vaccine bank will provide protection against clinical disease. This information will improve Australia's ability to respond to an FMD outbreak and minimise disruptions due to quarantine and trade restrictions. Ongoing testing of available vaccines will help to ensure that the current vaccine bank provides protection against newly emerging strains of this evolving virus. In July 2016, MLA obtained a $5 869 968 grant under the Rural Research and Development for Profit Program to support a project titled 'Improved surveillance, preparedness and return to trade for emergency animal disease incursions using FMD as a model' (see Section 4.6.1).

Other work conducted at AAHL includes research into trade-sensitive animal diseases such as African swine fever virus and diagnosis of diseases of aquatic animals (finfish, molluscs and crustaceans) with an emphasis on exotic and newly emerging diseases.

AAHL receives funding from CSIRO, the Australian Government Department of Agriculture and Water Resources, and external funding bodies.

CSIRO Agriculture and Food is also part of a trans-Tasman World Organisation for Animal Health (OIE) Collaborating Centre for Animal Welfare Science and Bioethical Analysis.

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10.3 Centre of Excellence for Biosecurity Risk Analysis

The Centre of Excellence for Biosecurity Risk Analysis (CEBRA) undertakes problem-based research into various aspects of biosecurity risk analysis on behalf of the Australian Government Department of Agriculture and Water Resources, and the New Zealand Ministry for Primary Industries. In 2016, CEBRA invested considerable effort in projects for animal biosecurity, some of which are described below. The described projects show a focus on management of the biosecurity risks associated with FMD, but the tools and principles developed are readily generalised to other pests.

Early detection of a pest has a very positive effect on incursion response outcomes; eradication is cheaper and more probable. CEBRA project

164 Funding was provided partly by the livestock industries in Australia, through AHA. The relevant industry bodies include the Cattle Council of Australia, Australian Dairy Farmers, the Australian Lot Feeders' Association, WoolProducers Australia, the Sheepmeat Council of Australia, Australian Pork Limited and the Goat Industry Council of Australia. The AHA funds are matched through the MLA Donor Company by the Australian Government under MLA Project P.PSH 0652.

1304A investigated the economic value of the use of bulk milk testing (BMT) for early detection of FMD. BMT can be justified if the FMD entry probability is sufficiently high or the cost of BMT is low. However, BMT may be well suited for post-outbreak surveillance, to shorten the length of time and size of an epidemic and to facilitate an earlier return to market. Further work, focusing on Victoria, compared the value of enhanced passive surveillance to a combination of passive and active surveillance, encompassing BMT and testing animals at saleyards.[165] The recommendation was to invest in improved producer reporting.

Finally, disease managers are faced with many challenges when deciding on the most effective disease control strategy to manage an outbreak. In an FMD outbreak, vaccination may assist in containment and eradication, but will be associated with additional costs due to removal or management and surveillance of the vaccinated population. Early information about the severity of an outbreak will help guide decisions on the suitability of vaccination. CEBRA used statistical modelling to try to predict disease severity using readily available indicators. This work showed that even relatively simple metrics available early in the control program can be used to predict the size of an FMD outbreak under Australian and New Zealand conditions.

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10.4 Cooperative research centres

10.4.1 Cooperative Research Centre for High Integrity Australian Pork

The Cooperative Research Centre (CRC) for High Integrity Australian Pork (Pork CRC) invests in improving animal health and promoting the more judicious use of antibiotics through Program 2 (Animal Health Management) of its research portfolio. Program 2 has three sub-programs:

- SP-1: diagnostic and health monitoring systems to control disease. Pork CRC researchers have developed new diagnostics and antimicrobial sensitivity profiles for most enteric and respiratory pathogens. These include *Escherichia coli, Lawsonia intracellularis, Brachyspira hyodysenteriae* isolates, *Mycoplasma hyopneumoniae, Actinobacillus pleuropneumoniae* and *Strepococcus suis*. Researchers have also established the risk factors for *E. coli* disease.
- SP-2: new pig genotypes and genetic technologies to enhance immune competence and disease resilience and robustness in Australian pig genetics. The program is based on existing and unique overseas lines, genomic and phenotypic relationships, and statistical methods for incorporating environmental and pathogen challenge data in current breeding programs.
- SP-3: integrated alternative health strategies and technologies to reduce reliance on antibiotics. Pork CRC has invested in the development of novel vaccines for *A. pleuropneumoniae* and *B. hyodysenteriae* and has developed a range of alternative strategies and technologies for reducing the impact of disease on animal health and performance. These include anti-inflammatories, genuine alternatives to antibiotics for weaner pigs and range of dietary strategies and technologies. More recent investment has been in understanding the impact of antibiotics and alternative strategies on the gut microbiome and how the changes relate to animal health and antibiotic resistance.

Pork CRC research projects funded between 2011 and 2016 are detailed on the Pork CRC website.

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10.4.2 Poultry Cooperative Research Centre

The key challenge for the Poultry CRC is to achieve sustainable, ethical poultry production using fewer resources with reduced environmental impacts. This is critical because the poultry industry is the

165 Garner MG, East IJ, Kompas T, Ha PV, Roche SE, Nguyen HTM. Comparison of alternatives to passive surveillance to detect foot-and-mouth disease incursions in Victoria, Australia. *Preventive Veterinary Medicine* 2016; 128: 78–86.

largest contributor of quality animal protein to Australia's food basket. 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 the end of its term in mid-2017.

The Poultry CRC is a joint venture between seven essential participants, having its headquarters at the University of New England in Armidale, New South Wales. The CRC has an extensive collaborative network of researchers, educators and support staff from more than 40 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 and Welfare) uses frontier science to deliver poultry health products and evidence-based welfare methods to industry.
- Program 2 (Nutrition and Environment) undertakes research to link the fundamental aspects of feeding to environmental outcomes.
- Program 3 (Safe and Quality Food Production) aims to control foodborne illness associated with poultry products.

An education program has also supplied financial support to 50 postgraduate students and 18 honours students, as well as developing educational resources for the school and vocational education and training sectors. As part of this program, a digital animation[166] was created to show the development of a chick embryo inside an egg. This freely accessible animation has been viewed more than a million times by a global audience, and used in many educational and commercial settings.

With the wind-up of the CRC's activities scheduled for 30 June 2017, a transition body, Poultry Hub Australia, has been established at the University of New England. Poultry Hub Australia will commence operations in early 2017 to ensure that the effective collaborative network, information-rich website, and other legacies of the Poultry CRC can continue to benefit the poultry industry.

166 www.poultryhub.org/embryo-2

Information about the CRC's progress is available from the Poultry CRC and Poultry Hub websites, and by subscribing to the eChook newsletter.

Contact: Poultry CRC
Email: admin@poultrycrc.com.au
Websites: www.poultrycrc.com.au, www.poultryhub.org

10.5 University research programs

10.5.1 Charles Sturt University

Charles Sturt University has an ongoing commitment to rural Australia and its livestock industries as well as an international focus. The School of Animal and Veterinary Sciences has Australian partners and collaborators through research centres such as the Graham Centre for Agricultural Innovation and international partners in, for example, Pakistan, India, Indonesia, Papua New Guinea, Fiji and China. These links allow the School to offer a breadth of exciting PhD training opportunities to Australian and international students.

Academic staff at the School of Animal and Veterinary Sciences have research interests in animal health across a range of species and disciplines. Research focuses on five research clusters: epidemiology, public health and biosecurity; animal health and disease diagnosis; farming systems; translational and clinical sciences; and learning and education. The school offers research training, with an emphasis on sustainable livestock production systems, theriogenology, equine medicine and surgery, and wildlife medicine. It has developed novel approaches to curriculum delivery to ensure that graduates benefit from leading-edge pedagogy, and uses research to inform further development of its educational programs.

The National Life Sciences Hub (NaLSH) on Charles Sturt University's Wagga Wagga campus provides world-class research laboratory facilities and a site for interaction and collaboration between researchers from the various schools on the campus and outside research organisations.

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10.5.2 James Cook University

At James Cook University (JCU), the Discipline of Veterinary Sciences within the College of Public Health, Medical and Veterinary Sciences, aims to provide global leadership to improve animal and human health in the tropics using a multi-disciplinary team of researchers. Particular strengths exist in five established groups, i.e. veterinary tropical diseases and food biosecurity, animal production, fertility in adverse environments, tropical rangeland ecosystems and aquatic animal health and disease. JCU also has strengths in related areas including medicine, biomedical sciences, marine science and tropical environments. In the most recent Australian Research Council Excellence in Research for Australia (ERA) survey (2015), the JCU Discipline of Veterinary Sciences achieved a ranking of 4 (above world standard).

One Health approaches are followed in helping to understand and improve the interdependent health and quality of life of wildlife, animals and humans in northern Australia as well as in proximate tropical regions. Current work involves both established infectious diseases (e.g. Johne's disease) and emerging infectious diseases (e.g. Hendra virus, chytridiomycosis and bovine ureaplasmosis), wildlife health surveillance, disease outbreak response and small mammal population declines. Other relevant areas of investigation, with an emphasis on the tropics, include:

- beef cattle and small ruminant nutrition, health and production
- improved cattle artificial breeding outcomes
- ecology and management of livestock parasites
- heat stress effects on boar fertility
- non-surgical sterilisation of male and female cattle
- health, welfare and behaviour of companion animals
- waterway clean-up algae as stock feed
- legumes to enhance livestock production within tropical pasture-based grazing systems
- evaluation of wildlife effects on available biomass.

The JCU Discipline of Veterinary Sciences was instrumental in establishing a regional food biosecurity network between Australia and selected Pacific Island countries. Research into trade networks and disease hotspots has shown where surveillance and biosecurity can be most cost effective.

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10.5.3 Murdoch University

Murdoch University maintains strong links to industry, other universities, and government and non-government organisations, ensuring translation and application of our research. Under the University's strategy on health futures, food security and sustainable development the School of Veterinary and Life Sciences has six research themes:

- animal and human health
- animal production, health and welfare
- marine, estuarine and freshwater science
- wildlife biology and conservation
- ecology, people and environment
- crop production and biosecurity.

The School of Veterinary and Life Sciences conducts One Health research into emerging, recurrent and zoonotic diseases, vector-borne diseases, and anti-parasitic drugs. A major research theme into antimicrobial resistance will see the opening of a $3.2 million high-throughput laboratory in 2017. International studies are conducted on the epidemiology and economics of FMD, control of rabies, the burden of brucellosis and toxoplasmosis in small ruminants, and transmission dynamics and control of avian and swine influenza.

Within the theme of animal production, health and welfare, there are research programs on animal behaviour, pain management, development of animal welfare assessment tools, nutrition for production, animal management for export, improved pathogen detection, and vaccine development. Food safety and public health research includes management of zoonotic diseases, livestock and watershed management, and studies into microbial contamination of meat

products. Production animal systems research includes reproductive and maternal efficiency, metabolic diseases and sustainable sheep parasite management. Meat, milk and fibre studies include nutrition and disease interactions and meat quality.

Biology and behavioural ecology of native, feral and invasive animals, health and disease of wildlife, and population management research includes projects as diverse as reptilian virology, infectious diseases of microbats and gastrointestinal parasites of orangutans, to the effect of habitat destruction on native cockatoos and the population genetics of understudied microbat species.

The School also conducts research into fish and marine wildlife health, responses of aquatic organisms to habitat and climate change, sustainability of fisheries, identification and responses to biosecurity threats, interdisciplinary marine systems research, responses to climate change, management of marine and coastal ecosystems, and sustainable marine tourism.

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Annual Research Report, Murdoch University School of Veterinary Science: www.murdoch.edu.au/School-of-Veterinary-and-Life-Sciences/Our-research

10.5.4 University of Adelaide

The School of Animal and Veterinary Sciences at the University of Adelaide began enrolling veterinary students in early 2008 and its first veterinary cohort graduated in late 2013. The School provides an outstanding environment for research, with high-quality infrastructure and access to industry and research facilities. Staff members are internationally recognised for their contributions to scientific and veterinary research.

The School is involved in several CRCs and has well established links with partner organisations that add considerably to the available research opportunities. Partner organisations include the South Australian Research and Development Institute, Primary Industries and Regions South Australia, the Pig and Poultry Production Institute, and Martindale Holdings. In addition, the School is continuing to build partnerships with Zoos South Australia and TAFE South Australia.

In 2016, the research interests of the School were embedded in five departments to recognise and highlight the School's research strengths:

- animal and veterinary bioscience
- pathobiology, infectious diseases and public health
- livestock production and health
- companion animal medicine, surgery and anaesthesia
- equine medicine, surgery and theriogenology.

Research interests include:

- animal anatomy and structural biology
- animal genetics
- animal models of human disease
- animal nutrition and physiology
- animal reproductive biology
- animal welfare, behaviour and ethics
- equine science
- pathobiology
- production animal health
- veterinary population and public health
- veterinary science and surgery
- wildlife ecology, health and disease.

The research profile of the School continues to expand, having gained a rank of 5 (well above international standards) in the field of veterinary science in the 2015 ERA rankings. Professor Wayne Hein is continuing as the Head of School and inaugural Dean of the Roseworthy Campus of the University of Adelaide.

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10.5.5 University of Melbourne

The Faculty of Veterinary and Agricultural Sciences 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 Animal

Welfare Science Centre jointly based at the Univeristy of Melbourne is a partner of the OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis. The faculty has particular interests in:

- antimicrobial resistance stewardship
- developing new vaccines and 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
- understanding the risk factors for, and mitigating against, catastrophic bone injury in horses
- understanding and manipulation of the plant, animal and soil microbiome
- developing new approaches to vaccination and assessing novel adjuvants
- developing animal models of human disease including asthma and gastrointestinal disorders
- dietary and other means to mitigate against heat stress in farm animals
- manipulation of the site of digestion of starch and protein to reduce disease risk and improve productivity in ruminants
- improving farm profitability and reducing production risk
- assessment and improvement of production animal behaviour and welfare
- understanding the epidemiology of mastitis in sheep and cattle
- pharmacology of vasoactive agents and the pathophysiology of laminitis
- wildlife disease surveillance.

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10.5.6 University of New England

The main strengths of the University of New England (UNE) are in the pastoral-based production systems with sheep and beef, as well as poultry production systems, with disciplinary strength in animal genetics, animal science and precision agriculture. The animal science group at UNE, located within the School of Environmental and Rural Science, has a long history of applied research in the areas of livestock genetics, nutrition and animal health. The current Australian Sheep and Poultry CRCs are located at UNE and have strong links into this group, as does the nearby CSIRO FD McMaster Laboratory. As a group, the animal science team tends to focus on interdisciplinary themes. The staff have diverse disciplinary backgrounds involved in the majority of projects, which are focused around three key areas:

- production efficiency and carbon management
- integrated health and welfare
- livestock and product quality.

The group works with most livestock species as well as feral and companion animals, and most of the projects are applied research funded by industry. The production efficiency research area involves projects on improvement in feed efficiency as a key industry objective for all livestock species. There is a global awareness that livestock have significant impacts on carbon emissions, and understanding, managing and mitigating impacts is a key area, with considerable focus on nutritional means of manipulating emissions.

Animal health and welfare are recognised as key issues that constrain production and limit efficiency and sustainability of livestock production. The group works to use genetics, nutrition, disease control and behaviour of animals as management tools and options to improve animal wellbeing in livestock and companion animals.

The third key research area involves factors linked to consumption of animal product. In Western cultures this is associated with product quality, and therefore research is primarily focused on how product quality can be manipulated and improved. The roles of basic genetics, nutrition, physiology and management strategies are all areas of research.

A strong integrating approach in our research is the use of intensive measurement and data in experimentation and management of agricultural systems, to provide better understanding and decision support for the improvement of productivity, animal health and environmental outcomes.

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10.5.7 University of Queensland

The School of Veterinary Science and the Queensland Alliance for Agriculture and Food Innovation at the University of Queensland conduct research to benefit livestock, companion animals and wildlife species. Through comparative medicine and One Health and EcoHealth research, the School also contributes to human health and wellbeing in a variety of countries. The School contains the Centre for Animal Welfare and Ethics which is a partner of the OIE Collaborating Centre for Animal Welfare and Bioethical Analysis. The school also houses the Animal Genetics Laboratory, which provides a genotyping service to the beef cattle industry and is also involved in genetics research.

Particular research interests and strengths of staff include:

- stem cell research
- antimicrobial and anti-parasitic drug resistance
- comparative oncology
- pathogenesis and treatment of equine laminitis
- health and production of livestock species in developing countries
- bovine mastitis, reproduction and nutrition
- wildlife diseases
- animal welfare
- veterinary education
- cattle genomics
- bacterial diseases in the intensive livestock industries
- cattle tick vaccine.

The School is located at the Gatton campus and has excellent laboratory and animal facilities, including access to a university dairy, piggery, poultry, equine and beef cattle facilities. The Queensland Animal Science Precinct is situated on the same campus and provides PC2-level animal housing for research in small and large animals.

Contact: Professor Glen Coleman
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Websites: veterinary-science.uq.edu.au/research; qaafi.uq.edu.au/centre-for-animal-science

10.5.8 University of Sydney

Research interests of the Faculty of Veterinary Science, University of Sydney, span animal health, livestock production science, One Health and zoonoses, and wildlife research. The Faculty's history is a remarkable one, with partnerships forged with rural industry organisations, CSIRO and government agriculture departments advancing the reproduction, nutrition, genetics and health of Australia's livestock, and our nation's enviable competitive trading status. These partnerships continue and are thriving, with joint projects in areas such as aquaculture, poultry nutrition, robotic dairying, semen sexing and footrot control.

International food production and food security research programs are supported by Australian and international aid and development agencies. Similarly, research in veterinary public health and biosecurity provides a link to collaborative programs in southeast Asia and Africa. The faculty is an international leader in research relating to companion animal health, welfare and behaviour, and comparative oncology.

Areas of research in animal health include:

- animal behaviour and welfare
- comparative oncology
- dogmanship
- equine research
- farm animal and veterinary public health
- inherited disorders
- livestock services and research
- microbiology
- molecular and diagnostic parasitology
- pathobiology
- photobiology
- research and clinical trials unit
- small animal clinical research
- strengthening food and nutrition security through family poultry and crop integration in Tanzania and Zambia
- zoonoses and One Health.

Areas of research in animal production include:

- animal reproduction
- Dairy Research Foundation
- genetics and genomics
- Poultry Research Foundation
- promotion of bone health in Chinese children.

Areas of research in wildlife conservation include:

- Australasian wildlife genomics
- educational research and practice management
- koala disease research
- reptile research
- wildlife and animal genetics
- wildlife health and conservation.

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10.6 Research and development corporations

The R&D corporations listed in this section invest in research by various service providers, including CSIRO, universities, commercial research organisations, government departments and CRCs, but most do not undertake research themselves.

10.6.1 Australian Egg Corporation Limited

The Australian Egg Corporation Limited (AECL) is a public, unlisted company limited by guarantee and established under the *Egg Industry Service Provision Act 2002 (Cwlth)*. AECL integrates on-farm, through-chain and market service provision for the benefit of all stakeholders. AECL is mainly funded through statutory promotional and R&D levies, received from all egg farmers and collected under the *Primary Industries (Excise) Levies Act 1999 (Cwlth)*, and through Australian Government funds for R&D activities in agreed program areas, including animal health.

The egg industry has experienced incursions of EADs, 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 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 directly with research institutions in projects and activities that affect the health of the laying flock, including:

- ensuring effective levels of on-farm quarantine and biosecurity
- completed research on flock uniformity, production and egg quality
- completed through-chain Salmonella risk-identification tool for stakeholders in the egg supply chain
- managing and enhancing rapid diagnosis of hen health problems
- engaging an animal health technical working group to provide industry with expertise through feedback and advice on animal health and maintenance of biosecurity.

Contact: Jojo Jackson
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Website: www.aecl.org/r-and-d

10.6.2 Australian Pork Limited

Australian Pork Limited (APL) is a unique rural industry service body for the Australian pork industry. It is a producer-owned company delivering integrated services that enhance the viability of Australia's pig producers. The industry places great emphasis on the welfare of our pigs, as evidenced by the inclusion of an animal welfare module in the Australian Pork Industry Quality Assurance Program (APIQ✓®). The APIQ✓® program covers 90% of the industry (by sow herd). Each year APIQ✓®-accredited producers are independently audited against the standards and performance indicators in the animal welfare module.

The Australian pork industry has specific welfare considerations, which the industry is refining through industry and stakeholder engagement. One of the greatest examples of industry's sense of duty to continuous improvement in animal welfare is the

commitment to phase out gestation stalls. In 2010, the Australian pork industry voted to voluntarily phase out gestation stalls by 2017. This decision was underpinned by decades of industry-funded research into sow loose housing, with the change providing freedom of movement, from five days after mating until one week before sows are due to farrow. Under the APIQ✓® Gestation Stall Free classification, 71% of the commercial breeding sows in Australia are currently verified as gestation stall free.

The industry's objectives for welfare are to uphold the duty of care to the animals they look after, to support producers by providing information and research outcomes and inform industry stakeholders about the activities and achievements in this area. Over the past five years, APL has invested over $2 million in welfare research alone to be at the forefront of innovative welfare science. This is the highest proportion of welfare spend to gross domestic product of any livestock industry.

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Email: pat.mitchell@australianpork.com.au
Website: australianpork.com.au/library-resources/research-reports/current-projects

10.6.3 Australian Wool Innovation Limited

The mission of Australian Wool Innovation Limited (AWI) is to invest in R&D and marketing and promotion to:

- increase the profitability, international competitiveness and sustainability of the Australian wool industry
- increase demand and market access for Australian wool.

The 2016 calendar year was covered by the operational plan for 2015–16. On-farm R&D focused on:

- sheep health, welfare and productivity (Strategy 1)
    - parasites and disease (consolidation of extension tools, support for regional grower groups focused on parasite control, research into new disease control technologies, and participation in the National Animal Biosecurity RD&E Strategy)
    - wild dog predation (investments in local and regional wild dog control efforts, and predation research)
    - invasive husbandry (reducing adverse impacts and developing alternatives)
    - genetics and genomics (e.g. across-flock benchmarking and new traits)
    - reproduction (support for grower training in all sheep production states)
- wool harvesting and quality preparation (Strategy 2)
    - support for in-shed training of shearers and wool handlers
    - promotion of excellence in the shearing industry
    - support for trainer development and national consistency
- production systems and eco-credentials
    - resource base (especially nitrogen and phosphorus use and perennialisation)
    - carbon (policy monitoring, and involvement in the Climate Change Research Strategy for Primary Industries)
- education and extension
    - improving capacity for grower skills (including support for grower extension networks)
    - stakeholder engagement and education (including leadership development and conduct of forums).

In addition, 2015–16 marked the final year of the three-year AWI Strategic Plan (2013–14 to 2015–16). During the year, AWI completed the following revised investment plans:

- AWI Strategic Plan 2016–17 to 2018–19
- Australian National Wool RD&E Strategy 2016–20
- Australian Wool Industry Emergency Animal Disease Preparedness RD&E Strategy 2016–20.

Contact: Dr Paul Swan
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Website: www.wool.com/on-farm-research-and-development

10.6.4 Dairy Australia Limited

Dairy Australia is the dairy industry's service company and is committed to supporting the current high levels of animal health and welfare on Australian dairy farms. Australia is fortunate that there are few diseases of importance affecting Australian dairy herds and most 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. The industry investment in RD&E has focused on projects for prevention and control of cattle diseases, genetic improvement, enhanced nutrition and improved animal handling and husbandry practices. Priorities for the dairy industry are the integration of biosecurity measures into whole-farm management and enhanced calf management.

Research projects provide information for dairy farmers and their advisors to prevent the occurrences of disease, achieve good animal welfare outcomes and to establish appropriate animal management systems and practices. The industry conducts several national projects addressing animal health topics and there are a large number of small regionally based projects. Countdown 2020 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. The Healthy Hooves program helps prevent lameness in dairy herds through good stockmanship, attention to herd nutrition and maintenance of yards and laneways.

To improve the skills of dairy farmers and their employees, Dairy Australia has established the National Centre for Dairy Education to develop and deliver vocational education and training for the dairy industry. The animal health and welfare content is regularly revised and updated. DairyBio, a new five-year initiative, will continue the partnership between industry and research sectors established under the Dairy Futures CRC (2010–2016). DairyBio will continue to use the progress in bioscience to deliver major improvements to plant and animal breeding.

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Website: dairybio.com.au

10.6.5 Fisheries Research and Development Corporation – Aquatic Animal Health Subprogram

The Fisheries Research and Development Corporation (FRDC) 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 FRDC's Aquatic Animal Health and Biosecurity Subprogram was established specifically to develop, support and manage a portfolio of aquatic animal health and biosecurity research projects, in consultation with the fisheries and aquaculture industry. The focus of the subprogram is infectious diseases (viral, bacterial, fungal and parasitic diseases) of finfish, crustaceans and molluscs.

Australian aquaculture continues to grow, and currently contributes 40% (about $1 billion) of the gross value of production of Australian fisheries ($2.49 billion). Although aquaculture is an important industry sector, R&D for aquatic animal health and biosecurity is required for all aquatic animal sectors, including the wild-catch, recreational and ornamental sectors, as well as non-commercial finfish, mollusc and crustacean (wildlife) stocks. The requirement for expert health and biosecurity 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 and Biosecurity Subprogram R&D Plan specifies six key research areas:

- nature of disease and host–pathogen interaction
- aquatic animal health management
- endemic and exotic aquatic animal disease diagnostics
- surveillance and monitoring
- aquatic animal disease therapy and prophylaxis
- training and capacity building.

More information can be found on the subprogram website. The Aquatic Animal Health and Biosecurity Subprogram R&D Plan can be obtained by contacting the subprogram leader.

Contact: Dr Mark Crane
Email: mark.crane@csiro.au
Website: frdc.com.au/research/aquatic_animal_health/Pages/default.aspx

10.6.6 Live Export Program Research Development and Extension

The Live Export Program (LEP) RD&E program focuses on three key strategies:

- improve animal health and welfare outcomes across the supply chain
- improve supply chain efficiency and regulatory performance
- enhance market access conditions for existing and new markets.

The largest area of investment for the RD&E program continues to be delivery of animal health and welfare (76%); supply chain efficiency and regulatory performance received 17% of the RD&E program funding, and the remaining 7% was allocated to market access and trade development.

In 2015–16, a key priority project for the LEP RD&E program was the development and delivery of the Livestock Global Assurance Program (LGAP). Other key project areas included securing multi-donor company funding in excess of $1 million to develop and trial a salmonella vaccine, monitoring the eating and drinking patterns of approximately 16 000 sheep throughout the inanition project, identification of animal welfare indicators through the supply chain, and heat management in the Middle East. Completion of the Beef Breeder Manual for Cold Winter Climates was another key program delivered.

Livestock Global Assurance Program

The objective of the LGAP project was to develop, pilot and deliver a global assurance program for the Australian livestock export industry that included all supporting materials including templates, standards and rules, implementation and communication plans and detailed costing. This project represented an ongoing effort by industry and has been subject to extensive consultation and consideration by many parties within and outside industry, and demonstrates the industry's commitment to animal welfare as well as a sustainable and secure future. A consultative committee comprised of industry and government

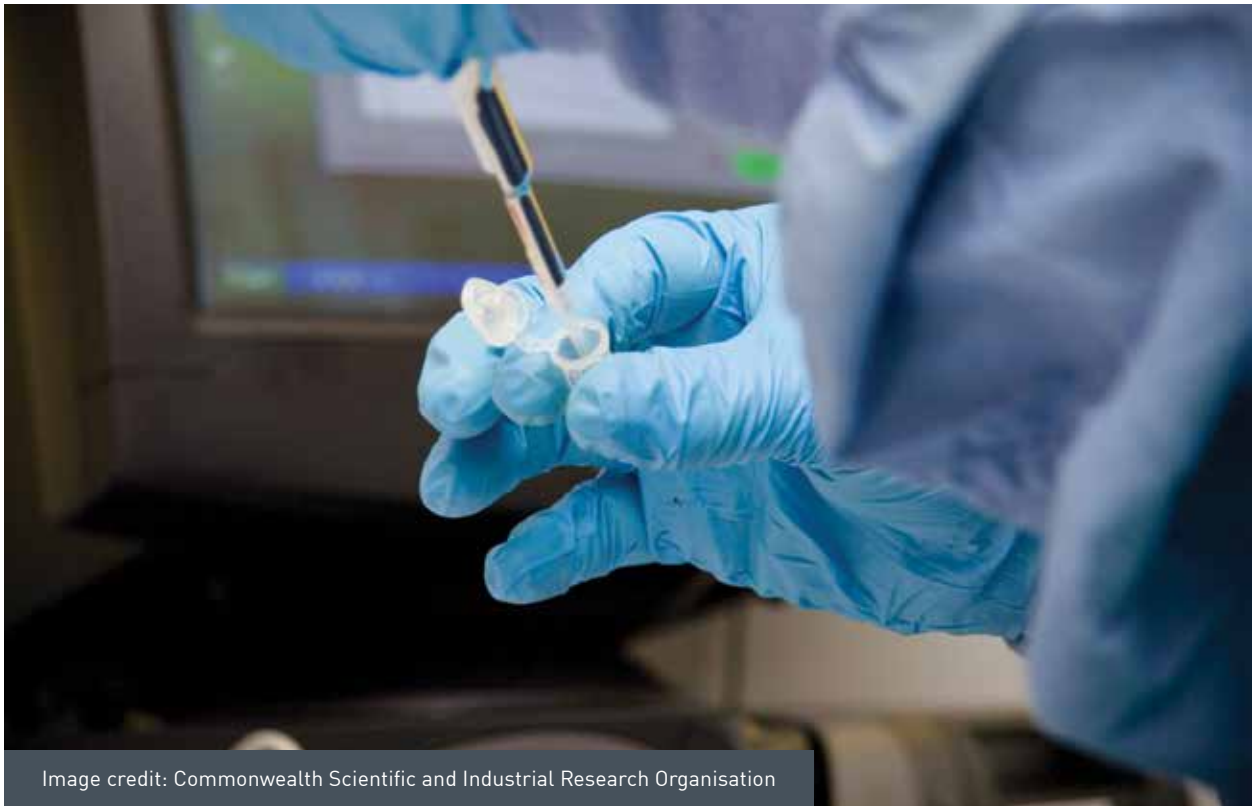

Image credit: Commonwealth Scientific and Industrial Research Organisation

representatives oversaw and guided the direction of the project.

The LGAP, co-funded by MLA, LiveCorp and the Australian Government, completed its pilot phase during 2015–16. Designed to improve on the Exporter Supply Chain Assurance System regulatory framework, the program was tested in Jordan (stunning sheep), Malaysia (non-stun goats), Indonesia (non-stun and stunning cattle) and Australia (exporters and importers) with the research outcomes now delivered to the Australian Livestock Exporters' Council for consideration and implementation with the wider industry.

The aim of the program is to enhance the long-term sustainability of the live export trade. As a certified, independent conformance program, the objective is that LGAP will improve audit robustness and apply more effective and direct accountability measures to assure animal welfare throughout the supply chain.

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Website: www.livestockglobalassurance.org

10.6.7 Meat & Livestock Australia

MLA invests in animal health research, including endemic, emerging and exotic diseases, to improve the profitability and sustainability of the beef cattle, sheep and goat industries in Australia. It also invests in research with a welfare focus, particularly aversive husbandry practices and on-farm mortality.

MLA invests in research into:

- Johne's disease: epidemiology
- respiratory disease in feedlot cattle
- plant toxicity
- nutritional and trace mineral deficiencies
- internal and external parasites in cattle, goats and sheep: prophylaxis, management, diagnosis and epidemiology
- vector-borne diseases such as *Theileria orientalis*: diagnosis and epidemiology
- control of scouring in sheep and young calves
- reproductive diseases of cattle and sheep
- sheep footrot: diagnosis and vaccination
- arthritis in lambs
- replacement of aversive husbandry practices, refinement of practices, best practice and pain relief
- reducing mortality through improved predator control, and improved lamb and calf survival.

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 and incursion control, bluetongue diagnosis and assessment of vector distribution, preparedness and response to FMD (see Section 4.6.1), and capripox diagnosis.

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10.6.8 Rural Industries Research and Development Corporation

The Rural Industries Research and Development Corporation (RIRDC) works with industry and government to increase knowledge that fosters sustainable, productive and profitable new and existing rural industries, and furthers understanding of national rural issues.

Most projects relating to animal health fall within the following RIRDC programs of RD&E:

- chicken meat
- honey bee and pollination
- horses (including Hendra virus)
- animal industries (new, developing and maturing).

In 2016, a substantial number of reports from completed projects relating to animal health were published. These can be accessed on the RIRDC website, together with details of projects in progress.

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Image credit: iStock

Image credit: iStock

APPENDIXES

APPENDIX A
LIVESTOCK INDUSTRIES IN AUSTRALIA

Australia is a major producer and exporter of livestock and livestock products. Animal production in Australia is based largely on extensive grazing and is dominated by the beef, dairy, wool and sheepmeat industries. Australia also has intensive pig and poultry industries.

Changes in livestock numbers since 2012–13 are shown in Table A1. Values for previous years may differ from those shown in previous publications as a result of revisions by the Australian Bureau of Statistics.

Table A1 Australian livestock numbers (millions)*

Livestock species	2012-13	2013-14	2014-15	2015-16
Sheep	75.5	72.6	70.9	68.7
Cattle				
Beef	26.5	26.3	24.6	23.3
Dairy	2.8	2.8	2.8	2.8
Total	29.3	29.1	27.4	26.1
Pigs	2.1	2.3	2.3	2.2
Poultry[a]	98.7	na	106.2	na

* Figures based on the Australian financial year (1 July to 30 June).

na = not available.

a Meat chickens and laying hens only

Sources: Australian Bureau of Agricultural and Resource Economics and Sciences (2017). *Agricultural commodities: March quarter 2017*, ABARES, Canberra. Australian Bureau of Statistics (2015). *Agricultural commodities, Australia*, 2014–15, cat. no. 7121.0, ABS, Canberra (for poultry data only).

Livestock industries are located across most agricultural and pastoral areas of Australia.

In 2015–16, the gross value of Australian livestock and livestock products was estimated to be $30.7 billion. Exports of livestock and livestock products were worth $22.1 billion.

Meat, wool and eggs

Australia has a highly developed meat industry. In 2015–16, the gross value of Australian livestock slaughtering was estimated to be $20.8 billion.

In 2015–16, Australian exports of beef, veal, sheepmeat, poultry and pork (not including live animals) were worth $10.7 billion. Selected export statistics are shown in Table A2.

Table A2 Volume of Australian meat exports (kilotonnes of shipped weight)*

Type of meat	2012-13	2013-14	2014-15	2015-16
Beef and veal	1052	1214	1376	1196
Mutton	153	186	180	156
Lamb	208	236	254	261
Pork	27	28	29	28
Poultry	32	37	36	29

* Figures based on the Australian financial year (1 July to 30 June).

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (2017). *Agricultural commodities: March quarter 2017*, ABARES, Canberra.

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 grazed across Australia's pastoral zone (Figure A1). Most Australian sheep are produced as part of mixed farming enterprises, frequently along with cropping and beef production.

In 2015–16, sheep numbers were estimated to have declined by 3.1% from the previous year to 68.7 million. This decline follows three consecutive years of declining sheep numbers as unfavourable seasonal conditions, combined with relatively strong lamb prices, resulted in high rates of turn-off.

Over the past decade, the sheep industry has shifted from wool production to meat production, reflecting relatively low returns for wool. A long-term decline in the demand for raw wool, coupled with growing demand for Australian lamb exports by the United States, Europe, the Middle East and Asia, has led to a greater emphasis on prime lamb production.

Total wool production is estimated to have declined by 5.4% in 2015–16 to 404 000 tonnes. Average wool cut per head is estimated to have fallen by 1.6% to 4.43 kilograms per sheep. Total wool exports decreased by 9.1% to 417 000 tonnes in greasy equivalent, while the value of wool exports increased by 4.1% to $3.3 billion. Selected production and export figures for the wool and sheepmeat industries are shown in Table A3.

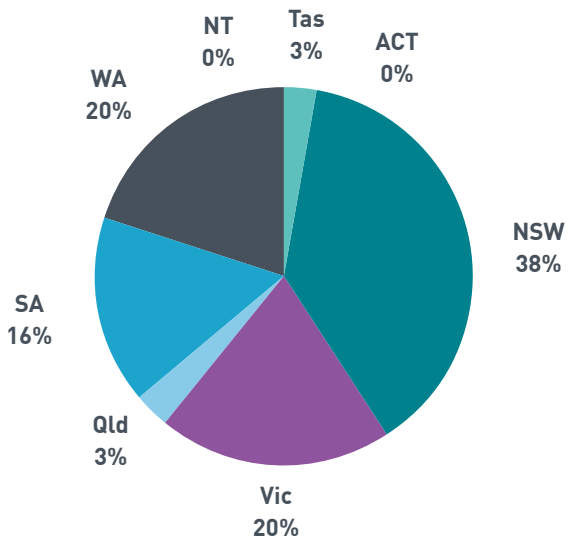

Figure A1 Sheep distribution by state and territory, 30 June 2015

ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; Qld = Queensland; SA = South Australia; Tas = Tasmania; Vic = Victoria; WA = Western Australia.

Source: Australian Bureau of Statistics (2015). *Agricultural commodities, Australia, 2014–15*, cat. no. 7121.0, ABS, Canberra.

Table A3 Australian sheep industry production*

Sheep production	2013–14	2014–15	2015–16
Sheep numbers (millions)	72.6	70.9	68.7
Sheep slaughterings (millions)	10.1	9.0	8.1
Lamb slaughterings (millions)	21.9	22.9	23.1
Total wool production (kilotonnes)	419.1	427.4	404.1
Mutton production (kilotonnes carcass weight)	227.9	214.4	196.0
Lamb production (kilotonnes carcass weight)	474.3	506.6	516.5
Sheepmeat exports (kilotonnes shipped weight)	422.7	433.5	417.2
Value of sheepmeat exports ($ million)	2305.6	2603.9	2470.0
Live sheep exports (millions)	2.0	2.2	1.9
Value of wool exports ($ million)	2877.0	3154.0	3284.0

* Figures based on the Australian financial year (1 July to 30 June).

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (2017). *Agricultural commodities: March quarter 2017*, ABARES, Canberra.

Beef cattle

Cattle are raised over much of Australia (see Figure A2). The main outputs are beef, animals for lot feeding and live cattle for export.

Across northern Australia, cattle are produced on large 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.

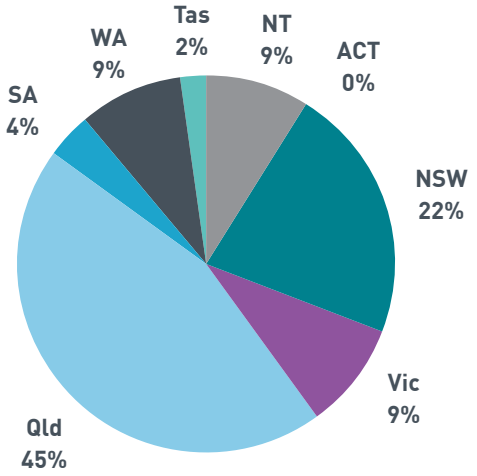

Figure A2 Beef cattle distribution by state and territory, 30 June 2015

ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; Qld = Queensland; SA = South Australia; Tas = Tasmania; Vic = Victoria; WA = Western Australia.

Source: Australian Bureau of Statistics (2015). *Agricultural commodities, Australia, 2014–15*, cat. no. 7121.0, ABS, Canberra.

In southern Australia, cattle are produced on smaller holdings than in the north. Breeds derived from *B. taurus* dominate.

Between 2013–14 and 2015–16, poor seasonal conditions and strong international demand for Australian beef resulted in a sharp increase in cattle turnoff, particularly in northern Australia. This, coupled with relatively low birth rates, led to a contraction in the Australian beef cattle herd to an estimated 23.3 million animals, 12% below the 2012–13 peak of 26.5 million.

The volume of Australian beef exports decreased by 13.5% in 2015–16 to approximately 1.2 million tonnes. The value of these exports decreased by 6.5% to approximately $8.3 billion. The number of live cattle exported for slaughter fell by 14% in 2015–16 to 1.1 million head (Table A4).

Table A4 Australian beef industry production*

Beef cattle production	2013–14	2014–15	2015–16
Total beef cattle (millions)	26.3	24.6	23.3
Slaughterings (millions)	9.5	10.1	8.8
Beef and veal production	21.9	22.9	23.1
(kilotonnes carcass weight)	2464.1	2661.6	2343.5
Live cattle exports (thousands)[a]	1005.7	1295.5	1114.2
Value of live cattle exports ($ million)[a]	794.5	1163.3	1280.2
Beef exports (kilotonnes shipped weight)	1214.0	1376.4	1195.9
Value of beef exports ($ million)	6422.0	9039.5	8494.6

* Figures based on the Australian financial year (1 July to 30 June).

a Live exports of feeder and slaughter cattle only; excludes breeder cattle.

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (2017). *Agricultural commodities: March quarter 2017*, ABARES, Canberra.

Pigs

The number of pigs slaughtered increased by 1.5% in 2015–16 to 5 million head (Table A5). Pigmeat production increased by 2% to approximately 378 000 tonnes, while the volume of Australian pigmeat exported also decreased by 2%, to approximately 27 000 tonnes (shipped weight).

Table A5 Australian pig industry production*			
Pig production	**2013–14**	**2014–15**	**2015–16**
Total pigs (millions)	2.3	2.3	2.2
Breeding sows, including gilts (thousands)	266.2	270.0	274.6
Slaughterings (millions)	4.8	4.9	5.0
Pigmeat production (kilotonnes carcass weight)	359.8	371.2	377.6
Pigmeat exports (kilotonnes shipped weight)	26.8	27.5	27.0
Value of pigmeat exports ($ million)	84.6	102.4	118.9
Gross value of production ($ million)	1081.1	1149.0	1353.1

* Figures based on the Australian financial year (1 July to 30 June).

na = not available.

Sources: Australian Bureau of Agricultural and Resource Economics and Sciences (2017). *Agricultural commodities: March quarter 2017*, ABARES, Canberra. Australian Bureau of Agricultural and Resource Economics and Sciences (2016). *Agricultural commodity statistics 2016*, ABARES, Canberra. (For breeding sow data only.)

The Australian Bureau of Statistics indicates that, at 30 June 2015, Australia had 1817 pig farms, holding a total of 271 000 sows.[167] In 2014–15, New South Wales had the largest number of pigs, followed by Victoria and Queensland.

Poultry meat and eggs

Poultry farming in Australia is an intensive industry, producing birds for meat and egg production. Meat chickens comprise approximately 85% of the flock and layer hens approximately 15%. 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 2015–16, 6206 businesses produced more than 326 million dozen eggs for human consumption. Approximately 50% of eggs are produced under intensive production systems, with the balance from free-range, barn-laid and organic systems.

The value of egg production is estimated to have decreased by approximately 0.18% in 2015–16 to $727.6 million (Table A6).

Table A6 Australian poultry industry production*			
Poultry production	**2013–14**	**2014–15**	**2015–16**
Meat chickens (millions)	na	88.6	na
Layer hens and pullets for egg production (millions)	15.3	17.5	na
Chicken slaughterings (millions)	579.9	590.6	623.3
Chicken meat production (kilotonnes carcass weight)	1084.3	1115.5	1150.1
Exports of poultry meat (kilotonnes shipped weight)[a]	36.7	35.7	29.0
Value of poultry meat exports ($ million)[a]	49.7	56.1	53.3
Value of egg production ($ million)	709.6	728.8	727.6
Value of meat production ($ million)	2344.0	2609.6	2747.1

* Figures based on the Australian financial year (1 July to 30 June).

na = not available.

a Excludes processed poultry meat.

Sources: Australian Bureau of Agricultural and Resource Economics and Sciences (2017). *Agricultural commodities: March quarter 2017*, ABARES, Canberra. Australian Bureau of Statistics (2015). *Agricultural commodities, Australia, 2014–15*, cat. no. 7121.0, ABS, Canberra. (For meat chicken, layer hen and pullet data only.)

167 Australian Bureau of Statistics (2015). *Agricultural commodities, Australia, 2013–14*, cat. no. 7121.0, ABS, Canberra.

Goats

Australia is the world's largest exporter of goat meat. In 2015–16, 2.16 million goats were slaughtered, supporting meat exports of 29 565 tonnes, valued at $226.4 million. The two largest export markets for Australian goat meat in 2015–16 were the United States and Taiwan, which accounted for 69% and 7% of these exports, respectively. Additionally, 80 730 live goats were exported in 2015–16, with an estimated value of $10.3 million. The largest markets for live goat exports in 2015–16 were Malaysia and the United Arab Emirates, which accounted for 74% and 11% of these exports, respectively.


Image credit: D L Stapleton

Game meat

Australia produces high-quality game meats from animals grazed on native grasslands. Game meat products include kangaroo, camel and buffalo.

Kangaroo

Australian exports of kangaroo meat for human consumption totalled 3427 tonnes in 2015–16, down 13% on the previous year. Belgium was the largest market, accounting for 28% of the total export volume, followed by Papua New Guinea (19%), Germany (18%) and the Netherlands (11%). The total value of the Australia's kangaroo meat exports was $18.8 million in 2015–16.

New South Wales, Queensland, South Australia and Western Australia commercially harvest kangaroos for export. In 2015, 1.6 million kangaroos were harvested by these states, Queensland accounted for around two-thirds of the total with 1.06 million kangaroos.

Camel

Australia is the largest exporter of camel meat in the world, accounting for around 95% of the trade in 2015. In 2015–16, Australian camel meat exports totalled 779 tonnes, all of which was shipped from South Australian ports. The largest markets were Morocco and the United States, which accounted for 70% and 22%, respectively. The total value of camel meat exports in 2015–16 was $4.7 million.

Australia also exports live camels but is a small supplier on the world market, accounting for less than 5% of the world camel trade in 2015. In 2015–16, a total of 273 camels were exported live, with the trade valued at $0.6 million. The United Arab Emirates was the largest market, accounting for 61% of the total value.

Buffalo

Australia exported 15 423 buffalo live in 2015–16, with 13 585 of these exported as live breeder buffalo. The trade was valued at $13 million. Malaysia and Indonesia were the largest markets for Australian live buffalo exports, accounting for 53% and 32%, respectively.

Dairy

The dairy industry (milk production) was the third largest rural industry in Australia by value of production in 2015–16. Victoria has 67% of the national dairy herd, followed by New South Wales (11%) and Tasmania (9%).

The Australian dairy cow herd fell by 1.6% in 2015–16 to 1.66 million as a result of increased culling of less productive cows, particularly in Victoria. This followed late-season step-downs in farmgate milk prices and the relatively strong saleyard prices for cows (Table A7).

Australian milk production decreased by 2% in 2015–16 to 9.5 billion litres. A lower farmgate price for milk is estimated to have resulted in the gross value of milk production falling 13.1% in 2015–16, to $4.1 billion.

Table A7 Australian dairy industry production*

Dairy production	2013–14	2014–15	2015–16
Dairy cow numbers (millions)	1.65	1.69	1.66
Total milk production (million litres)	9372.4	9731.7	9539.4
Milk yield per cow (litres)	5691.7	5760.6	5736.3
Gross value of milk production ($ million)	4729.4	4722.1	4102.0

* Figures based on the Australian financial year (1 July to 30 June).

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (2017). *Agricultural commodities: March quarter 2017*, ABARES, Canberra.

In 2015–16, Australia exported dairy products worth $3 billion to about 100 countries (Table A8).

Table A8 Australian dairy production and exports (kilotonnes)*

	Total production			Exports		
Dairy product	2013–14	2014–15	2015–16	2013–14	2014–15	2015–16
Cheese	311.5	344.1	344.3	150.6	158.7	171.9
Butter and butter fat	116.1	118.6	117.6	49.3	43.6	33.6
Milk powders[a]	340.8	339.1	321.9	240.5	256.0	238.9

* Figures based on the Australian financial year (1 July to 30 June).

a Includes whole milk powder, skim milk powder and casein.

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (2017). *Agricultural commodities: March quarter 2017*, ABARES, Canberra.

Image credit: iStock

Fisheries and aquaculture

Australia has diverse wild-catch and aquaculture fisheries that produce both native and introduced species. In 2014–15, the gross value of fisheries production was approximately $2.8 billion. The volume and value of fisheries production for 2013–14 and 2014–15 are shown in Table A9.

Table A9 Australian fisheries production by species*

	Volume of production (kilotonnes)		Value of production ($ million)	
Fishery	**2013–14**	**2014–15**	**2013–14**	**2014–15**
Abalone	4.7	4.6	163.9	164.4
Oysters	11.6	10.9	91.3	92.3
Prawns	25.0	25.1	338.5	358.3
Rock lobster	10.4	10.3	586.1	667.6
Salmonids	41.8	48.6	543.0	630.8
Scallops	4.4	4.3	11.3	11.3
Tuna	10.7	12.4	146.7	160.9
Other fish	101.3	101.0	403.2	433.7
Other crustaceans and molluscs[a]	13.1	18.5	185.8	241.2
Total[ab]	223.1	235.7	2469.8	2760.5

* Figures based on the Australian financial year (1 July to 30 June).

a Volume excludes pearl oysters.

b Figures may not add to totals due to rounding. Includes aquaculture production but excludes hatchery production.

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (2016). *Australian fisheries and aquaculture statistics 2015*, ABARES, Canberra.

Farmed aquaculture production in Australia includes many major species, such as tuna, salmon, barramundi, abalone and oysters. It is an important component of production from Australian fisheries. Between 2004–05 and 2014–15, the share from the aquaculture sector of the total value of production from Australian fisheries grew from 30% to 43%. The volume of aquaculture production in Australia increased by 19% in 2014–15, to approximately 89 200 tonnes. The value of aquaculture production increased from 2013–14 to 2014–15 by 19%, to approximately $1.2 billion.

Selected figures for the volume of production and gross value of aquaculture harvests in 2014–15 are shown in Table A10.

Image credit: Joshua Smith

Table A10 Australian aquaculture production, 2014–15*

Aquaculture production	Volume of production (kilotonnes)	Gross value of production ($ thousand)
Fish		
Barramundi	3.8	37 058
Salmonids	48.6	630 842
Silver perch	0.3	3 949
Tuna	8.4	130 670
Other[a]	1.7	26 452
Total[b]	62.8	828 971
Crustaceans		
Marron	0.06	2 013
Prawns	5.3	86 288
Redclaw	0.05	1 043
Yabbies	0.03	785
Total[b]	5.4	90 129
Molluscs		
Abalone	0.8	28 685
Mussels	3.7	11 714
Oysters – edible	10.9	92 314
Oysters – pearl	na	67 863
Total[b]	15.4	200 576
Production not included elsewhere	5.6	66 492
Total[b,c] (all categories)	89.2	1 186 167

* Figures based on the Australian financial year (1 July to 30 June).

na = not available.

a Includes eels, other native fish and aquarium fish.

b Figures may not add to totals due to rounding.

c Total volume excludes pearl oysters.

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (2016). *Australian fisheries and aquaculture statistics 2015*, ABARES, Canberra.

Exports of Australian edible fisheries products, shown in Table A11, totalled 62 100 tonnes and were worth $1.4 billion in 2015–16.

Table A11 Exports of Australian fisheries products[a]*

	Volume (kilotonnes)			Value ($ thousand)		
Type of food	**2013–14**	**2014–15**	**2015–16**	**2013–14**	**2014–15**	**2015–16**
Edible	38.9	43.3	62.1	1138 348	1292 656	1418 323
Non-edible	na	na	na	165 904	146 965	123 460

* Figures based on the Australian financial year (1 July to 30 June).

na = not available.

a Excludes live tonnage, includes live value.

Source: Australian Bureau of Agricultural and Resource Economics and Sciences (2016). *Australian fisheries and aquaculture statistics 2015*, ABARES, Canberra.

Bees and bee products

In 2015–16 the gross value of the bee industry as a whole was estimated at $110 million, of which around 88% was from honey production. The remainder was made up of beeswax, pollination services, and exports of package bees and queens.

The Australian honey bee industry comprises approximately 13 400 registered beekeepers, operating about 448 000 hives of European honey bees. On average, Australian beekeepers operated 393 hives in 2014–15. New South Wales had the highest average number of hives per beekeeping business (524 hives) and Queensland had the lowest average number of hives per business (226 hives). Australian beekeepers produced an average of 23.4 tonnes of honey in 2014–15, but the scale of production around this estimate varied widely, with approximately one-half of beekeepers producing less than 8 tonnes. The mix of products also varied across the industry; 25% of beekeepers produced beeswax for sale, but fewer than 1% produced and sold pollen.

Australia exported 4479 tonnes of honey (including comb) in 2015–16 and a further 266 tonnes of beeswax. China was the largest destination for bee products, accounting for 15% of the total. The Philippines (10%) and Singapore (1%) are also important markets for Australian honey and beeswax exporters. The total value of Australian honey and beeswax exports was $49 million in 2015–16, up 23% on the previous year.

Australia also exported around 25 000 live bees in 2015–16, with 80% of the total shipped to Canada. The value of Australian live bee exports was $1.1 million in 2015–16, down 26% on the previous year.

Further information

Further information on each of the industries may be found at the relevant industry websites (see Appendix B).

Other Australian agricultural statistics and forecasts are available from the Australian Bureau of Agricultural and Resource Economics and Sciences.[168]

168 www.agriculture.gov.au/abares

APPENDIX B
KEY AUSTRALIAN ANIMAL HEALTH WEBSITES

Accreditation Program for Australian Veterinarians	www.animalhealthaustralia.com.au/training-centre/accreditation-program-for-australian-veterinarians-apav
Animal Health Australia	www.animalhealthaustralia.com.au
Animal Health Surveillance Quarterly	www.animalhealthaustralia.com.au/our-publications/animal-health-surveillance-quarterly
AQUAPLAN	www.agriculture.gov.au/animal/aquatic/aquaplan
AQUAVETPLAN	www.agriculture.gov.au/animal/aquatic/aquavetplan
AUS-MEAT Limited	www.ausmeat.com.au
Australasian Veterinary Boards Council	www.avbc.asn.au
Australian Alpaca Association	www.alpaca.asn.au
Australian Border Force	www.border.gov.au
Australian Centre for International Agricultural Research	www.aciar.gov.au
Australian Chicken Meat Federation	www.chicken.org.au
Australian Chief Veterinary Officer	www.agriculture.gov.au/animal/health/acvo
Australian Dairy Farmers	www.australiandairyfarmers.com.au
Australian Egg Corporation Limited	www.aecl.org
Australian Food & Grocery Council	www.afgc.org.au
Australian Government Department of Agriculture and Water Resources	www.agriculture.gov.au
Australian Government Department of Foreign Affairs and Trade Overseas Aid Program (Australian Aid)	dfat.gov.au/aid/Pages/australias-aid-program.aspx
Australian Government Department of Health	www.health.gov.au
Australian Harness Racing	www.harness.org.au
Australian Honey Bee Industry Council	www.honeybee.org.au
Australian Horse Industry Council	www.horsecouncil.org.au
Australian Livestock Export Corporation (LiveCorp)	www.livecorp.com.au
Australian Lot Feeders' Association	www.feedlots.com.au
Australian National Quality Assurance Program	www.anqap.com
Australian Pork Limited	www.australianpork.com.au

Australian Poultry Cooperative Research Centre	www.poultrycrc.com.au
Australian Q Fever Register	www.qfever.org
Australian Veterinary Association	www.ava.com.au
Australian Wool Innovation Limited	www.wool.com
Australia's animal health laboratory network	www.agriculture.gov.au/animal/health/system/lab-network
AUSVETPLAN	www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/ausvetplan
Biosecurity in Australia	www.agriculture.gov.au/biosecurity/australia
Biosecurity risk analysis	www.agriculture.gov.au/biosecurity/risk-analysis
Cattle Council of Australia	www.cattlecouncil.com.au
Centre of Excellence for Biosecurity Risk Analysis	www.cebra.unimelb.edu.au
Cooperative Research Centre for High Integrity Australian Pork	www.porkcrc.com.au
Cooperative Research Centre for Sheep Industry Innovation	www.sheepcrc.org.au
CSIRO Australian Animal Health Laboratory	www.csiro.au/en/Research/Facilities/AAHL
Dairy Australia	www.dairyaustralia.com.au
Deer Industry Association of Australia	www.deerfarming.com.au
Department of Agriculture and Fisheries, Queensland	www.daf.qld.gov.au
Department of Agriculture and Food, Western Australia	www.agric.wa.gov.au
Department of Economic Development, Jobs, Transport and Resources	www.economicdevelopment.vic.gov.au
Department of Fisheries, Western Australia	www.fish.wa.gov.au
Department of Primary Industries, New South Wales	www.dpi.nsw.gov.au
Department of Primary Industries, Parks, Water and Environment, Tasmania	www.dpipwe.tas.gov.au
Department of Primary Industry and Resources, Northern Territory	www.dpir.nt.gov.au
Faculty of Veterinary and Agricultural Sciences, University of Melbourne	www.fvas.unimelb.edu.au
Faculty of Veterinary Science, University of Sydney	www.sydney.edu.au/vetscience
Farm Biosecurity	www.farmbiosecurity.com.au
Fisheries Research and Development Corporation, Aquatic Animal Health	www.frdc.com.au
Food Standards Australia New Zealand	www.foodstandards.gov.au
Goat Industry Council of Australia	www.gica.com.au
Livestock Biosecurity Network	www.lbn.org.au
Meat & Livestock Australia	www.mla.com.au

National Animal Health Information System	www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/national-animal-health-information-system-nahis
National Animal Health Performance Standards	www.animalhealthaustralia.com.au/what-we-do/laboratory-services/national-animal-health-performance-standards
National Farmers' Federation	www.nff.org.au
National Notifiable Diseases Surveillance System	www.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-nndss-nndssintro.htm
National pest & disease outbreaks	www.outbreak.gov.au
National Transmissible Spongiform Encephalopathies Surveillance Program	www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/tse-freedom-assurance-program/surveillance-of-tses
Primary Industries and Regions South Australia	www.pir.sa.gov.au
Racing Australia	www.racingaustralia.horse
Rural Industries Research and Development Corporation	www.rirdc.gov.au
SAFEMEAT	www.safemeat.com.au
School of Animal & Veterinary Sciences, Charles Sturt University	www.csu.edu.au/vet
School of Animal and Veterinary Sciences, University of Adelaide	www.adelaide.edu.au/vetsci
College of Public Health, Medical and Veterinary Sciences, James Cook University	www.jcu.edu.au/college-of-public-health-medical-and-veterinary-sciences
School of Veterinary and Life Sciences, Murdoch University	www.murdoch.edu.au/School-of-Veterinary-and-Life-Sciences
School of Veterinary Science, University of Queensland	www.veterinary-science.uq.edu.au
Sheepmeat Council of Australia	www.sheepmeatcouncil.com.au
Wildlife Health Australia	www.wildlifehealthaustralia.com.au
Wool Producers Australia	www.woolproducers.com.au

APPENDIX C
INVESTIGATIONS OF CERTAIN EMERGENCY ANIMAL DISEASES AND NATIONALLY NOTIFIABLE ANIMAL DISEASES

Australia maintains a National List of Notifiable Animal Diseases of Terrestrial Animals. Investigations during 2016 of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases are recorded in the National Animal Health Information System (Section 2.3) and are reported in Table C1. Additional information on some disease investigations is recorded in individual programs: anthrax (Section 2.4.2), avian influenza (Section 4.6.2), bovine brucellosis (Section 3.2.2), infection with equid herpesvirus 1 (abortigenic and neurological strains) (Section 2.4.12), infection with Newcastle disease (Section 2.4.17), and transmissible spongiform encephalopathies (Section 3.3.2). Wildlife health surveillance activities are reported in Section 3.2.5.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Acariasis – tracheal mite (*Acarapis Woodi*)	Bees	Qld	33	2	Negative
Avian influenza	Bird	NSW	5	2	Negative
	Bird	NT	4	2	Negative
	Bird	Qld	4	3	Negative
	Bird	Qld	3	2	Negative
	Bird	SA	2	2	Negative
	Bird	SA	3	3	Negative
	Bird	Tas	5	2	Negative
	Bird	Vic	37	2	Negative
	Bird	WA	6	2	Negative
	Chicken	NSW	52	2	Negative
	Chicken	NT	20	2	Negative
	Chicken	Qld	1	3	Negative
	Chicken	Qld	43	2	Negative
	Chicken	SA	1	3	Negative
	Chicken	SA	20	2	Negative
	Chicken	Tas	8	2	Negative
	Chicken	Vic	1	3	Negative
	Chicken	Vic	51	2	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016					
Disease	**Species**	**State**	**No. of investigations**	**Response Code[a]**	**Finding**
Avian influenza *continued*	Chicken	WA	5	3	Negative
	Chicken	WA	48	2	Negative
	Duck	NSW	1	2	Negative
	Duck	Qld	2	2	Negative
	Duck	Tas	1	2	Negative
	Duck	WA	1	2	Negative
	Turkey	NSW	5	2	Negative
	Turkey	NT	1	2	Negative
	Turkey	SA	1	2	Negative
	Turkey	Vic	4	2	Negative
	Turkey	WA	1	2	Negative
African horse sickness virus	Horse	WA	2	3	Negative
African swine fever	Pig	NSW	1	3	Negative
	Pig	NT	1	3	Negative
	Pig	Qld	1	3	Negative
	Pig	SA	2	3	Negative
	Pig	Vic	1	3	Negative
	Pig	WA	4	3	Negative
American foulbrood (*Paenibacillus larvae*)	Bees	NT	1	5	Positive
	Bees	NT	11	3	Negative
	Bees	NT	1	2	Negative
	Bees	Qld	96	2	Positive
	Bees	Qld	48	2	Negative
	Bees	SA	54	2	Positive
	Bees	SA	124	2	Negative
Anaplasmosis in tick free areas	Cattle	NSW	1	2	Negative
	Cattle	WA	6	2	Negative
Anthrax	Alpaca	Qld	1	2	Negative
	Alpaca	Vic	2	2	Negative
	Camel	Vic	1	2	Negative
	Cattle	NSW	80	2	Negative
	Cattle	NSW	3	2	Positive
	Cattle	NT	1	2	Negative
	Cattle	Qld	1	2	Negative
	Cattle	Vic	54	2	Negative
	Cattle	WA	5	2	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016					
Disease	**Species**	**State**	**No. of investigations**	**Response Code[a]**	**Finding**
Anthrax *continued*	Dog	NSW	2	2	Negative
	Goat	NSW	3	2	Negative
	Hippopotamus	NSW	1	2	Negative
	Horse	NSW	2	2	Negative
	Horse	Qld	1	2	Negative
	Horse	SA	1	2	Negative
	Pig	NSW	1	2	Negative
	Sheep	NSW	38	2	Negative
	Sheep	NSW	2	2	Positive
	Sheep	SA	1	2	Negative
	Sheep	Vic	13	2	Negative
Aujezsky's disease	Pig	SA	2	3	Negative
	Pig	Vic	1	3	Negative
	Pig	WA	4	3	Negative
Australian bat lyssavirus	Camel	WA	1	3	Negative
	Cat	Vic	1	3	Negative
	Cattle	Qld	2	2	Negative
	Dog	NT	1	3	Negative
	Dog	Qld	1	3	Negative
	Dog	Qld	1	2	Negative
	Horse	NSW	1	2	Negative
	Horse	Qld	16	2	Negative
	Horse	Vic	1	3	Negative
	Pig	SA	1	3	Negative
	Primate	Vic	1	3	Negative
Babesiosis in tick free areas	Cattle	NSW	17	2	Negative
	Cattle	WA	8	2	Negative
	Sheep	NSW	1	2	Negative
Bluetongue – clinical disease[b]	Camelid	NSW	1	2	Negative
	Cattle	NSW	3	2	Negative
	Cattle	SA	2	3	Negative
	Cattle	SA	2	2	Negative
	Cattle	Vic	1	3	Negative
	Cattle	WA	1	3	Negative
	Cattle	WA	3	2	Negative
	Goat	NT	2	2	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Bluetongue – clinical disease[b] *continued*	Goat	Vic	1	2	Negative
	Goat	WA	1	2	Negative
	Sheep	NSW	1	3	Negative
	Sheep	NSW	13	2	Negative
	Sheep	Qld	1	2	Negative
	Sheep	SA	1	3	Negative
	Sheep	SA	5	2	Negative
	Sheep	Tas	1	3	Negative
	Sheep	Vic	1	3	Negative
	Sheep	WA	1	3	Negative
	Sheep	WA	28	2	Negative
Bovine virus diarrhoea type 2	Cattle	WA	2	2	Negative
	Pig	NT	1	3	Negative
Brucellosis (*Brucella abortus, B. suis, B. canis* and *B. melitensis*)[c]	Alpaca	Vic	1	2	Negative
	Cattle	NSW	8	2	Negative
	Cattle	Qld	14	2	Negative
	Cattle	SA	17	2	Negative
	Cattle	Tas	7	2	Negative
	Cattle	Vic	37	2	Negative
	Cattle	WA	35	2	Negative
	Dog	NSW	25	2	Positive
	Dog	NSW	173	2	Negative
	Dog	Qld	3	3	Positive
	Dog	Qld	4	2	Positive
	Dog	Qld	14	2	Negative
	Dog	WA	3	3	Negative
	Dog	WA	3	2	Negative
	Goat	Vic	2	2	Negative
	Goat	WA	1	2	Negative
	Horse	NT	1	3	Negative
	Horse	Qld	1	2	Negative
	Pig	NSW	6	2	Negative
	Pig	Qld	3	2	Negative
	Pig	SA	5	2	Negative
	Pig	WA	1	3	Negative
	Pig	WA	2	2	Negative
	Sheep	SA	3	2	Negative
	Sheep	WA	5	2	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Bungowannah virus (porcine myocarditis)	Pig	NSW	2	2	Negative
Classical swine fever	Pig	NSW	1	3	Negative
	Pig	SA	4	3	Negative
	Pig	Vic	1	3	Negative
	Pig	WA	8	3	Negative
	Pig	WA	4	2	Negative
Contagious agalactia	Sheep	WA	8	2	Negative
Contagious bovine pleuropneumonia	Cattle	WA	8	2	Negative
Cysticercus bovis (*Taenia saginata*)	Cattle	Vic	1	2	Negative
Duck herpesvirus 1 (duck viral enteritis/duck plague)	Bird	WA	1	2	Negative
East Coast fever (*Theileria parva*) and Mediterranean theileriosis (*T. annulata*)	Cattle	WA	3	2	Negative
Enzootic abortion of ewes	Pig	WA	1	3	Negative
	Sheep	WA	2	3	Negative
	Sheep	WA	3	2	Negative
Enzootic bovine leucosis	Cattle	NSW	4	2	Negative
	Cattle	SA	1	2	Negative
	Cattle	Vic	2	2	Negative
Equid herpesvirus 1 (abortigenic and neurological disease)	Horse	NSW	9	2	Positive (8 abortigenic; 1 neurological)
	Horse	NSW	196	2	Negative
	Horse	NT	1	2	Negative
	Horse	Qld	1	2	Positive (abortigenic)
	Horse	Qld	41	2	Negative
	Horse	SA	3	2	Negative
	Horse	Tas	2	2	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Equid herpesvirus 1 (abortigenic and neurological disease) *continued*	Horse	Vic	3	2	Positive (2 abortigenic; 1 neurological)
	Horse	Vic	7	2	Negative
	Horse	WA	7	3	Negative
	Horse	WA	3	2	Negative
Equine encephalomyelitis (eastern, western and Venezuelan)	Horse	WA	4	3	Negative
Equine infectious anaemia	Horse	NSW	4	2	Negative
	Horse	Qld	1	2	Positive
	Horse	Qld	6	2	Negative
	Horse	SA	1	2	Negative
	Horse	Vic	50	2	Negative
	Horse	WA	4	2	Negative
Equine influenza	Horse	NSW	1	2	Negative
	Horse	Vic	1	3	Negative
	Horse	Vic	2	2	Negative
Equine viral arteritis	Horse	NSW	3	2	Negative
	Horse	Qld	3	2	Negative
	Horse	Vic	1	2	Positive
	Horse	Vic	45	2	Negative
	Horse	WA	4	2	Negative
European foulbrood (*Melissococcus plutonius*)	Bees	NT	1	5	Positive
	Bees	NT	2	3	Positive
	Bees	NT	11	3	Negative
	Bees	Qld	20	2	Positive
	Bees	Qld	123	2	Negative
	Bees	SA	8	2	Positive
	Bees	SA	26	2	Negative
Foot-and-mouth disease	Cattle	NSW	12	3	Negative
	Cattle	Qld	2	3	Negative
	Cattle	SA	7	3	Negative
	Cattle	SA	1	2	Negative
	Cattle	Vic	22	3	Negative
	Cattle	Vic	1	2	Negative
	Cattle	WA	5	3	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Foot-and-mouth disease *continued*	Pig	NSW	2	3	Negative
	Pig	NT	1	3	Negative
	Sheep	NSW	3	3	Negative
	Sheep	Qld	1	3	Negative
	Sheep	SA	3	3	Negative
	Sheep	Vic	14	3	Negative
	Sheep	WA	5	3	Negative
Fowl typhoid (*Salmonella Gallinarum*)	Bird	WA	1	2	Negative
Haemorrhagic septicaemia	Cattle	WA	2	2	Negative
Hendra virus	Camel	WA	1	3	Negative
	Dog	NSW	1	2	Negative
	Dog	Qld	1	3	Negative
	Dog	Qld	1	2	Negative
	Donkey	Qld	3	2	Negative
	Horse	NSW	1	2	Positive
	Horse	NSW	255	2	Negative
	Horse	NT	1	3	Negative
	Horse	NT	10	2	Negative
	Horse	Qld	685	2	Negative
	Horse	SA	3	3	Negative
	Horse	Tas	1	3	Negative
	Horse	Vic	9	3	Negative
	Horse	Vic	5	2	Negative
	Horse	WA	6	3	Negative
	Pig	SA	1	3	Negative
Louping ill	Sheep	WA	1	3	Negative
Lumpy skin disease	Cattle	SA	1	3	Negative
Malignant catarrhal fever – wildebeest-associated	Cattle	NSW	2	3	Negative
	Cattle	WA	2	2	Negative
Menangle virus	Horse	NSW	1	2	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Newcastle disease (virulent)	Bird	NSW	3	2	Negative
	Bird	NT	4	2	Negative
	Bird	Qld	4	2	Negative
	Bird	SA	2	2	Negative
	Bird	SA	3	3	Negative
	Bird	Tas	4	2	Negative
	Bird	Vic	35	2	Negative
	Bird	WA	6	2	Negative
	Chicken	NSW	52	2	Negative
	Chicken	NT	20	2	Negative
	Chicken	Qld	41	2	Negative
	Chicken	SA	1	3	Negative
	Chicken	SA	20	2	Negative
	Chicken	Tas	4	2	Negative
	Chicken	Vic	50	2	Negative
	Chicken	WA	4	3	Negative
	Chicken	WA	47	2	Negative
	Duck	NSW	1	2	Negative
	Duck	Qld	2	2	Negative
	Duck	WA	1	2	Negative
	Turkey	NSW	5	2	Negative
	Turkey	NT	1	2	Negative
	Turkey	SA	1	2	Negative
	Turkey	Vic	4	2	Negative
	Turkey	WA	1	2	Negative
Nipah virus infection	Pig	SA	2	3	Negative
Porcine epidemic diarrhoea virus	Pig	NT	1	3	Negative
	Pig	Vic	1	3	Negative
	Pig	WA	5	3	Negative
Porcine reproductive and respiratory syndrome	Pig	NT	1	3	Negative
	Pig	Vic	1	3	Negative
	Pig	WA	13	3	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Post-weaning multi-systemic wasting syndrome	Pig	WA	1	2	Negative
Rabies	Dog	NT	1	3	Negative
	Dog	Qld	1	3	Negative
	Dog	Vic	1	3	Negative
Salmonellosis (*Salmonella abortusovis*)	Sheep	WA	4	2	Negative
Screw-worm fly – New World (*Cochliomyia hominivorax*)	Dog	NT	1	3	Negative
	Sheep	WA	1	2	Negative
Screw-worm fly – Old World (*Chrysomya bezziana*)	Cattle	Qld	1	2	Negative
	Dog	Qld	4	2	Negative (2 related investigations in July)
	Sheep	WA	1	2	Negative
Sheep pox and goat pox	Sheep	NSW	1	3	Negative
	Sheep	WA	1	3	Negative
	Sheep	WA	2	2	Negative
Surra (*Trypanosoma evansi*)	Buffalo	NT	1	3	Negative
	Cattle	NT	1	3	Negative
	Horse	WA	2	3	Negative
Swine influenza	Pig	Qld	1	2	Negative
	Pig	SA	1	3	Positive[d]
	Pig	WA	1	3	Positive[d]
	Pig	WA	12	2	Negative
Swine vesicular disease virus	Pig	NSW	1	3	Negative
Transmissible gastroenteritis	Pig	Vic	1	3	Negative
	Pig	WA	5	3	Negative
Transmissible spongiform encephalopathies[e]	Cattle	NSW	147	3	Negative
	Cattle	NSW	98	2	Negative
	Cattle	NT	1	3	Negative
	Cattle	NT	14	2	Negative
	Cattle	Qld	34	3	Negative
	Cattle	Qld	122	2	Negative
	Cattle	SA	4	3	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Transmissible spongiform encephalopathies[e] *continued*	Cattle	SA	28	2	Negative
	Cattle	Tas	9	3	Negative
	Cattle	Tas	8	2	Negative
	Cattle	Vic	61	3	Negative
	Cattle	Vic	63	2	Negative
	Cattle	WA	37	2	Negative
	Sheep	NSW	16	3	Negative
	Sheep	NSW	120	2	Negative
	Sheep	Qld	2	3	Negative
	Sheep	Qld	32	2	Negative
	Sheep	SA	9	3	Negative
	Sheep	SA	40	2	Negative
	Sheep	Tas	1	3	Negative
	Sheep	Tas	4	2	Negative
	Sheep	Vic	21	3	Negative
	Sheep	Vic	75	2	Negative
	Sheep	WA	17	3	Negative
	Sheep	WA	95	2	Negative
Tropilaelaps mite (*Tropilaelaps clareae* or *T. mercendesae*)	Bees	Qld	63	2	Negative
Tuberculosis (*Mycobacterium bovis*)	Cattle	NSW	2	2	Negative
	Cattle	NT	1	2	Negative
	Cattle	Vic	3	2	Negative
Varroosis (*Varroa destructor* or *V. jacobsoni*)	Bees	Qld	2	2	Positive
	Bees	Qld	126	2	Negative (10 related investigations in Jul; 21 related investigations in Aug; 30 related investigations in Sep)
	Bees	Vic	2	2	Negative
Vesicular stomatitis virus	Cattle	NSW	15	3	Negative
	Cattle	Qld	2	3	Negative
	Cattle	SA	7	3	Negative
	Cattle	Vic	22	3	Negative
	Cattle	WA	5	3	Negative
	Horse	NSW	1	3	Negative

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2016

Disease	Species	State	No. of investigations	Response Code[a]	Finding
Vesicular stomatitis virus *continued*	Horse	WA	1	3	Negative
	Pig	NSW	1	3	Negative
	Sheep	NSW	3	3	Negative
	Sheep	Qld	1	3	Negative
	Sheep	SA	3	3	Negative
	Sheep	Vic	14	3	Negative
	Sheep	WA	1	3	Negative
West Nile virus infection – clinical	Bird	SA	2	3	Negative
	Camel	WA	1	3	Negative
	Horse	NSW	1	2	Negative
	Horse	SA	1	2	Negative
	Horse	Tas	1	3	Negative
	Horse	Vic	1	2	Negative
	Horse	WA	6	3	Negative
	Sheep	NSW	1	2	Negative
	Sheep	WA	1	3	Negative

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 CSIRO Australian Animal Health Laboratory (AAHL) 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/disease-surveillance/national-arbovirus-monitoring-program.

c Bovine brucellosis (caused by *B. abortus*) was eradicated from the Australian cattle herd in 1989 and is presently considered an exotic animal disease in Australia. Caprine and ovine brucellosis (caused by *B. melitensis*) has never been reported in Australian sheep or goats. Swine brucellosis (caused by *B. suis*) is confined to small areas of northern Australia, where it occurs in feral pigs, with cases detected occasionally in dogs used to hunt feral pigs.

d Laboratory detection was determined to be an incidental finding. Sequencing of the influenza virus most closely correlated with older human-origin 'seasonal' influenza A viruses for the HA and NA genes, and to pandemic H1N1 2009 viruses for the internal genes.

e All abattoir-sourced specimens are sent to CSIRO AAHL for testing.

ACRONYMS AND ABBREVIATIONS

AAHL	Australian Animal Health Laboratory
AADIS	Australian Animal Disease model
AAPSP	Australian Animal Pathology Standards Program
ABLV	Australian bat lyssavirus
ACIAR	Australian Centre for International Agricultural Research
ACMF	Australian Chicken Meat Federation
ACT	Australian Capital Territory
AECL	Australian Egg Corporation Limited
AFB	American foulbrood
AGSOC	Agriculture Senior Officials' Committee
AHA	Animal Health Australia
AHB	Asian honey bee
AHB T2M	Asian Honey Bee Transition to Management
AHC	Animal Health Committee
AHPND	acute hepatopancreatic necrosis disease
AI	avian influenza
AIP-EID	Australia Indonesia Partnership for Emerging Infectious Diseases
ALFA	Australian Lot Feeders' Association
ALOP	Appropriate Level of Protection
AMR	antimicrobial resistance
AMRA	Australian Milk Residue Analysis
ANQAP	Australian National Quality Assurance Program
ANZSDP	Australian and New Zealand Standard Diagnostic Procedure
APIQ	Australian Pork Industry Quality Assurance Program
APL	Australian Pork Limited
APMV	avian paramyxovirus
APVMA	Australian Pesticides and Veterinary Medicines Authority
AQUAVETPLAN	Australian Aquatic Veterinary Emergency Plan
ARA	Australian Renderers Association
AUSVETPLAN	Australian Veterinary Emergency Plan
AVBC	Australasian Veterinary Boards Council

AWI	Australian Wool Innovation Limited
AWPS	Animal Welfare Position Statement
B-QUAL	honey bee industry food safety quality program
BEF	bovine ephemeral fever
BIRA	Biosecurity Import Risk Analysis
BMT	bulk milk testing
BSE	bovine spongiform encephalopathy
BTV	bluetongue virus
CAE	caprine arthritis–encephalitis
CCEAD	Consultative Committee on Emergency Animal Diseases
CDNA	Communicable Diseases Network Australia
CEBRA	Centre of Excellence for Biosecurity Risk Analysis
ChAFTA	China–Australia Free Trade Agreement
Codex	Codex Alimentarius Commission
CRC	cooperative research centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CVO	Chief Veterinary Officer
DAF	Department of Agriculture and Fisheries
DAFWA	Department of Agriculture and Food Western Australia
DFAT	Department of Foreign Affairs and Trade
DFTD	devil facial tumour disease
DOT	dropped ovary technique
DPIR	Department of Primary Industries and Resources
DPIPWE	Department of Primary Industries, Parks, Water and Environment
EAD	emergency animal disease
EADRA	Emergency Animal Disease Response Agreement
EADRP	Emergency Animal Disease Response Plan
EBL	enzootic bovine leucosis
ECA	Egg Corp Assured
EFB	European foulbrood
EHV	equid herpesvirus
EIA	equine infectious anaemia
EID	emerging infectious disease
ERA	Excellence in Research for Australia
ESCAS	Exporter Supply Chain Assurance System
EuFMD	European Commission for the Control of Foot-and-Mouth Disease
EVA	equine viral arteritis
eWHIS	electronic Wildlife Health Information System

FAO	Food and Agriculture Organization of the United Nations
FMD	foot-and-mouth disease
FR	free range
FRDC	Fisheries Research and Development Corporation
FREPA	Free Range Egg and Poultry Australia
FSANZ	Food Standards Australia New Zealand
FTA	free trade agreement
GSF	gestation stall free
HACCP	hazard analysis and critical control points
HeV	Hendra virus
HPAI	highly pathogenic avian influenza
IAHER	International Animal Health Emergency Reserve
ICS	Incident Command System
ICT	immunochromatographic test
IGAB	Intergovernmental Agreement on Biosecurity
ILRI	International Livestock Research Institute
IPPC	International Plant Protection Convention
iSIKHNAS	Indonesian animal health information system
JAEPA	Japan–Australia Economic Partnership Agreement
JCU	James Cook University
JE	Japanese encephalitis
JEE	Joint External Evaluation
KAFTA	Korea–Australia Free Trade Agreement
LAMP	Live Animal Marketing and Production
LBN	Livestock Biosecurity Network
LEADDR	Laboratories for Emergency Animal Disease Diagnosis and Response
LEP	Livestock Export Program
LGAP	Livestock Global Assurance Program
LLS	Local Lands Services
LPA	Livestock Production Assurance
LPAI	low pathogenic avian influenza
MAF	Ministry of Agriculture and Fisheries
MAP	Market Assurance Program
MERS-CoV	Middle East respiratory syndrome coronavirus
MLA	Meat & Livestock Australia
MN	monitored negative
MoAg	Indonesian Ministry of Agriculture
MRL	maximum residue limit

NABF	Northern Australia Biosecurity Framework
NACA	Network of Aquaculture Centres in Asia–Pacific
NAHIS	National Animal Health Information System
NAHTSC	National Animal Health Training Steering Committee
NAIWB	National Avian Influenza Wild Bird
NAMP	National Arbovirus Monitoring Program
NAQIA	National Agriculture Quarantine and Inspection Authority (PNG)
NAQS	Northern Australia Quarantine Strategy
NASOP	nationally agreed standard operating procedure
NATA	National Association of Testing Authorities
NBC	National Biosecurity Committee
NCN	National Communication Network
NBPSP	National Bee Pest Surveillance Program
NFAS	National Feedlot Accreditation Scheme
NLIS	National Livestock Identification System
NMG	National Management Group
ND	Newcastle disease
NNDSS	National Notifiable Diseases Surveillance System
NRS	National Residue Survey
NSDIP	National Significant Disease Investigation Program
NSHMP	National Sheep Health Monitoring Project
NSW DPI	New South Wales Department of Primary Industries
NTSESP	National Transmissible Spongiform Encephalopathies Surveillance Program
NVD	National Vendor Declaration
NWS	New World screw-worm fly
OB	outdoor bred
OCVO	Office of the Chief Veterinary Officer
OIE	World Organisation for Animal Health
OJD	ovine Johne's disease
OsHV-1 µvar	ostreid herpesvirus 1 microvariant
OWS	Old World screw-worm fly
PCR	polymerase chain reaction
PED	porcine epidemic diarrhoea
PetFAST	Pet Food Adverse Event System of Tracking
PHA	Plant Health Australia
PNG	Papua New Guinea
POMS	Pacific oyster mortality syndrome
PPMV	pigeon paramyxovirus

PT	proficiency testing
PVS	Performance of Veterinary Services
QA	quality assurance
qPCR	quantitative PCR
Quads	Animal Health Quadrilateral Group
R&D	research and development
RAWS	Regional Animal Welfare Strategy
RD&E	research, development and extension
RHDV	rabbit haemorrhagic disease virus
RIRDC	Rural Industries Research and Development Corporation
RRT	Rapid Response Team
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SCAAH	Sub-Committee on Aquatic Animal Health
SCAHLS	Sub-Committee on Animal Health Laboratory Standards
SEACFMD	South East Asia and China Foot and Mouth Disease
SFMCA	Stock Feed Manufacturers' Council of Australia
SHB	small hive beetle
SIRP	Seafood Incident Response Plan
STANDZ	Stop Transboundary Animal Diseases and Zoonoses
SWF	screw-worm fly
SWFSPP	Screw-worm Fly Surveillance and Preparedness Program
TSE	transmissible spongiform encephalopathy
TSEFAP	Transmissible Spongiform Encephalopathy Freedom Assurance Program
WALDO	WA Livestock Disease Outlook
WHA	Wildlife Health Australia
WHO	World Health Organization
WTO	World Trade Organisation
ZAA	Zoo and Aquarium Association

GLOSSARY

acaricide	Pesticide used to control acarids such as mites and ticks.
antimicrobial	Antibacterial agent; includes ionophores but does not include antiprotozoals, antifungals, antiseptics, disinfectants, antineoplastic agents, antivirals, immunologicals, direct-fed microbials or enzyme substances.
APITHOR	Fipronil-impregnated cardboard hive beetle trap.
biosecurity	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.
camelids	Members of the biological family Camelidae, including camels, alpacas, llamas and dromedaries.
Culicoides	A genus of biting midge species. Very small insects visible to the naked eye, some of which carry and spread the bluetongue and Akabane viruses via blood meals from hosts.
emergency animal disease	A disease that, when it occurs, requires an emergency response, because it would have a national impact if it was not controlled.
emerging (disease)	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.
endemic (disease)	A disease that is known to occur over a long period of time within a population or a geographic range.
enteric	Intestinal; relating to the intestines (gut).
epidemic	An unexpected and substantial increase in the incidence of a disease.
epidemiological	Relating to the study of disease and its causes in a population.
epidemiologist	A scientist who studies the transmission and control of diseases.
epidemiology	Science of the distribution of disease in populations, with investigations into the sources and causes of disease.
exotic (disease or pest)	A disease that does not normally occur in a particular area or country (as opposed to an endemic disease).
granuloma	Encapsulated lesion with a yellowish appearance and a caseous (cheesy), caseo-calcereous (cheesy and chalky) or calcified (bony) consistency; of varying size and may contain pus.
morbidity	State of illness or disease.
nucleotide substitution	A form of mutation of the nucleotide sequence of deoxyribonucleic acid (DNA), where one base is replaced by another.
pathogen	A biological agent that causes disease or illness in its host.
pathogenic	Capable of causing disease.
precursor	A substance, or virus, from which another substance can form.

ratite	A large, flightless bird, such as an emu or an ostrich.
sentinel	A previously uninfected animal herd (or hive or clinic) 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 sentinel group at intervals to check whether infection or infestation has occurred.
serology	Science of immunological reactions and properties of serum, often used to diagnose disease.
synthetic pyrethroid	Synthetic chemical insecticide that acts in a similar manner to naturally derived pyrethrins.
transboundary animal diseases	Epidemic animal diseases that are highly infectious, with potential for very rapid spread, irrespective of national borders, and able to have serious impacts on the economy or human health (or both).
vector	A living organism (e.g. an insect) that transmits an infectious agent from one host to another.
virology	The study of viruses and viral diseases.
virulence	The relative ability of an infectious agent to cause disease.
zoonosis (zoonotic disease)	A disease that can be transmitted from animals to people or, more specifically, a disease that normally exists in animals but that can infect humans (plural: zoonoses).

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