ANIMAL HEALTH IN AUSTRALIA 2017

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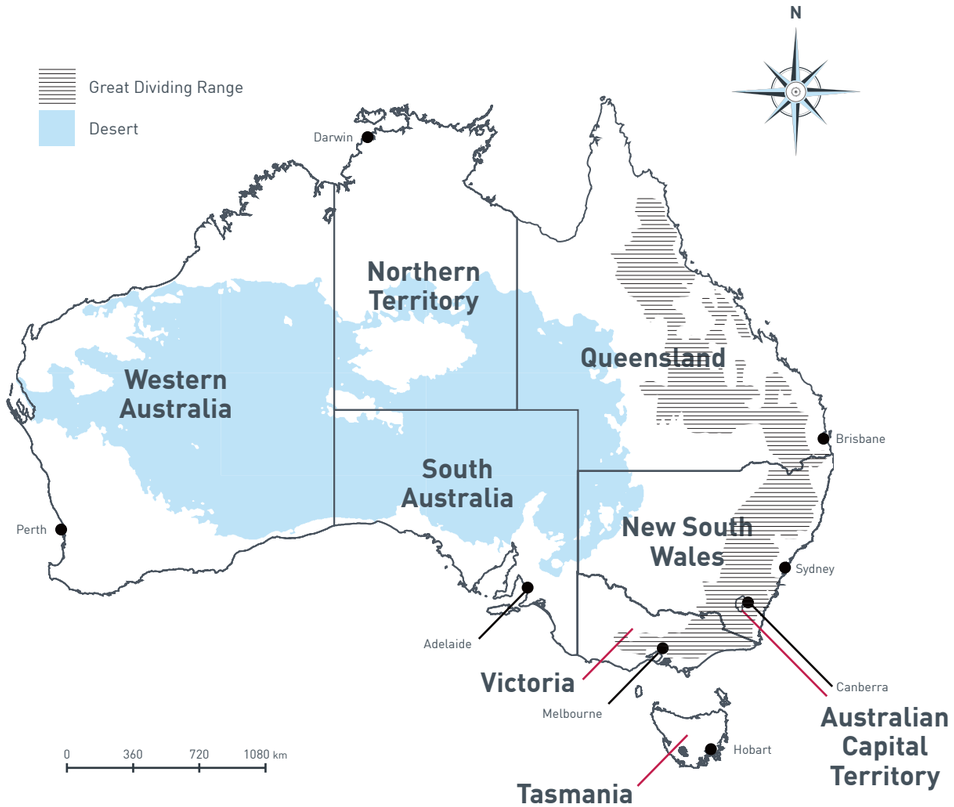
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FOREWORD

It is with pleasure I present the 2017 *Animal Health in Australia* report, a comprehensive summary of Australia's animal health status and system. This report 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. It highlights Australia's contribution to regional animal health activities and the key animal health research and development activities in Australia during 2017.

It has been a remarkable year for Australian agriculture. Risk management remained high on our agenda, with a particular focus on the eradication of white spot syndrome virus and the progression of antimicrobial resistance-prevention initiatives.

The presence of white spot syndrome virus was confirmed in farmed prawns late in 2016, prompting immediate response measures including the suspension of importation of uncooked prawns into Australia. Additional biosecurity measures and a national surveillance plan have been implemented to reduce the risk of reintroduction of the disease and ultimately demonstrate Australia's freedom from infection in the future. Affected ponds will lie fallow until mid-2018 and until interim test results indicate that control activities have been effective in containing the virus.

Australia continued a conservative approach to the use of antimicrobial agents in agriculture and conducted detailed risk assessments to consider the registration of antimicrobial agents for animal use. We worked cooperatively with international organisations to contribute to global guidance on limiting antimicrobial resistance, and with our domestic human health colleagues to progress a range of national activities. During November, as part of World Antibiotic Awareness Week, an Australian Government website (amr.gov.au) was launched to raise public awareness about antibiotic resistance and the actions we can all take to reduce antibiotic use.

Australia's history of eradication of notifiable diseases can be attributed to the coordinated efforts of animal health services throughout the country. This year we celebrated 10 years since equine influenza was eradicated. Our ongoing freedom from equine influenza and other notifiable diseases is apparent through a range of ongoing disease surveillance and control programs.

Surveillance activities supported by the **Agricultural Competitiveness White Paper** continued to target critical biosecurity risks to protect our animal health status. White Paper surveillance activities are highlighted throughout this report.

Individual state and territory Performance of Veterinary Services evaluations commenced to complement the national World Organisation for Animal Health (OIE) Evaluation of Performance of Veterinary Services, which was conducted in 2015. The evaluations are ongoing and will conclude by the end of 2018.

Using the World Health Organization's Joint External Evaluation assessment tool, the Australian Government Department of Health led an appraisal of Australia's implementation of the core capacities established under the International Health Regulations 2005. Several animal health-related capabilities were assessed, including antimicrobial resistance, zoonotic

disease surveillance and management, medical countermeasures and real-time surveillance. Australia will address the findings and develop a national action plan for health security after the final report has been provided.

Following her appointment in mid-2016, the Inspector-General of Biosecurity continued working through the review program assessing Australia's biosecurity risk management systems across the biosecurity continuum. Two reviews published during 2017 included the management of biosecurity risks posed by invasive mosquitoes entering or establishing in Australia, and the biosecurity considerations relevant to future trade in uncooked prawns. A number of recommendations are being addressed on both issues.

Priorities for Australia's biosecurity system were released following an independent review of Australia's national biosecurity system and the Intergovernmental Agreement on Biosecurity. The review acknowledged the substantial achievements made since the Intergovernmental Agreement on Biosecurity commenced and made some practical recommendations to strengthen the national biosecurity system.

The many successful outcomes recognised throughout this report would not have been possible without consistent collaboration between the Australian Government, state and territory jurisdictions, industry organisations, private veterinary services and educators, and national animal health bodies. I also acknowledge the importance of international collaboration through organisations such as the OIE, the Animal Health Quadrilateral Group, the Food and Agriculture Organization of the United Nations, and our trading partners.

I extend my warmest thanks to all our collaborators for your enduring cooperation and look forward to continuing these relationships in the future.

Dr. Mark Schipp
Australian Chief Veterinary Officer

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Image credit: Arthur Mostead

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 is a comprehensive summary of the status of Australia's animal health and the system that maintains it. It includes insights into ongoing programs, nationally significant terrestrial and aquatic animal diseases, and initiatives undertaken during 2017.

Organisation of the animal health system

Australia has strong and stable veterinary services which are predicated on effective collaboration between governments, industries and other stakeholders.

Australia is committed to ensuring the continued strength of its veterinary services. A review of Australia's biosecurity systems under the Intergovernmental Agreement on Biosecurity was finalised in 2017. Following the 2015 Performance of Veterinary Services evaluation of Australia by the World Organisation for Animal Health (OIE), individual state and territory evaluations commenced in 2017. Australia also undertook a self-assessment and was subject to an external evaluation of its implementation of the core capacities established under the International Health Regulations 2005 as part of the World Health Organization initiative.

Australia places great emphasis on international animal health partnerships, noting the value of working together to achieve global goals. During 2017, Australia continued to make significant contributions to the international community, including by holding prominent positions in the OIE, sharing expertise within the OIE, actively supporting OIE work and collaborating extensively with other countries.

Livestock traceability, biosecurity and quality assurance programs

Federal, state and territory governments and industry collaborate to provide traceability, quality assurance (QA) and biosecurity programs and services for Australia's livestock. Livestock identification, biosecurity measures and QA initiatives are an integral part of the national preparedness against disease and the maintenance of animal health. This chapter highlights Australia's National Livestock Identification Scheme, which delivers systems for the supply chain to record stock and movements, creating lifetime traceability for all cattle, goats, pigs and sheep. Another focus of this chapter is industry-driven biosecurity and QA programs which promote and provide animal health, on-farm biosecurity and product integrity best practice and/or accreditation for producers.

Terrestrial animal health status

The disease status of the following diseases changed in 2017.

In 2017, *Leishmania macropodum* was isolated in a new species, captive Nabarlek (pygmy rock wallaby, *Petrogale concinna*), in the Northern Territory.

Between May and June 2016, several occurrences of pigeon mortality with similar clinical presentation were investigated. Notifiable diseases such as Newcastle disease, avian influenza and pigeon paramyxovirus were excluded through laboratory testing. In early 2017, additional cases were identified in other jurisdictions and pigeon rotavirus (a virus in the family *Reoviridae*) was identified.

Release of rabbit haemorrhagic disease virus (RHDV1, strain K5) occurred throughout all jurisdictions in Australia in the first week of March 2017. The disease is now considered endemic throughout the country.

The response to the detection of *Varroa jacobsoni* (which causes varroosis of honey bees) entered the eradication phase in November 2016, and this phase finished on 1 March 2017. The response has entered the proof-of-freedom phase, which will conclude (unless circumstances change) on 31 August 2019.

Bluetongue antibody seropositive test results occurred in Victoria, indicating previous exposure to the disease in cattle destined for export. It is important to note that there was no virus detected and no signs of clinical infection, therefore there was no requirement to report the results to the OIE. The OIE *Terrestrial animal health standards code* defines infection with bluetongue virus (BTV) as when the virus or antigen has been detected, or antibodies which are not a consequence of vaccination are detected, in an animal showing clinical signs consistent with BTV or epidemiologically linked to a confirmed case.

Terrestrial animal disease surveillance and control programs

Chapter 4 describes Australia's disease surveillance and control programs for terrestrial animal diseases. These programs are supported by a network of government field veterinary officers, private veterinarians, government and private

veterinary diagnostic laboratories, researchers and livestock producers.

The **Agricultural Competitiveness White Paper** was released in July 2015. It is a $4 billion investment to build a more profitable, more resilient and more sustainable agricultural sector. It includes a special focus on biosecurity surveillance and analysis, including in northern Australia, to better target critical biosecurity risks and support market access. Funds are being used to help keep pests and diseases out of Australia and identify and respond to pests and diseases when they arrive. Biosecurity surveillance and analysis activities funded through the 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.

In the preceding 30 years, Australia successfully eradicated bovine brucellosis, bovine tuberculosis, equine influenza, highly pathogenic avian influenza (HPAI) and virulent Newcastle disease. In 2017, Australia maintained its surveillance activities to demonstrate ongoing freedom from these diseases.

Since mid-2016, a highly infectious rotavirus (pigeon rotavirus) emerged in kept pigeons in some Australian states, resulting in high mortality rates in lofts over a short period. Partnerships between Australian Animal Health Laboratory (AAHL) and state laboratories have resulted in the development of new diagnostic tests for pigeon rotavirus, including a real-time polymerase chain reaction (PCR) test. Research at AAHL in 2017 indicated that domestic poultry are not affected by pigeon rotavirus.

Data relating to events involving disease investigations in wildlife continue to be held in the national database of Wildlife Health Australia (WHA). More than 880 events were added in 2017. Approximately 42% of these events were bats (mostly submitted for exclusion testing for Australian bat lyssavirus), wild bird morbidity and mortalities account for a further 29%, and further 22% relate to marsupials.

From January to December 2017, a minimum of 5900 data records for bee pest surveillance activities performed nationally were collected by volunteer beekeepers and Australian, state and territory government staff. There were no further detections of *Varroa jacobsoni* since it was last detected in 2016, and Australia moved into the proof-of-freedom stage on 1 March 2017.

In 2017, the targeted surveillance activities of the National Avian Influenza Wild Bird Surveillance Program were expanded to include testing for avian paramyxoviruses (APMV), predominantly targeting APMV-1. A total of 5385 faecal environmental swabs and/or cloacal and/or oropharyngeal swabs collected from waterbirds were tested for avian influenza viruses, with a subset of 4304 swabs also tested for APMV-1. No HPAI viruses or virulent strains of APMV-1 were identified in 2017.

The Northern Australian Quarantine Strategy (NAQS) of the Department of Agriculture and Water Resources addresses the risks associated with the vulnerability of the coastline between Broome and Cairns, and north through the Torres Strait. In 2017, NAQS priorities included surveillance for targeted exotic pests and diseases; new sentinel cattle monitoring sites in north Queensland and the Northern Territory, and working to establish monitoring sites in Timor-Leste and Papua New Guinea; extending the network and training of Indigenous ranger groups involved in biosecurity surveillance activities; funding new diagnostic tests for BTV surveillance; and improving preparedness for canine rabies in northern Australia.

Animal health laboratories

Animal health laboratories in Australia are an integral part of the national animal health system and play a crucial role in disease preparedness and response.

A network of world-class animal health laboratories is operated under the Commonwealth, state and territory governments, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), universities and the private sector. These laboratories undertake surveillance, diagnostic, QA and research works for endemic and/or emergency animal diseases (EADs), including exotic and zoonotic diseases. They often work together to achieve specific objectives through networking and national disease management programs. These functions underpin national and international trade and market access for animal and animal products and help to safeguard and improve animal and public health in Australia.

Animal health laboratory functions and programs have evolved over many years to meet various challenges, especially those associated with disease situations, technological advances, standard requirements, policy landscape, operating environments and socioeconomic issues. Chapter 5 highlights the national animal health laboratory structures and responsibilities and their key functions, programs and developments.

Managing terrestrial animal health emergencies

Chapter 6 describes Australia's arrangements for preparing for, and responding to, terrestrial EADs, including planning, training and communication. The chapter also describes EAD responses during 2017.

In 2016, the third five-year review of the Emergency Animal Disease Response Agreement was undertaken to ensure that it remains relevant, flexible and functional. The key objectives of the Australian Veterinary Emergency Plan (AUSVETPLAN) were also reviewed, with a focus on ensuring that the disease-specific documents (disease strategies and response policy briefs) are fit-for-purpose. Work continued or was initiated on individual reviews of 13 disease-specific documents, two enterprise manuals and one operational manual.

A national project to develop training and assessment materials for three biosecurity response qualifications commenced in 2017. The qualifications provide formal recognition of the training and skills developed by government and industry officers in responding to biosecurity incidents, and complement other elements of the national EAD training program. In May, the Rapid Response Team (RRT) held a discussion activity on the response to an aquatic animal disease outbreak as their final professional development activity. The RRT, which had focused on EADs, was replaced in July by the National Biosecurity Response Team, a cross-sectoral cohort which can be deployed in response to a range of biosecurity incidents (animal, plant, aquatic animal or environmental). Several EAD exercises also took place in Victoria, based on simulated outbreaks of HPAI.

In 2017, the Department of Agriculture and Water Resources continued its agreement with the European Commission for the Control of Foot-and-Mouth Disease (EuFMD) of the Food and Agriculture Organization of the United Nations (FAO), for the provision of real-time and online FMD training for Australian veterinarians and livestock workers. Four real-time courses were held in Nepal (where FMD is present) and there was one FMD emergency preparation online course. By the end of 2017, a total of 227 Australians had participated in real-time training and 192 had undertaken the online course.

The Australian Animal DISease model (AADIS) offers full national-scale modelling capability and addresses the needs of disease-control managers to capture complex disease epidemiology. In 2017, AADIS was used in two projects: incorporating economic components in Australia's FMD-modelling capability and evaluating post-outbreak management to support return to trade; and vector-borne spread of animal disease. Results from these projects, along with other disease-modelling studies, are helping Australia strengthen its EAD preparedness.

In 2017, under the International Animal Health Emergency Reserve (IAHER) arrangement, New Zealand requested assistance from Australia for a response to an outbreak of *Mycoplasma bovis*. Over a period of three months, Australia provided a total of 15 veterinary epidemiological and laboratory personnel. Activation of the IAHER arrangement allowed Australian personnel to receive valuable practical emergency response experience.

The Prohibited Pig Feed (Swill) Compliance and Awareness project continued. In 2016-17, 429 industry audits within the Australian Pork Industry Quality Assurance Program (APIQ✓®) were conducted, and 213 government inspections of piggeries took place. These audits and inspections were to monitor compliance with the prohibition on feeding swill (prohibited pig feed) to pigs, with no major incidents of swill feeding found.

A survey of over 1200 producers nationwide, undertaken through the Farm Biosecurity campaign, revealed positive trends in awareness, understanding and uptake of on-farm biosecurity across all industries. The Farm Biosecurity

campaign, which encourages producers to incorporate on-farm biosecurity measures into their everyday operations, also launched a smartphone app to help producers investigate biosecurity risks on their property and create their own biosecurity action list.

This year, the Australian CVO's National Animal Health and Biosecurity Review (ACVO Review) was conducted to assess the key issues affecting Australia's animal health and biosecurity system, now and into the future. Findings from the ACVO Review will be used to ensure Australia's biosecurity system is well prepared for future risks.

There were several outbreaks of anthrax in New South Wales, Queensland and Victoria in 2017. For each outbreak, control measures were implemented using agreed national response policy. The disease did not spread beyond the affected properties. In 2017, there were four incidents of Hendra virus infection reported, with one in Queensland and three in New South Wales. These incidents were managed with well-established biosecurity and public health responses.

Aquatic animal health

The status of aquatic animal diseases in Australia which are of national and international significance, and the national system for responding to and preparing for emergency aquatic animal disease events, are described. Australia's collaboration with neighbouring countries and regional and international organisations to mitigate biosecurity risks by promoting regional capacity and cooperation is also described.

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

Significant achievements under AQUAVETPLAN in 2017 included publication of guidelines and templates for the aquaculture farm biosecurity plan, and positive and internal control materials for 32 polymerase chain reaction assays to detect aquatic diseases. The *Aquatic animal diseases significant to Australia: identification field guide* was released as a mobile phone app.

The Department of Agriculture and Water Resources, with the abalone and oyster industries, developed sector-specific on-farm biosecurity plan guidelines.

From 2017, the Department of Agriculture and Water Resources reinvigorated national and regional proficiency testing (PT) programs for aquatic animal diseases. Any Australian laboratory can participate in the national PT program for eight diseases over three annual rounds of testing from 2017 to 2019. The department, in collaboration with AAHL, is extending this PT service to over 30 laboratories in 14 countries in the Asia–Pacific region to improve testing for 10 pathogens of significance to the region.

In 2017, an 'Aquatic Deed' for industries and governments to share the responsibilities and costs for managing aquatic EADs was developed. A draft was completed by the end of 2017, and steps towards ratification will take place in 2018.

From late 2016 and throughout 2017, the Department of Agriculture and Water Resources has been a part of the response to the white spot disease outbreak in Queensland. The Aquatic Consultative Committee on Emergency Animal Diseases, chaired by the Australian Chief Veterinary Officer, had met on 31 occasions by the end of 2017 to coordinate response, containment and surveillance activities and provide technical advice to affected industries and state governments. The response activities are ongoing.

Trade

Australia maintains a strong commitment to the principles of the World Trade Organization (WTO) and is a signatory to the Agreement on the Application of Sanitary and Phytosanitary Measures. 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.

The Australian Government supports the negotiation of comprehensive free trade agreements (FTAs) that are consistent with the WTO rules and

guidelines and which complement and reinforce the multilateral 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. There have been tariff reductions and significant growth in trade in agricultural goods in 2017, as a result of FTAs with three of Australia's key trading partners in China, Japan and Korea.

The Department of Agriculture and Water Resources 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 foods, wool and pharmaceutical goods). One way that the department maintains Australia's favourable market access is by hosting visits by competent authorities of trading partners. In 2017, Australia hosted 13 overseas delegations from eight international trading partner countries.

The Department of Agriculture and Water Resources negotiated animal health requirements for the export of live animals (such as livestock, horses and bees) and their genetic material (such as bovine semen and embryos, and day-old chicks and hatching eggs) to 35 countries in 2017. A key example was finalisation of health certification for the export of day-old poultry chicks and their hatching eggs to the Republic of Korea, Sri Lanka and Taiwan. This outcome will provide a beneficial trade opportunity, following numerous outbreaks of HPAI in Asia, Europe and North America, which significantly affected overseas poultry industries and the international supply of elite breeding flocks.

As part of a wider initiative to strengthen agricultural exports and market access, the department has undertaken to improve the existing agricultural export legislative framework. Following an extensive period of consultation with international trading partners, industry stakeholders and the public in 2017, the *Export Control Bill 2017* (Cwlth) was introduced into the Australian Parliament on 7 December 2017. Work on the legislative instruments to support the new Act (the Rules) will commence in 2018. The improved legislative framework will be implemented before 1 April 2020.

Phase 2 construction of the Post-Entry Quarantine (PEQ) facility in Mickleham, Victoria was finalised at the end of 2017, with the completion of the avian facilities. The avian facilities will undergo rigorous testing in 2018 before opening. Other facilities completed throughout 2017 as part of Phase 2 construction included additional capacity for cats and dogs and a purpose-built facility for camelid and ruminant imports. The PEQ Mickleham facility was announced as the 2017 winner for Excellence in Construction of Industrial Buildings by the Master Builders Association of Victoria.

One Health

One Health involves multiple disciplines working together in a holistic approach to provide better health outcomes for humans, animals and ecosystems which intersect with each other.

The Department of Agriculture and Water Resources, along with other Australian Government agencies, has been working at international and national levels towards the minimisation of antimicrobial resistance (AMR). Work has included technical input for developing international standards and participating in international forums, discussions and assessments (Joint External Evaluation of Australia's implementation of the International Health Regulations [2005]), raising awareness of AMR (World Antibiotic Awareness Week), launching a One Health AMR website, and continuing the establishment of Australia's AMR surveillance program for livestock.

The animal health industry sector has also been active in establishing a stewardship framework through their Intensive Animal Antimicrobial Stewardship working group.

With zoonotic diseases and other cross-cutting public health issues, the department meets regularly with other Australian Government agencies in formal and informal settings to share and provide animal health input into technical policies and guidelines. For example, the department participated in a dedicated Communicable Diseases Network Australia group for the development of a national guideline to assist with the public health management of Q fever cases.

Consumer protection – food

The Australian Government and state and territory food safety authorities routinely audit, inspect and monitor the food supply to ensure its safety for consumers. 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 derived from these commodities are safe for human consumption.

Food Standards Australia New Zealand (FSANZ) has a key 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.

FSANZ also collaborates with a range of international agencies responsible for food standards, guidelines, codes of practice and other recommendations relating to food.

During 2017, the Asia–Pacific Economic Cooperation Food Safety Cooperation Forum (FSCF) held its biennial conference and several technical workshops. The FSCF seeks to build robust food safety systems in the Asia–Pacific region and is co-chaired by Australia (FSANZ) and China.

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 and guide animal welfare.

At a national level, the Animal Welfare Task Group continued in 2017 to develop nationally consistent standards and guidelines for the welfare of livestock, building on the existing model codes of practice for the welfare of animals. Standards and guidelines for cattle and sheep welfare continued to be implemented by state and territory governments. The *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.

The Australian Government is undertaking a review of the national health and welfare standards for animals in the live export trade, to ensure that the standards are fit for purpose and align with contemporary animal health and welfare research.

The Australian Government works with international organisations such as the OIE to support the development of scientifically-based international animal welfare guidelines. In 2017, the newly formed OIE Regional Animal Welfare Strategy (RAWS) Advisory Group detailed several key actions including an update of the terms of reference and modus operandi, an ongoing review of the RAWS Action Plan, preparation of a package of material to support new OIE National Focal Points for Animal Welfare in the region, and a stocktake of available animal welfare training resources in the region.

Regional animal health initiatives

Australia continues to provide leadership in animal health in the region and represent the region at the OIE World Assembly. It is conducting additional surveillance and capacity-building activities in PNG and Timor-Leste through the **Agricultural Competitiveness White Paper**.

Through the new Indo-Pacific Centre for Health Security, Australia is contributing to the region by improving both human and animal health systems with a focus on zoonotic diseases.

In December 2017, after six years of activities aiming to reduce the impact of emerging infectious diseases in southeast Asia, Australia concluded the Stop Transboundary Animal Diseases and Zoonoses program. A major achievement of this program was establishing a southeast Asian regional FMD control model, which has been adapted by the Association of Southeast Asian Nations for its avian influenza and rabies control strategies.

Australia continues to help Indonesia strengthen its animal health systems and fund agricultural research in Africa, Asia and the Pacific.

Research and development

Chapter 13 provides a snapshot of Australian research in animal health and welfare during 2017. The CSIRO, cooperative research centres, universities and industry-based research and development corporations are all involved in animal health and welfare research.

The National Animal Biosecurity Research, Development and Extension Strategy was revised in 2017 and now reflects stakeholder consultation; the research, development and extension priorities of the National Biosecurity Committee; the Australian Government's Science and Research Priorities (2015), the **Agricultural Competitiveness White Paper**, the review of the Intergovernmental Agreement on Biosecurity and the strategic plans of the livestock industries.

Several projects also took place under the National Primary Industries Animal Welfare Research, Development and Extension Framework during 2017. The strategy encourages co-investment and collaboration to improve efficient use of research, development and extension resources in animal welfare.

Image credit: Australian Chicken Meat Federation

Image credit: Australian Alpaca Association

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. Australia's animal health system includes all organisations, government agencies, commercial companies, universities and individuals involved in animal health and the livestock production chain.

The Australian Government advises on and assists with the coordination of 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 coordination for animal health matters occurs through the Animal Health Committee (AHC) (see Section 1.1.1).

Australian governments have a close association with livestock industries. This supports consultation and collaboration between government and industry to advance 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.

Links are maintained with human health agencies, particularly for zoonoses (diseases that are transmissible between animals and humans) (see Section 1.2.3), antimicrobial resistance, One Health issues (see Chapter 9) and food safety issues (see Chapter 10). Links are also maintained with environmental agencies, particularly for wildlife health (see Section 1.2.2).

More than 16,000 veterinarians and other personnel are directly involved in animal health services in Australia (Table 1.1).

1.1 Consultative committees, organisations and partnerships

1.1.1 Australian Government committees

Consultative committees ensure that all components of the animal[1] health system work together to serve the interests of Australia. 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 (AGMIN), respectively. Figure 1.1 illustrates the structure of the animal health management committees and organisations in Australia.

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 and, most recently, New Zealand governments, with Animal Health Australia (AHA) and Plant Health Australia (PHA) as observers. In 2017, the NBC was supported by two expert groups (National Biosecurity Information Governance Expert Group and National Biosecurity Emergency Preparedness Expert Group) and four sectoral committees (AHC, Invasive Plants and Animals Committee, Marine Pest Sectoral Committee

Table 1.1 Veterinarians and other animal health personnel in Australia, 2017

Registered veterinarians		Auxiliary personnel	
Government	619	Stock inspectors, meat inspectors, etc	2506
Laboratories, universities, etc	902		
Private practitioners	10 574		
Other veterinarians	1478		
Total	**13 573**	**Total**	**2506**

1 Both terrestrial and aquatic animals.

and Plant Health Committee). AHC 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).[2] The 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. This collaboration is directed through the NBC with the most recent focus being on six areas of priority reform: 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. The report from a review of the national biosecurity system and the IGAB was released in 2017 (see Section 1.4).

Animal Health Committee

AHC[3] provides the Australian and state and territory governments with scientific, strategic and nationally coordinated policy advice on animal health issues through NBC and 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 chief veterinary officers, and the director of the Australian Animal Health Laboratory (AAHL). AHC observers are AHA, Wildlife Health Australia (WHA) and the Australian Government Department of Environment and Energy. There is also participation from the New Zealand government.

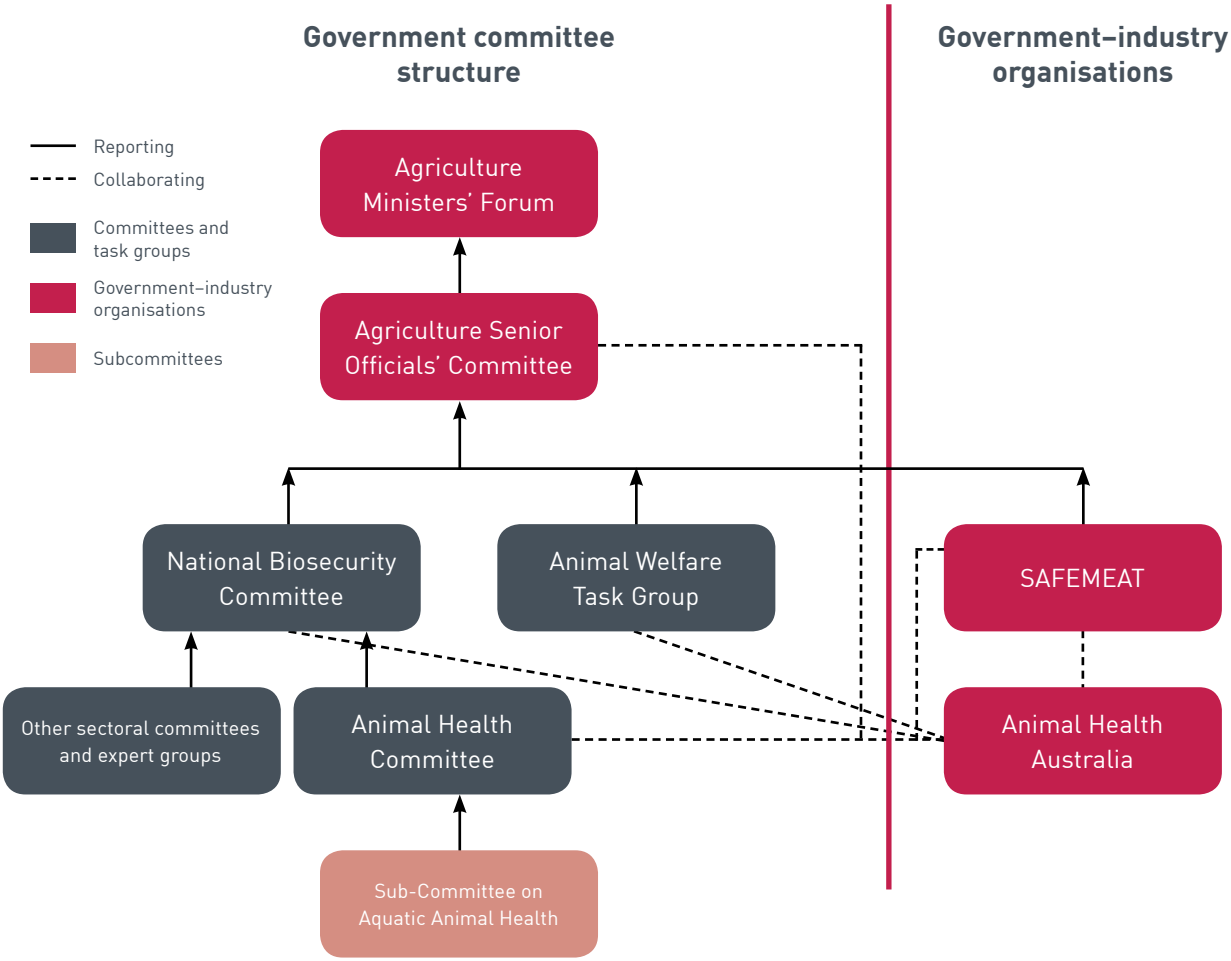

Figure 1.1 Structure of animal health management committees and organisations in Australia

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

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

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*,[4] AHA industry forums, and industry stakeholder participation in AHC meetings. Aquatic industries are consulted through the National Aquaculture Council and the Australian Fisheries Management Forum. Stakeholders in zoo or wild (including feral) animals are consulted through WHA.

Sub-Committee on Aquatic Animal Health

The SCAAH provides policy, scientific, technical and strategic advice to the AHC on aquatic animal health issues relating to capture fisheries, recreational fishing, aquaculture and the ornamental fish industry. SCAAH membership comprises representatives from the Australian, state, territory and New Zealand governments, AAHL, Australian and New Zealand universities and the National Aquaculture Council.

Animal Welfare Task Group

The Animal Welfare Task Group develops national animal welfare policies in areas referred to it by AGSOC and AGMIN. The group includes officials from the Australian, state, territory and New Zealand governments. The task group is developing *Australian animal welfare standards and guidelines* for several types of animals (see Section 11.3).

1.1.2 Government–industry committees and organisations

Consultative Committee on Emergency Animal Diseases

The Consultative Committee on Emergency Animal Diseases (CCEAD)[5] is convened in the event of an emergency animal disease (EAD) outbreak. The CCEAD is chaired by the Australian Chief Veterinary Officer (CVO) and comprises AHC members and technical representatives from relevant industries. Further information about CCEAD's membership and role is in Chapter 6.

Aquatic Consultative Committee on Emergency Animal Diseases

The Aquatic CCEAD is convened in the event of an emergency aquatic animal disease outbreak. The Aquatic CCEAD is chaired by the Australian CVO and comprises state or territory CVOs or directors of fisheries, and representatives from the Department of Agriculture and Water Resources and AAHL. Further information about the Aquatic CCEAD's membership and role is detailed in Chapter 7.

Animal Health Australia

AHA is an incorporated, not-for-profit, public company established in 1996 by the Australian, state and territory governments, and major national livestock[6] industries. It is governed by an independently selected, skills-based board.

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

Through the coordination and management of more than 70 national projects, AHA works in partnership with its members and other stakeholders to enhance preparedness for emergency animal diseases and to improve animal health, strengthen biosecurity, enhance market access and foster the resilience and integrity of the Australian animal health system.

The strength 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.

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

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

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

6 For AHA definitional 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.

- 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.

The long-term, end-of-program goals of these strategic priorities are:

- producers reduce disease entry on farm
- prompt notifiable disease outbreak detection and effective emergency animal disease response arrangements in place
- national surveillance and animal health reports are considered robust by members and markets
- new and enhanced partnerships and sustainable programs.

Information on terrestrial animal health management in Australia is provided in Chapter 6 and aquatic animal health management in Australia is provided in Chapter 7.

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 Eggs 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)	Sheep Producers Australia Ltd*
	WoolProducers Australia Ltd
	Associate members
	Australian Livestock Export Corporation Ltd (LiveCorp)
	Dairy Australia Ltd
	Meat and Livestock Australia Ltd
	National Aquaculture Council Inc.
	Racing Australia Ltd
	Veterinary Schools of Australia and New Zealand
	Wildlife Health Australia
	Zoo and Aquarium Association Inc.

*Formerly Sheepmeat Council of Australia; name changed during 2017.

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,[7] which is the central place for all bee biosecurity-related information.

SAFEMEAT

SAFEMEAT[8] is a partnership between the peak meat industry bodies[9] and the Australian and 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.

Programs and systems developed by SAFEMEAT include:

- targeted residue-monitoring programs for the export red meat industry – these programs are conducted by the National Residue Survey
- the National Livestock Identification System (NLIS), which has been developed for cattle, sheep, goats and pigs
- a system of National Vendor Declarations (NVDs) about the food safety status 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.

In 2015, a steering group produced the report *Towards an integrated integrity system*, which outlined changes to the red meat and livestock industry's integrity system under the SAFEMEAT Initiatives Review. In 2017, work continued on the Implementation Pathway, which comprises the following core elements: governance, funding, standards, strengthened program elements, monitoring and compliance, education and communications, and system enhancements. As a part of the Implementation Pathway, governance changes were implemented in 2017, including the disbandment of the SAFEMEAT executive and several SAFEMEAT sub-committees. A new Policy Group was formed to provide a consultative platform for industry and government stakeholders to:

- develop unified policy for the Australian meat industry's integrity systems
- form recommendations for SAFEMEAT partners on the policy, standards, rules and strategic direction of the Australian meat industry's integrity systems
- provide advice to integrity program owners (e.g. Integrity Systems Company [ISC]) on operational matters relating to program implementation
- ensure a collaborative approach to the delivery of safe and hygienic Australian meat to consumers.

In 2017, the Livestock Production Assurance (LPA) program was transferred from AUS-MEAT to ISC. ISC is now fully responsible for the management

7 www.beeaware.org.au

8 www.safemeat.com.au

9 Australian Livestock Exporters' Council Ltd, Meat & Livestock Australia, Sheep Producers Australia, WoolProducers Australia, Cattle Council of Australia, Australian Lot Feeders' Association, Australian Meat Industry Council, Australian D airy Farmers Ltd, Australian Pork Ltd, Australian Livestock & Property Agents Association, Australian Livestock Markets Association, Goat Industry Council of Australia and Animal Health Australia

and delivery of industry's integrity programs (NLIS, LPA and NVD) with SAFEMEAT continuing to provide policy direction.

There was also continued improvement in NLIS systems for cattle and pigs. This included progressing the *NLIS cattle standards* (replacing the previous *Operational rules* of 2005) and *NLIS pig standards*, which were both endorsed by AGMIN in July 2017. Mandatory pig movement recording is planned to come into effect for most jurisdictions in February 2018.

SAFEMEAT has several working groups which regularly convene to work through current issues, including NLIS compliance in the live animal export sector; use of cotton trash for drought feed; improvements in the supply-chain management of cattle treated with hormonal growth promotants; and the use of the three-hole punch as a permanent identifier for Silirum®-vaccinated cattle to prevent these animals (which may potentially test positive for Johne's disease) from entering export-sensitive markets.

The SAFEMEAT partnership continues to provide a valuable mechanism for industry to maintain a high level of food safety and market access for its products.

1.2 Service delivery

1.2.1 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 Australian CVO
- 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
- Inspector-General of Biosecurity (IGB).

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

Office of the Australian Chief Veterinary Officer

The Australian CVO is the primary representative of, and advisor to, the Australian Government on matters relating to the maintenance and improvement of Australia's animal health status and its supporting systems. The Australian CVO provides leadership and strategic direction on policy issues relating to animal health in Australia, as well as being Australia's international reference point for animal health and welfare.

The Office of the Australian CVO assists the Australian CVO in providing national leadership and fulfilling Australia's obligations as a member of the OIE including the official declaration of Australia's animal health status and participating in the development of international animal health and welfare standards. It provides strategic support to the Australian CVO when representing Australia in national and international forums and alliances, and delivering advice to Australian stakeholders and the international community. The office also provides strategic, scientific and administrative assistance to AHC and CCEAD.

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 (ABIAB) works collaboratively with Australian industries, governments and the community to maintain Australia's favourable animal health status by managing the risk of exotic pest and disease incursions across the biosecurity continuum. ABIAB 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.

ABIAB works in an environment of changing and emerging disease risks which are influenced by international trade in animals and animal products. The branch works within this environment to minimise the risk of exotic animal pests and diseases entering Australia 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 oversees export inspection and certification for live animals and animal reproductive material that meet importing country requirements.

Export Standards Branch

The Export Standards Branch negotiates with trading partners to improve, develop and maintain 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; develops Australian positions on international standard setting for trade in food; delivers content for the Manual of Importing Country Requirements; 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.

Inspector-General of Biosecurity

The IGB has a broad scope to independently review how the Department of Agriculture and Water Resources implements biosecurity risk management systems under the *Biosecurity Act 2015* (Cwlth).

The IGB publishes an annual review program on the IGB website,[10] carries out each review with appropriate consultation, and prepares a report on each review which includes the Department of Agriculture and Water Resources response to recommendations. Final review reports and public submissions to each review are available on the IGB website unless they contain information that is considered prejudicial to the public interest. In 2017, the IGB published the reports *Managing the biosecurity risks posed by invasive vector mosquitoes* and *Uncooked prawn imports: effectiveness of biosecurity controls*.

1.2.2 Other national animal health bodies 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 700 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 and biodiversity. WHA also facilitates and contributes to education and training courses in wildlife health and preparedness.

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.

10 www.igb.gov.au

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

Animal health laboratories

Animal health laboratories play an integral part in Australia's animal health system. A network of world-class animal health laboratories is operated by the Commonwealth, state and territory governments, AAHL, veterinary schools and the private sector. This network provides surveillance, diagnostic and research services for endemic and exotic animal diseases, including transboundary animal diseases and zoonoses. Some government, university and private laboratories also participate in specific national disease management programs (e.g. anthrax, arboviruses) or service business needs on an ad hoc basis.

The National Laboratory Task Group (NLTG) assists AHC in managing a range of essential national laboratory functions. These functions underpin national and international trade and market access for animal and animal products and help safeguard and improve animal and public health in Australia. NLTG consists of members from the Department of Agriculture and Water Resources, AAHL, state and territory government laboratories and the New Zealand Ministry for Primary Industries. AHA is an observer. NLTG provides scientific and policy advice to AHC on terrestrial animal health laboratory and diagnostics issues. It also provides national leadership for networked diagnostic capacity coordination and oversees development and evaluation of new tests, standards for testing methodologies, training initiatives and other quality assurance functions.

All government laboratories play a key role in undertaking testing for EAD surveillance and response. They, together with the Department of Agriculture and Water Resources, also form the Laboratories for EAD Diagnosis and Response (LEADDR) network with a primary role in supporting EAD laboratory preparedness and responses.

AAHL,[11] which is one of six major high-containment animal health laboratories in the world, is an OIE and/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 on relevant matters, including biosafety and biosecurity. It also plays a key role in transferring testing capabilities for major EADs to state and territory government laboratories and, if appropriate, other laboratories under controlled quality assurance conditions.

There are several private or industry-based laboratories that provide National Association of Testing Authorities-accredited animal health testing services domestically and/or internationally. Some governments have outsourced laboratory testing to the private sector, through contracts, to provide official veterinary diagnostic services. These private animal health laboratories are therefore important to Australia's overall EAD testing capacity.

University veterinary laboratories often undertake research to develop platform technologies, develop and validate specific tests, train laboratory professionals, provide continuing education, and provide expert scientific advice. Some of them, through partnership with the government laboratories, also play a reference laboratory role. Further information about Animal Health Laboratories is in Chapter 5.

Livestock Biosecurity Network

The Livestock Biosecurity Network (LBN) is an incorporated, not-for-profit company established in 2012 by Cattle Council of Australia (CCA), Sheepmeat Council of Australia and WoolProducers of Australia. In September 2016, LBN became a subsidiary company of AHA, with two members, AHA and CCA.

LBN partners with its members and stakeholders to convey relevant information on and seek adoption of biosecurity matters (such as emergency and endemic diseases, pests and weeds), food safety, and livestock health and welfare among supply chain participants. LBN also acts to improve the skill levels of its supply chain participants. These activities aim to foster resilience and integrity in the Australian animal health system. LBN has established a small network of biosecurity and extension managers throughout Australia who act as proactive agents for information on biosecurity, food safety, livestock health and welfare to support a prepared and responsive livestock sector and

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

understanding of its key role in surveillance, detection and reporting of disease or pest events.

LBN has a broad, regularly engaged network, including corporate partnerships with key industry, producer and organisational advocates that collect and disseminate information on livestock health, welfare and biosecurity. It has developed key partnerships to boost activities building awareness of on-farm biosecurity for producers and animal health workers. These key partners include livestock agents and workers in saleyards, extension/adoption organisations, industry programs and agricultural shows. Targeted extension/adoption campaigns have also been held in veterinary and agricultural schools.

In 2017, LBN, in partnership with other organisations, trained producers to develop on-farm biosecurity plans, delivering 36 workshops to over 7,500 producers. All these producers have implemented a farm biosecurity plan. The plans meet the new requirements for biosecurity and livestock welfare under the red meat industry verification program (the Livestock Production Assurance program; see Section 2.2.8).

The LBN Strategic Plan 2017–2022 forms the blueprint for its strategic direction. LBN will focus on realising service excellence, enhanced partnerships, innovative approaches, sustainable funding, efficient systems and tailored communication under three strategic priorities, to:

- ensure producers are better prepared to manage livestock health, pest and weed threats and welfare matters on-farm
- promote implementation of biosecurity practices
- deliver organisational performance, member value and sustainable resourcing.

1.2.3 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 the use of 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[12] lists exotic, emergency and endemic terrestrial animal diseases of national significance. Australia also maintains a *National list of reportable diseases of aquatic animals*[13] (see Section 7.1). 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.

Australia has a long history of eradicating many notifiable diseases because of the coordinated efforts of state and territory animal health services – often assisted by nationally harmonised arrangements. 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

State and territory animal health personnel conduct surveillance and applied research projects. Authorities are constantly alert to the possible emergence of new infectious diseases, recognising that 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. AHA also trains livestock industry staff to work in EAD control centres, promoting further government–industry partnerships.

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, melioidosis and infections with avian influenza, Hendra virus, and Australian bat lyssa virus.

In 2017, collaboration between the Department of Agriculture and Water Resources, state and territory governments, AHA and the livestock industries, including through AHC, led to progress

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

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

Image credit: Animal Health Australia

on national animal health priorities. The National Animal Health Surveillance and Diagnostics (NAHSD) Business Plan 2016–2019 was developed to guide the efficient and effective delivery of surveillance activities in accordance with nationally agreed objectives and priorities. This Business Plan is being implemented by governments and industries in partnership and a review commenced in 2017. The NLTG is developing a draft National Animal Health Diagnostics Business Plan to be included in the revised NAHSD Business Plan. The Business Plan is discussed in Section 4.2.1.

Several initiatives relating to preparedness for foot-and-mouth disease (FMD) and other EADs continued in 2017. FMD is recognised as the single greatest EAD threat to Australia's red meat, dairy, wool and pig industries.[14] The priorities for Australia are to prevent the introduction of FMD, 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 4.

1.2.4 Private veterinary services and veterinary education

Private veterinary practitioners play a vital role in communities by (among other activities) 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 pre-requisite 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 and 2017, Australian Government funding was made available to state and territory governments, under the **Agricultural Competitiveness White Paper** (see Section 4.2.2), 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 6.2.3. In October 2017, private veterinarians were also among the attendees at the AAHL EAD symposium, which is an annual event focusing on emerging

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

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

The national Accreditation Program for Australian Veterinarians[15] 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 4.3.3.

BIOCHECK® is a new program, released in 2017 and managed by members of the Australian Cattle Veterinarians, a special interest group of the Australian Veterinary Association. The BIOCHECK® Biosecurity plan is a tool which accredited private veterinarians can use to help farmers develop tailor-made biosecurity plans for their properties. It is designed to ensure that the farm has considered the major biosecurity risks, and has appropriate risk-management strategies in place.

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 13).

Once every seven years, the Veterinary Schools Accreditation Advisory Committee (VSAAC) 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)[16] has provided oversight of the VSAAC audits. 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 Council on Education-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.

1.2.5 Veterinary statutory bodies

Each Australian state and territory has its own veterinary statutory body (VSB). The core purposes of VSBs are safeguarding public confidence in the profession and ensuring minimum standards of veterinary care.

As defined by the OIE, the core purposes of VSBs include regulating veterinarians (and paraprofessionals) through licensing, determining the minimum standards of education that entitles registration, and defining the standards of professional conduct of veterinarians. State and territory legislation commonly distils these requirements into tasks such as registering veterinarians, evaluation of domestic and foreign veterinary qualifications to determine acceptability for registration, licensing of veterinary hospitals, protection of the title 'veterinarian', defining those classes of therapeutic agents and invasive procedures that are restricted to veterinarians, investigation of complaints, the application of disciplinary procedures, and setting standards for continuous professional development and assessing and registering veterinarians as specialists.

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

16 www.avbc.asn.au

Each Australian state and territory has its own legislature and regulatory authority, and each has its own veterinary legislation and VSB. In principle, a veterinarian who is registered by one such VSB would therefore be restricted to practising within the territory administered by that VSB. These activities could not be delegated to any other body, either national or international. Steps have been taken to facilitate movement of veterinarians between jurisdictions without the need for de novo assessment of veterinarians by each registering jurisdiction. The *Mutual Recognition Act 1992* (Cwlth) and National Recognition of Veterinary Registration amendments to veterinary legislation have been enacted in all state jurisdictions except Western Australia, and are being developed in the Northern Territory and Australian Capital Territory. Progress has also been made in establishing mechanisms for evaluating components of some key tasks of VSBs that could be delegated to an overarching body. This is primarily to harmonise the standards of the VSBs. Australian VSBs have delegated to the AVBC many tasks, such as accreditation of veterinary degrees, recognition of foreign qualifications, assessment of foreign veterinarians and assessment of specialists, although the final decision on registration is always that of the board.

1.2.6 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, and is scheduled for completion by the end of 2018.

1.3 Performance of veterinary services

Australia is committed to ensuring the effective performance of veterinary services in the country. Australia underwent an OIE Evaluation of Performance of Veterinary Services (PVS evaluation) in October–November 2015, with the final report[17] published in May 2016. This involved a systematic evaluation of the country's animal health system using the OIE PVS Tool based on the OIE *Standards for veterinary services*.[18] 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 benefits to Australia and its trading partners of the collaborative approach adopted. Following the OIE evaluation, the findings were considered by AHC. It was agreed that individual state and territory PVS evaluations would be undertaken to complement the national evaluation. These evaluations commenced in 2017, by officers trained by the OIE in PVS evaluations. They are due to be completed by the end of 2018.

Australia also undertook a self-assessment and external evaluation of its implementation of the core capacities established under the International Health Regulations 2005. Country self-assessment is an initiative of the World Health Organization, using the Joint External Evaluation assessment tool. Country self-assessment is the first of a two-stage process. The second stage involves an external assessment by a panel of approximately 10 experts from other World Health Organization member states who objectively assess Australia's implementation of the International Health

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

18 www.oie.int/solidarity/pvs-evaluations

Regulations. The external assessment was undertaken in Australia between 24 November and 1 December 2017, where the assessors considered the available evidence to support Australia's self-assessment claims. This process was managed by the Australian Government Department of Health and involved input to the self-assessment report and participation in the evaluation visit by the Department of Agriculture and Water Resources, AAHL and universities, on the animal health components for several of the capacities being assessed. These included antimicrobial resistance, zoonotic disease, medical countermeasures and real-time surveillance. The Joint External Evaluation mission report will be published when it is finalised.[19]

1.4 National biosecurity reforms

Australia has a strong biosecurity system that protects human, animal and plant health, and our unique environment, and supports our reputation as a safe, 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.

Continuous review of the biosecurity system is essential to ensure it is contemporary and flexible, and that resources are allocated appropriately to reflect changing risks and priorities. Agriculture Ministers therefore agreed to a review of the capacity of the national biosecurity system, including its underpinning intergovernmental agreement, by an independent panel comprising Dr Wendy Craik AM (chair), Mr David Palmer and Dr Richard Sheldrake AM, with extensive stakeholder consultation across all relevant sectors throughout 2016 and 2017.

On 26 July 2017, Dr Craik presented the final report, *Priorities for Australia's biosecurity system: an independent review of the capacity of the national biosecurity system and its underpinning intergovernmental agreement* (the Review) to the Agriculture Ministers' Forum. The Review recognised the significant achievements made since the enactment of the IGAB, including a framework for the management of national surveillance and diagnostic capability, and the strategies for plant, animal, and environment and community biosecurity research, development and extension. The report makes 42 recommendations aimed at strengthening the national biosecurity system. These recommendations focus on risk and capability; engagement and communication with system participants; financial sustainability of the system; and governance, performance and accountability. The Australian, state and territory governments are developing a national response to the report and a refreshed IGAB, which is anticipated by mid-2018.

The Review also acknowledged the benefits of governments, primary industries and other stakeholders working closely 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.
In 2017, NBC oversaw several policy reforms to improve the effectiveness of Australia's biosecurity system, including:

- implementation of National Biosecurity Response Team arrangements 2017–2019, enabling rapid cross-sectoral emergency responses
- development of national biosecurity research and extension priorities for a more strategic, nationally consistent approach to biosecurity research and support
- development of the Australian Weeds Strategy 2017–2027 and Australian Pest Animal Strategy 2017–2027 to provide national pest animal and weed frameworks
- development of national minimum data standards for emergency responses, to improve data-sharing between jurisdictions and the effectiveness of emergency responses. They will also support market access for Australian agriculture, fisheries, food and forestry industries.

19 www.who.int/ihr/procedures/mission-reports-western-pacific/en/

Image credit: Australian Pork Limited

1.5 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. In 2017, the OIE Council continued to focus on the implementation of the OIE 6th Strategic Plan including scientific excellence, transparency and improved governance. A new procedure for the election of experts to OIE specialist commissions was introduced following work by Australia and several other countries. The terms of reference and membership of the OIE working groups were reviewed, resulting in better geographical representation for the Wildlife Working Group, an issue raised by Australia. Other key issues where Australia was influential included the future of the OIE PVS Pathway, the development of the World Animal Health Information System (WAHIS+) and OIE budget and administration.

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.

Several Australian experts participated in OIE ad hoc groups relating to:

- avian influenza
- veterinary paraprofessionals
- surveillance
- high-throughput sequencing, bioinformatics and computational genomics
- biothreat reduction in relation to specific methodology for veterinary services for investigation of suspicious biological events
- alternatives for surveillance for demonstration of freedom from FMD and recovery periods
- veterinary biobanking
- demonstration of disease freedom.

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.

Image credit: Taryn Mokotupu

2 LIVESTOCK TRACEABILITY, BIOSECURITY AND QUALITY ASSURANCE PROGRAMS

2.1 Livestock identification and traceability programs

The National Livestock Identification System (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 implementation of 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 (National Vendor Declarations [NVDs]) and submitted to the NLIS database by producers, saleyard operators, livestock agents and processors. Integrity Systems Company (a wholly owned subsidiary of Meat & Livestock Australia) 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.

2.1.1 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.

2.1.2 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.

2.1.3 NLIS for pigs

Australian Pork Limited (APL) 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 continues through the PigPass portal, with a high uptake to report movements under the voluntary arrangements.

In July 2017, Australia's agriculture ministers agreed to mandatory recording of all pig movements in Australia in a central database. Australia's states and territories are introducing legislation that will require recording of all pig movements to the PigPass database from 1 February 2018. This data is then transferred to the NLIS database. Recording pig movements will bring the pig industry into line with the cattle, sheep and goat industries, which have required recording of movements in the NLIS database for a number of years.

2.1.4 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 an 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 commenced scanning electronic tags of sheep and goats and

Image credit: DL Stapleton

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. A tracing exercise for NLIS (Sheep and Goats), Exercise Sheepcatcher II, occurred in June 2016.

2.2 Livestock industry biosecurity and 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) and biosecurity programs in the livestock industries are central to on-farm biosecurity and food safety practices. Some livestock industry QA and biosecurity programs are detailed in the following sections.

2.2.1 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 (FSANZ) – including the development of a hazard analysis and critical control points (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 (AHBIC), 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 only 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)
- traceability from hive to retail
- 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 has completed a review of the program. Details of the revised program can be found on the B-QUAL website.[20] The Board continues to monitor the program on a regular basis to meet changes in government and industry requirements.

20 www.bqual.com.au

2.2.2 National Bee Biosecurity Program

Plant Health Australia (PHA) are the managers of the National Bee Biosecurity Program, which includes the employment of Bee Biosecurity Officers (BBOs) and stewardship of the *Australian honey bee industry biosecurity code of practice*. The Program, through the Code, aims to improve the management of established bee pests and diseases (particularly American foulbrood) and increase the preparedness of beekeepers for exotic pests (including pest bees). The program is funded by the honey bee industry through the honey levy, with state governments contributing extensive in-kind resources.

In 2017, the AHBIC, state and territory governments and PHA continued to work together to promote and formally phase in the Program and Code.

The Program continues now with the industry-endorsed Code and ongoing appointments of BBOs in state departments of primary industries. Contracts have been fully executed and a BBO is now positioned in New South Wales, Tasmania, Victoria and Western Australia. South Australia are currently in the interview and appointment phase, and Queensland continue with their contract negotiation and BBO workplan development.

To further assist beekeepers to be compliant with the Code and provide advice on keeping honey bees healthy using industry best practice, an online training course, Biosecurity for Beekeepers,[21] was launched in April 2017. This course is externally funded and delivered through the Honey Bee Biosecurity subdomain of PHA on the Biosecurity Online Training site. This course was developed through consultation with AHBIC and technical specialists, and has had a significant uptake with 425 enrolments since going live. The value of the course has been specifically recognised by the Victorian Government, where the BBO is strongly promoting the course to beekeepers.

The BeeAware website[22] has been updated to include substantial support materials for the Code and online training course. Templates to facilitate better record keeping for hive inspections and reporting notifiable diseases have been completed and are available for download. Furthermore, the New South Wales Department of Primary Industries has published the Code in Arabic and Greek, allowing it to reach even further into the beekeeping community.

2.2.3 Alpaca industry biosecurity programs

The Australian Johne's disease Market Assurance Program for alpacas (AlpacaMAP) has had dwindling participation and will be closed down in 2018. The other more widely used alpaca QA program, Q-Alpaca, will also be reviewed and a new biosecurity program for the alpaca industry will be developed, with work commencing in 2018. The concept of this new biosecurity program was endorsed by the Animal Health Committee in November 2017.

In November 2017, the Australian Alpaca Association (AAA) launched its new eAlpaca herd registry system, recording pedigree and ownership details of all registered alpacas in Australia. This online system will be used as a key part of the new biosecurity program, allowing AAA members and their veterinarians to work together electronically.

The national South American Camelid Health Declaration was revised in 2017 and is available from the Farm Biosecurity and AAA websites. The form is recommended for use both as a vendor health declaration and as a waybill for interstate alpaca movements.

2.2.4 Australian Chicken Meat Federation's quality systems

The Australian Chicken Meat Federation maintains and promotes the *National farm biosecurity manual for chicken growers*.[23] 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. A

21 www.beeaware.org.au/training

22 www.beeaware.org.au

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

review of the biosecurity manual was undertaken in 2017, with the revised version expected to be available in 2018.

Implementation of the procedures in the manual also largely satisfy the requirements for poultry farming specified in the *Primary production and processing standard for poultry meat*,[24] issued by FSANZ. 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.

In the past year, a biosecurity induction video resource was made available to industry. Its purpose is to help farmers ensure their staff are aware of biosecurity risks and understand and apply good biosecurity practices on their farms. This resource was part funded by the AgriFutures Australia Chicken Meat program and is available on their YouTube channel.[25]

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.

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 Prevention of Cruelty to Animals (RSPCA) Approved Farming Scheme standards,[26] and most of these are accredited under this system; RSPCA staff assess compliance with scheme standards.

2.2.5 Australian Pork Industry Quality Assurance Program

Australian Pork Industry Quality Assurance Program (APIQ✓®) is a key platform providing confidence to consumers, regulators, markets and the Australian public that pig production standards are of a high level. APIQ✓® is an independently audited program, which verifies producer compliance with management, food safety, animal welfare, biosecurity, traceability, environment and transport standards.

A producer can be certified as:

- APIQ✓®, which indicates that their pigs are primarily indoors
- APIQ✓® Free Range, which means their pigs are outdoors at all times with access to feed and shelter
- APIQ✓® Outdoor Bred, Raised Indoors on Straw, which means that breeding pigs are outdoors at all times with access to feed and shelter, and grower pigs move to indoor group housing with bedding after weaning.

APIQ✓® also provides voluntary verification options for specific customers or markets, such as:

- Gestation Stall Free (GSF)
- Customer Specifications for Coles.

APIQ✓® certification incorporates the legal requirements set out in the *Model code of practice for the welfare of animals: pigs*. 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. Supplementary information to help producers comply with the standards is provided in manuals, including a compliance guide and auditor guide for auditors found on the APIQ✓® website.[27]

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

25 www.youtube.com/watch?v=jJK4wRQq8o0&feature=youtu.be

26 rspcaapproved.org.au/rspca-approved-products

27 www.apiq.com.au

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 and agriculture authorities, Australian Government export market requirements, and the FSANZ *Australian standard for the hygienic production and transportation of meat and meat products for human consumption* (AS 4696:2007).

Current status

APIQ✓® certification covers more than 90% of Australian commercial sows in production. GSF compliance has reached 82.6% of APIQ✓®-certified sows in production, and the proportion of sows in outdoor production (Free Range or Outdoor Bred) systems is just over 10% of all APIQ✓®-certified sows.

The Australian pork industry routinely reviews and considers opportunities for improvements to APIQ✓® policy, process, standards and practice. The most recent and significant amendment emerging from these reviews is the move to independent third-party auditing (TPA). This was considered necessary to:

- strengthen the independence of the audit system of APIQ✓®
- deliver a longer term, sustainable audit system
- establish a system that helps manage audit costs
- make certification a viable option for smaller producers
- ensure an auditor network that covered all pig production areas.

The TPA concept was presented to industry delegates in November 2016 for their consideration. Delegates largely supported the TPA concept but it was decided that further nationwide consultation would be useful to ensure producers understood the benefits and opportunities TPA provides, and to allow time for a trial of the alternative system to be conducted. Consultation was completed between November 2016 and April 2017 and included all stakeholder groups in all pig-producing areas. An independent review committee called for and reviewed expressions of interest to provide independent audit services. AUS-MEAT was selected as the preferred organisation to accomplish the industry's TPA objectives at an acceptable audit cost.

A small team of AUS-MEAT auditors were trained to conduct APIQ✓® audits and conducted 39 trial audits. The trials showed that AUS-MEAT auditors had the necessary audit skillset, including:

- skills, expertise and training to facilitate audits
- industry knowledge to successfully conduct pig audits
- capacity and expertise to administer and manage the audit process
- personnel coverage to meet industry requirements
- ability to schedule audits to spread associated travel and accommodation costs and minimise audit costs to individual producers.

Having successfully completed the trial, the APL Board approved a recommendation to adopt TPA and announced approval of TPA to delegates on 15 November 2017, to commence 1 January 2018. Industry delegates supported this decision.

AUS-MEAT will be assigning all APIQ✓® audits to AUS-MEAT auditors from 1 January 2018. AUS-MEAT will receive and review audit reports, and manage extensions, corrective actions and recertification processes independently of APIQ✓® Management.

APIQ✓® Management will continue to assess and investigate incidents, issues and critical corrective actions in cooperation with AUS-MEAT and the APIQ✓® Panel.

APL continues to own and administer the program on behalf of industry and has signed an initial two-year TPA service agreement with AUS-MEAT.

2.2.6 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 FSANZ 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 by the relevant competent authority, and compliance with the mandatory food safety program is verified by regulatory 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 for dairy cattle 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.

2.2.7 Egg Standards of Australia

Australian Eggs Limited (AEL) has developed Egg Standards of Australia (ESA), 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* (see Chapter 6) and the industry's responsibility to the community to ensure the production of quality eggs. ESA is a unique QA scheme that provides three different levels to encourage adoption across the different scales of egg production and facilitate the adoption of QA systems across the industry. ESA provides a compliance framework for a range of egg industry good practices for pullet rearing and egg production, grading and packing. It addresses:

- hen welfare
- egg quality
- biosecurity
- food safety
- work health and safety
- environmental management.

ESA began its implementation phase in April 2017, replacing the previous QA program (Egg Corp Assured). Only ESA audits will be conducted from 1 January 2018. The scheme is governed by certification rules, a registration and licensing process, and a suite of policies and procedures. An independent third party manages administration and audit operations, and four independent, third-party certification bodies manage the auditors.

Following the launch of ESA in April 2017, several farms have undergone ESA audits, with more businesses planning to transition to the new scheme throughout 2018. It is envisaged that ESA will have a similar reach to the previous QA scheme and will cover approximately half the national laying flock.

AEL entrusts audit management of ESA to four independent certification bodies whose auditing staff have Exemplar Global accreditation in food safety, as a minimum qualification. Auditors must also attend the ESA auditor training program held each year by AEL. A program of verification and unannounced audits (following formal complaints) form part of the scheme.

The Egg Corp Assured grading and packing standards are still in effect. ESA for grading and packing is still undergoing review and is planned to be launched in 2018.

2.2.8 Livestock Global Assurance Program

The objective of the Livestock Global Assurance Program (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, has been subject to extensive consultation and consideration by many parties within and outside industry, and shows the industry's commitment to animal welfare as well as to a sustainable and secure future. A consultative committee comprised of industry and government representatives oversaw and guided the direction of the project.

The LGAP, co-funded by Meat & Livestock Australia (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 (with stunning sheep), Malaysia (with non-stun goats), Indonesia (with non-stun and stunning cattle) and Australia (with exporters and importers), with the research outcomes delivered to the Australian Livestock Exporters' Council for consideration and implementation with the wider industry in April 2016.

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. Further information can be found on the LGAP website.[28]

2.2.9 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 assurance program for cattle, sheep and goats covering food safety, biosecurity and animal welfare. It was developed by MLA, in conjunction with industry peak councils and stakeholders. The LPA program (including LPA QA) is managed on behalf of the red meat industry by Integrity Systems Company, a wholly-owned subsidiary of MLA.

The LPA program is associated with on-farm food safety guidelines, which underpin food safety declarations on NVDs displaying the LPA logo. The LPA standards comprise seven 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 – to ensure that livestock intended for human consumption do not contain unacceptable chemical residues or physical hazards
- stock foods, fodder crops, grain and pasture treatments – to ensure that livestock are not exposed to feeds containing unacceptable contamination, especially animal products or unacceptable chemical residues
- preparation for dispatch of livestock – to ensure 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

28 www.livestockglobalassurance.org

- livestock transactions and movements – to 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
- biosecurity – to ensure that the risk of introducing infectious diseases to livestock production properties and the risk of spreading diseases between properties is minimised
- animal welfare – to ensure that livestock management is consistent with requirements of the *Australian animal welfare standards and guidelines*.

During 2017, several enhancements to the LPA program were introduced. These enhancements included:

- expansion of LPA to include two new elements: biosecurity and animal welfare
- implementation of a three-yearly LPA accreditation-renewal process, involving an assessment and supporting online learning modules
- introduction of a fee for LPA program accreditation and accreditation renewal, as a part of a revised funding model for the LPA program
- roll-out of the free-to-use electronic National Vendor Declaration (eNVD) platform.

These LPA program enhancements came into effect on 1 October 2017. As of 15 December 2017, approximately 218 500 property identification codes were accredited in the LPA program and more than 8700 of these producers had completed the new reaccreditation process.

For the year ending 30 June 2017, approximately 3250 on-farm audits were completed under the LPA random audit program and the targeted audit program conducted on behalf of the National Residue Survey (see Section 8.3.3). Before 30 June 2017, more than 52 300 audits had been completed since program commencement in 2004.

2.2.10 National Feedlot Accreditation Scheme

The National Feedlot Accreditation Scheme (NFAS) is the Australian cattle feedlot industry's QA scheme and is the cornerstone of eligibility for beef to be described as 'grain-fed' within prescribed industry standards. The program encompasses QA elements for animal health and welfare, environmental management, food safety and product integrity. There are currently more than 400 feedlots in Australia that are NFAS-accredited and are independently audited annually. AUS-MEAT administers the NFAS through the Feedlot Industry Accreditation Committee, supported by the Australian Lot Feeders Association (ALFA).

The NFAS is one of Australia's first agriculturally based QA schemes. It was reviewed in 2015 to ensure that the program meets the current and future needs of the industry and other stakeholders. Implementation of the recommendations is now underway, with dedicated workshops and ongoing support materials developed. The scheme is continuously updated with relevant scientific and technical information. These changes are being introduced in Australia from November 2017, and come into effect on 1 March 2018.

ALFA has reviewed animal welfare practices and outcomes within the sector and amended the *NFAS standards*. Changes include:

- direct reference to the *Australian animal welfare standards and guidelines for cattle*
- an additional performance indicator – *Procedures are in place to investigate, manage and record any incidents of animal cruelty*
- a commitment to the latest national welfare standards and guidelines and formal requirements for the investigation and management of any incidents of animal cruelty.

Stocking density rates are also contained in the new feedlot definition as *constructed facility with designated water points where cattle are confined with a stocking density of 25 m^2 per standard cattle unit (SCU) or less and are fed only a prepared ration for the purposes of production.*

The NFAS has high standards that are recognised, and it meets the requirements of the new on-farm biosecurity module requirement to gain or renew LPA, in effect from 1 October 2017. An additional performance indicator has now been included in NFAS: *the feedlot has conducted a risk assessment addressing the biosecurity risk at the feedlot site and formulated a biosecurity management plan*.

Livestock incident reporting has now been clarified, including trigger levels, reporting process and shared responsibility clearly delineated.

ALFA's technical officer is also a dedicated resource in NFAS delivery and QA support, with on-site provision of advice including matters relating to animal health, welfare and biosecurity.

In addition to this, ALFA has a core commitment to industry to facilitate best practice in animal health and welfare, and now has more than 250 trained animal welfare officers working in Australian feedlots. This training provides participants with the necessary knowledge and skills for the management, assessment and auditing of animal welfare within a feedlot operation. Further workshops will be held in 2018.

The level of oversight and rigour enables continued confidence in food safety and animal health in the grain-fed feedlot industry.

2.2.11 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.[29] This was developed in consultation with the Chief Veterinary Officers 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

The *Australian standard for the hygienic rendering of animal products* (AS 5008:2007)[30] 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 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) 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.

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

30 www.publish.csiro.au/book/5666

Seafood standards

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.

Australia has Federal, State and Territory food safety standards, legislation and regulations that cover the seafood supply chain from production through processing under the requirements of the FSANZ Code (Standard 4.2.1 *Primary production and processing standard for seafood*). Under this Standard, a seafood business must identify potential seafood safety hazards and implement controls that are commensurate with the risk. This Standard represents the minimum food safety and QA standard an Australian seafood business must meet. Many of the larger seafood industry sectors have developed their own QA programs, based on HACCP principles and good manufacturing practices, that are tailored to their individual operations. For example, the Australian Shellfish Quality Assurance Program is a government–industry co-operative program designed to assure the food safety of shellfish managed in accordance with operational guidelines.

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* (AS 5300),[31] which specifies the nationally agreed standard names for all fish species in Australia.

All individual seafood 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.

There are many voluntary standards and certification schemes that can apply to the seafood industry. Some are domestically or internationally recognised independent QA schemes, including but not limited to:

- Aquaculture Stewardship Council
- Best Aquaculture Practice
- BRC Global Standards
- Global GAP
- ISO 22000 and FSSC 22000
- Marine Stewardship Council.

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

Image credit: Joshua Smith

3

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 of 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 and Australia's status for all nationally significant terrestrial animal diseases.

3.1 Status of terrestrial animal health in Australia

Australia provides the World Organisation for Animal Health (OIE) with routine information about OIE-listed diseases through reports every six months. Table 3.1 shows Australia's status for OIE-listed diseases in 2017.

Table 3.1 Australia's status for OIE-listed diseases of terrestrial animals, 2017

Disease	Status	Date of last occurrence and notes
Multiple-species diseases		
Anthrax	Present	Limited distribution (see Figure 3.1)
Aujeszky's disease virus (infection with)	Free	Never occurred
Bluetongue	Virus present	Restricted to specific areas of Australia (see Figure 3.1). 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. Sporadic detections in pig hunting dogs however this is not OIE notifiable.
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 seasonally 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	–
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

cont.

Disease	Status	Date of last occurrence and notes
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 2017
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
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

cont.

Disease	Status	Date of last occurrence and notes
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
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

cont.

Disease	Status	Date of last occurrence and notes
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 and was last reported in 2004. 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
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] and another released in 2017[b]
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

cont.

Disease	Status	Date of last occurrence and notes
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 *Varroa jacobsoni* was identified in June 2016 and the response is currently in proof-of-freedom phase
Other diseases		
Camel pox	Free	Never occurred
Leishmaniasis	Australian variant, *Leishmania macropodum*, present	Rare. Australian variant was first isolated in 2000 from macropods and occurs infrequently in a small region near Darwin. In 2017, it was isolated in a new species, captive Nabarlek (pygmy rock wallaby, *Petrogale concinna*), in the Northern Territory

OIE = World Organisation for Animal Health

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

b www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review?page_refer=MapFullEventReport&reportid=23377

The National List of Notifiable Animal Diseases[32] of terrestrial animals facilitates disease reporting and control. It is based on the list of diseases that are notifiable to the OIE and also includes endemic diseases of national significance. Occurrences of diseases on this list must be reported to government authorities and this requirement is contained in state and territory legislation. Producers and veterinarians are also encouraged to report any unusual incidents involving animal mortality or sickness to ensure that any diseases of terrestrial or public health significance are investigated. The list is reviewed biennially by the AHC and was last reviewed in early 2015. A review has been underway in 2017 and will be finalised in 2018. Table 3.2 shows Australia's status for diseases on the National List of Notifiable Diseases of Terrestrial Animals that are not reportable to the OIE, for 2017.

States and territories also have their own lists of notifiable diseases which contain all the diseases on the national list, as well as others that are of particular interest to an individual state or territory.

Table 3.2 Australia's status for diseases on the National List of Notifiable Diseases of Terrestrial Animals, 2017 (not reportable to the OIE)

Australian bat lyssavirus	Present	–
Brucella canis	Free	Never reported
Borna disease virus (infection with)	Free	Never reported
Bungowannah virus (porcine myocarditis) (infection with)	Present	2003. Restricted distribution, one piggery
Devil facial tumour disease	Present	Restricted distribution
Duck herpesvirus 1 (duck viral enteritis/duck plague) (infection with)	Free	Never reported
Encephalitides (tick-borne)	Free	Never reported
Equine encephalosis virus (infection with)	Free	Never reported
Getah virus (infection with)	Free	Never reported
Hendra virus (infection with)	Present	Sporadic occurrence (see Figure 3.1)

cont.

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

Disease	Status	Date of last occurrence and notes
Histoplasma farciminosum (epizootic lymphangitis) (infection with)	Free	Never reported
Influenza A viruses in swine (infection with)	Present	–
Jembrana disease virus (infection with)	Free	Never reported
Louping ill	Free	Never reported
Malignant catarrhal fever (wildebeest-associated)	Free	Never reported
Menangle virus (infection with)	Present	1997
Mycobacterium avium (avian tuberculosis) (infection with)	Present	–
Neorickettsia risticii (Potomac horse fever) (infection with)	Free	Never reported
Porcine epidemic diarrhoea virus (infection with)	Free	Never reported. National survey conducted in 2016 with negative results
Post-weaning multi-systemic wasting syndrome	Free	Never reported
Psoroptes ovis (sheep scab) (infection with)	Free	1896
Pulmonary adenomatosis (jaagsiekte)	Free	Never reported
Salmonella Abortusequi (infection with)	Free	Never reported
Salmonella Enteritidis in poultry (infection with)	Present	National Salmonella Enteritidis Monitoring and Accreditation Program available for commercial egg producers
Swine vesicular disease virus (infection with)	Free	Never reported
Taenia saginata (cysticercus bovis) (infection with)	Present	–
Teschovirus A (porcine enteroviral encephalomyelitis) (infection with)	Free	Never reported
Transmissible spongiform encephalopathies (chronic wasting disease of 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 bovine spongiform encephalopathy-affected cattle are thought to have caused the disease
Trypanosoma cruzi (Chagas disease) (infection with)	Free	Never reported
Vesicular exanthema	Free	Never reported
Vesicular stomatitis virus (infection with)	Free	Never reported
Warble fly infestation	Free	Never reported
Wesselsbron virus (infection with)	Free	Never reported

3.2 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 jurisdictional field and laboratory databases, enabling disease control programs to be informed by property, regional and jurisdictional intelligence on diseases.

A subset of jurisdiction-held disease investigation data are collated nationally in Australia's National Animal Health Information System (NAHIS). 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. NAHIS makes a current, consistent national dataset of important surveillance information available to the Australian Government Department of Agriculture and Water Resources for reporting to the OIE, for substantiating Australian claims to disease occurrence status and for trade negotiations.

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 Advisory Committee facilitates effective cooperation for identifying needs and priorities for collating and reporting summary animal health information and required enhancements to 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,[33] and annually in this report (*Animal health in Australia*).

Image credit: iStock

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

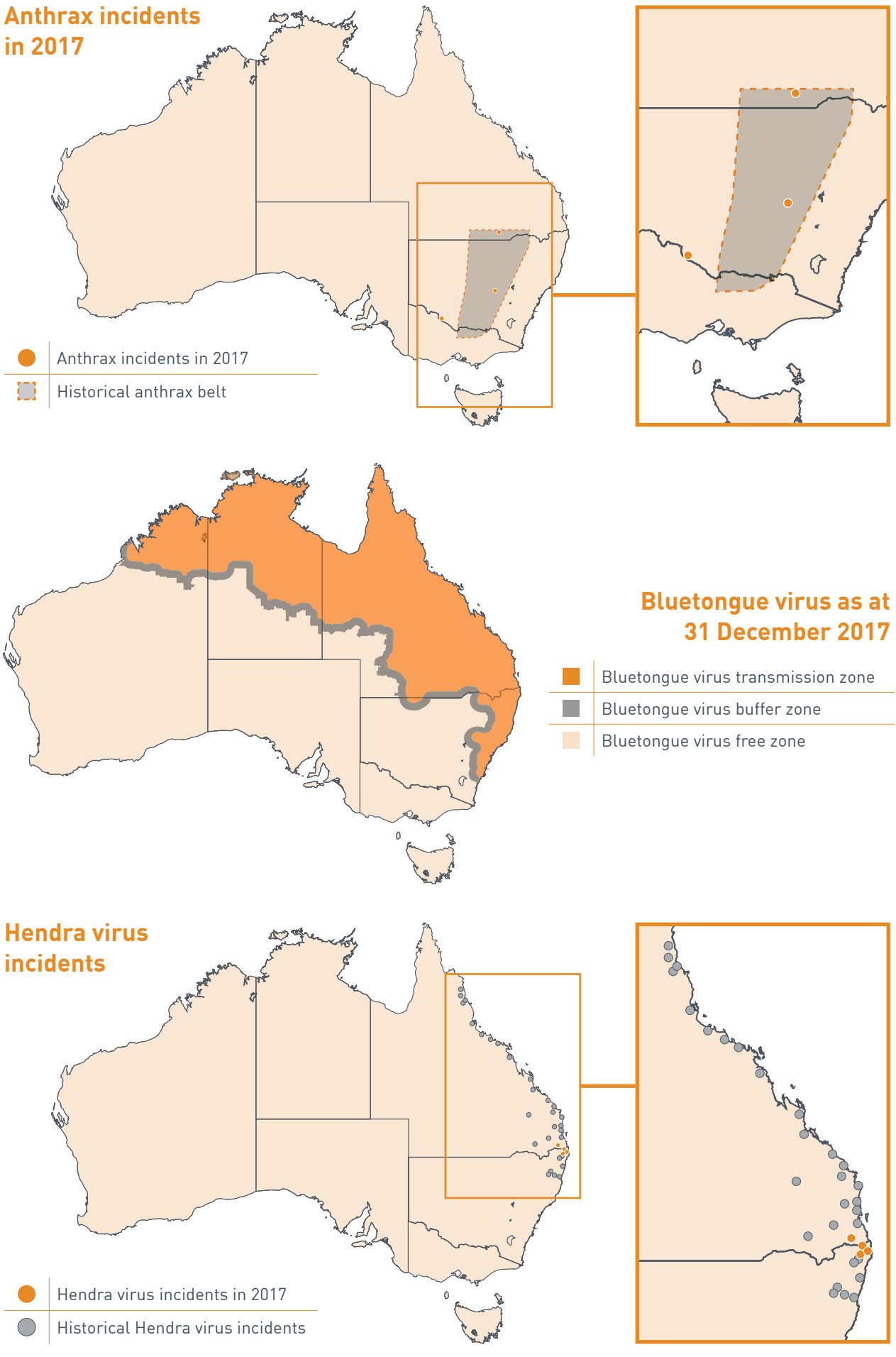

Figure 3.1 Distribution of selected terrestrial animal diseases in Australia

Image credit: Animal Health Australia

4

TERRESTRIAL ANIMAL DISEASE SURVEILLANCE AND CONTROL PROGRAMS

Australia's surveillance and control programs for terrestrial animal diseases are supported by a network of government field veterinary officers, private veterinarians, government and private veterinary diagnostic laboratories, researchers and livestock producers.

This network undertakes surveillance to identify and treat risks from notifiable, exotic and emerging diseases. It is supported by the National Livestock Identification System (NLIS) (see Section 2.1), which enables livestock to be identified and traced from property of birth to slaughter, and the National Animal Health Information System (NAHIS) (see Section 3.2) for data collation, analysis and reporting.

This chapter outlines the structure of Australia's surveillance systems and activities, and describes national surveillance initiatives undertaken in 2017. It also describes general surveillance and targeted programs at the national level, and programs specific to northern Australia, jurisdictions and industry.

4.1 Australia's surveillance systems and activities

Australia's globally competitive and sustainable livestock industries are maintained within a strong biosecurity framework, supported by effective animal health surveillance systems and activities.

Surveillance is a critical element of an effective, efficient animal health system and is a core competency of Veterinary Services as described by the World Organisation for Animal Health (OIE). Surveillance activities enable the identification of exotic, emerging and nationally significant endemic animal diseases; provide the necessary information for disease control policies, programs and reporting requirements; support access to Australia's export markets for animal and animal products; and maintain the productivity and profitability of livestock industries.

The Intergovernmental Agreement on Biosecurity[34] has recognised that surveillance is a shared responsibility and all parties have a role in Australia's animal health surveillance system. The benefits of an effective surveillance system are substantial and far-reaching across governments, livestock industries and the wider community. With common interests and a diverse range of stakeholders, it is imperative to have a coordinated national approach to strengthening this system.

National technical policy for surveillance and diagnostic services is endorsed by chief veterinary officers (CVOs) through the Animal Health Committee (AHC, see Section 1.1.1). 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. 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. Legislation in all states and territories requires that animal owners, veterinarians and laboratories report to animal health authorities any suspicion of notifiable diseases, including emergency animal diseases (EADs).[35]

Field staff are supported by government veterinary laboratories or government-contracted veterinary diagnostic laboratories that meet prescribed standards. In all cases of suspect notifiable diseases, laboratory diagnosis is free of charge and samples are also submitted to the Australian Animal Health Laboratory (AAHL) of the Commonwealth Scientific and Industrial Research Organisation. Laboratory quality assurance (QA) is maintained by compulsory accreditation of laboratories by the National Association of Testing Authorities as well as participation by laboratories in inter-laboratory QA programs (see Chapter 5 for further information).

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. Several states and territories produce regular newsletters[36,37,38,39,40] and maintain websites, email lists and social media networks tailored to private veterinarians and other relevant stakeholders, to improve the exchange of surveillance information. A nationally consistent framework for subsidising disease investigations, laboratory expenses and training for private veterinarians is supported under the National Significant Disease Investigation Program (NSDIP, see Section 4.3.3).

Data gathered by field and laboratory staff are recorded in information management systems to maintain disease profiles of districts and individual properties. Property-of-origin health certificates and official reports to various authorities –

34 www.coag.gov.au/content/intergovernmental-agreement-biosecurity

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

36 www.dpi.nsw.gov.au/about-us/publications/animal-health-surveillance

37 www.daf.qld.gov.au/about-us/enewsletters/biosecurity-news

38 dpipwe.tas.gov.au/biosecurity-tasmania/animal-biosecurity/animal-health/information-for-veterinary-practitioners

39 agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/animal-diseases/vetsource/vetwatch

40 www.agric.wa.gov.au/newsletters/waldo-producers

Image credit: Max Maddock

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 for analysis, reporting and response (see Section 3.2). 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.

4.2 National surveillance initiatives

4.2.1 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 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.

Activities in the Business Plan continue to progress, with the Implementation Task Group providing oversight. The Business Plan contains many foundational or scoping activities that direct the subsequent development of surveillance activities, and realisation of outcomes will increase in the second half of the implementation period.

The Business Plan is available on the Department of Agriculture and Water Resources website.[41]

4.2.2 Agricultural Competitiveness White Paper

The **Agricultural Competitiveness White Paper**[42] 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 agricultural 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 announced $200 million over four years for biosecurity surveillance and analysis, including in northern Australia (see Section 4.5), to better target critical biosecurity risks and support market access. The funds are being used to help keep pests and diseases out of Australia and identify and respond to pests and diseases when they arrive. They are also helping to enhance import and export processes. The biosecurity surveillance and analysis initiative contributes to four broad

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

42 agwhitepaper.agriculture.gov.au

themes: strengthening surveillance, community-based action, improving scientific capability, and improving information and analysis. More information on the biosecurity surveillance and analysis initiative is available on the Department of Agriculture and Water Resources website.[43]

One of the projects of the **Agricultural Competitiveness White Paper** is specifically focused on enhancing Australia's animal health, aquatic animal health and marine pest onshore surveillance system. This project has four main outcomes:

- improved early detection of exotic and emergency pests and diseases of animals and aquatic animals and marine pests
- enhanced surveillance programs to identify and target the highest risks
- improved management of specified threats to public health and biodiversity
- market access and trade supported and/or improved.

Along with some aquatic animal health and marine pest surveillance activities, terrestrial animal health surveillance activities that have commenced and were supported through 2016–17 funding as part of this project included:

- providing foot-and-mouth disease (FMD) real-time training in Nepal for veterinarians and stock handlers (see Section 6.2.3)
- providing FMD eLearning for veterinarians run by the European Commission for the Control of Foot-and-Mouth Disease (EuFMD) of the Food and Agriculture Organization of the United Nations (FAO) (see Section 6.2.3)
- developing reference and training materials for veterinarians on EAD surveillance
- establishing networks of 'surveillance champions' to facilitate livestock health surveillance and networks across participating jurisdictions
- enhancing the laboratories for EAD diagnosis and response (LEADDR) network QA program and assay rollout (see Section 5.1.1)
- developing minimum standards and national guidelines for next-generation sequencing capability for animal disease surveillance and diagnosis
- conducting Newcastle disease (ND) surveillance in wild birds, plus the national avian influenza (AI) in wild birds surveillance program (see Section 4.3.5)
- improving diagnostic testing for *Brucella suis*
- undertaking surveillance for antimicrobial resistance in the chicken egg and pig industries
- investigating methods to make better use of existing data
- initiating the Australian Livestock Industry Health Studies project, a trial of a new approach to surveillance in the livestock industries.

Other projects relevant to animal health surveillance are also being funded by the **Agricultural Competitiveness White Paper**, including initiatives in northern Australia, surveys in Indian Ocean territories, and collaborative offshore surveillance and capacity-building programs with neighbouring partner countries.

The biosecurity surveillance and analysis activities funded through the 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.

4.3 General surveillance

4.3.1 Surveillance activities for eradicated diseases

For diseases that have been eradicated within the previous 25 years, the *OIE terrestrial animal health code* (OIE Code) recommends that countries follow pathogen-specific surveillance requirements in the OIE Code, if they exist. If there are no specific requirements, countries should follow the general recommendations on surveillance outlined in the OIE Code, provided that, for at least the previous 10 years:

- the disease has been a notifiable disease
- an early detection system has been in place
- measures to prevent the introduction of the disease or infection have been in place
- no vaccination against the disease has been carried out unless otherwise provided for in the OIE Code

43 www.agriculture.gov.au/biosecurity/agwhitepaper-bio-surveillance-analysis

- infection is not known to be established in wildlife within the country.

Australia follows these recommendations in the OIE Code and has successfully eradicated bovine brucellosis, bovine tuberculosis, equine influenza, highly pathogenic avian influenza (HPAI) and virulent ND, in the preceding 30 years.

Bovine brucellosis

In 1970, industry, state and territory governments and the Australian Government united to form the national brucellosis and tuberculosis eradication campaign (BTEC). During the campaign to eradicate brucellosis, vaccination was used to contain the disease and testing and slaughter were used to eradicate the infection. Following a successful eradication campaign, in accordance with the recommendations in the OIE Code, Australia declared freedom from bovine brucellosis (*Brucella abortus*) in 1989. Targeted surveillance for *B. abortus* continued until the end of 1993.

Australia uses general surveillance to demonstrate its ongoing freedom from *B. abortus*. State and territory veterinary laboratories test for *B. abortus* as part of abortion investigations and for other reasons. Additional testing is done to meet export requirements for certain markets. Species other than cattle are also sampled. No cases of *B. abortus* were detected in 2017 (see Appendix Table C1 for more information).

Bovine tuberculosis

Following on from BTEC, Australia declared freedom from bovine tuberculosis (TB) (*Mycobacterium bovis*) in 1997, in accordance with the recommendations in the OIE Code. 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.[44] 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.

Australia uses general surveillance to demonstrate its ongoing freedom from bovine TB. In addition, the *Australian standard for the hygienic production and transportation of meat and meat products for human consumption* (AS 4696:2007)[45] requires that all carcases and their parts are inspected by a meat safety inspector. Because bovine TB is an exotic animal disease in Australia, suspicious granulomas identified when cattle carcases are inspected at slaughter establishments, including export abattoirs, are submitted for testing to exclude *M. bovis* as a cause. Additional testing is done to meet export requirements for certain markets. No cases of *M. bovis* were detected in 2017 (see Appendix Table C1 for more information).

Equine influenza

In August 2007, Australia experienced a large outbreak of equine influenza. Commonwealth, state and territory governments and industry agreed on a national approach to contain and eradicate equine influenza, through the Consultative Committee on Emergency Animal Diseases (CCEAD) and the National Management Group (NMG). The national approach was effective in eradicating the disease and the last case was reported in December 2007. In accordance with the recommendations in the OIE Code, Australia declared freedom from equine influenza in December 2008.

Australia uses general surveillance to demonstrate its ongoing freedom from equine influenza. As of 2017, there continues to be no evidence that equine influenza is circulating in the Australian horse population. No cases of equine influenza were detected in 2017 (see Appendix Table C1 for more information).

Highly pathogenic avian influenza

Australia's last outbreak of HPAI, caused by an H7N2 virus, was in October 2013. The outbreak affected two properties and was quickly contained and eradicated. In accordance with the recommendations in the OIE Code, Australia declared freedom from HPAI in February 2014.

Australia has a targeted surveillance program for HPAI in wild birds (see Section 4.4.3) and uses general surveillance and subsequent investigation to exclude HPAI infection and demonstrate ongoing freedom from HPAI in poultry populations. The results of targeted surveillance for AI in wild birds in Australia are reported in Section 4.4.3. No cases

44 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.

45 www.publish.csiro.au/book/5553

of HPAI were detected in 2017 (see Appendix Table C1 for more information).

Newcastle disease

Australia's last outbreaks of virulent ND were in 2002. The two incidents affected single properties and the disease was eradicated using an agreed national approach, through the CCEAD and NMG. In accordance with the recommendations in the OIE Code, Australia declared freedom from virulent ND in 2003. Non-pathogenic (lentogenic) ND virus strains are present in Australia.

Subsequent to the 2002 outbreaks, a National Newcastle Disease Management Plan (NNDMP)[46] was developed to minimise the risk of Australian-origin virulent ND outbreaks in commercial chicken flocks, through vaccination. The NNDMP concluded in 2016. However, as of 2017, all long-lived chickens in flocks greater than 1000 birds are required to be vaccinated. In addition, broiler chickens in New South Wales and Victoria are required to be vaccinated. Vaccination of broilers in other jurisdictions is optional.

Australia used a targeted surveillance program for avian paramyxovirus (APMV) in wild birds in 2016–17 (see Section 4.3.5) and uses general surveillance to demonstrate its ongoing freedom from virulent ND in poultry populations. The results of targeted surveillance for APMV in wild birds in Australia are reported in Section 4.3.5. No cases of virulent ND were detected in 2017 (see Appendix Table C1 for more information).

4.3.2 Surveillance activities for new and emerging diseases

Pigeon rotavirus

Since mid-2016, a highly infectious rotavirus (pigeon rotavirus) has emerged in kept pigeons (racing and fancy pigeons) in New South Wales, Queensland, South Australia, Tasmania, Victoria and Western Australia. Pigeon rotavirus infection can result in high mortality rates in lofts over a short period, and has also been reported in feral pigeons (the rock pigeon, *Columba livia*). Typical clinical signs include a sudden onset of depression, diarrhoea, vomiting and regurgitation.

Following initial reports of the disease, a collaborative diagnostic investigation between AAHL and state laboratories from affected jurisdictions excluded other known EADs and notifiable diseases, including AI, ND virus and pigeon paramyxovirus type 1 (PPMV-1). Partnerships between AAHL and state laboratories have resulted in the development of new diagnostic tests for pigeon rotavirus, including a real-time polymerase chain reaction (PCR) test.

Domestic poultry were not found to be affected by pigeon rotavirus during transmission studies conducted at AAHL in 2017. Nevertheless, exclusion of pigeon rotavirus when the clinical and post-mortem signs in poultry resemble those seen in pigeons known to be infected with pigeon rotavirus is considered best practice.

The pigeon industry is advised to implement biosecurity measures to prevent the spread of the disease.[47] Notification of the novel rotavirus was made to the OIE World Animal Health Information System.[48]

4.3.3 Private veterinarian surveillance activities

National Significant Disease Investigation Program

The NSDIP was initiated in June 2009 to facilitate investigation of significant disease events by private veterinarians. Significant disease events are defined as those clinically consistent with national notifiable animal diseases not suspected to be EADs,[49] or other diseases showing an increasing incidence and/or an expanding geographical or host range. Where there is a genuine suspicion of an EAD, the disease event is considered outside the scope of NSDIP funding and the relevant state or territory government department will lead and fund an investigation.

NSDIP is managed by Animal Health Australia (AHA) and delivered by state and territory governments and Wildlife Health Australia (WHA). It is funded

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

47 www.agriculture.gov.au/pests-diseases-weeds/protect-animal-plant/bird-owners

48 www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review/viewsummary?fupser=&dothis=&reportid=23344

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

from livestock industry and government member subscriptions to AHA. The program aims to boost Australia's capacity for early detection of national notifiable animal diseases and new or emerging diseases in livestock and wildlife, by increasing the participation of private veterinarians 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.

Registered private veterinarians engaged in clinical veterinary medicine, including veterinary practitioners in university clinics, zoos and wildlife parks, are eligible to participate in the program. 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. From July 2016, the scope of NSDIP activities was expanded to include training of private veterinarians in disease investigation, and to increase levels of knowledge, skill and confidence to investigate and report on disease events.

Further information on the NSDIP is available on the AHA website.[50]

Other support for disease surveillance by private veterinarians

A number of state and territory government departments extend support for private veterinarians to undertake disease investigations and training through provision of additional subsidies. For example:

- In 2017, following a review of the Victorian Enhanced Equine Clinical Arbovirus Surveillance project,[51] the Department of Economic Development, Jobs, Transport and Resources further extended the support provided to private veterinarians under the NSDIP to allow follow-up testing of sera from convalescent horses when this is required to establish a diagnosis in a particular case.
- In South Australia, the Rural Practitioner Enhanced Disease Surveillance program[52] promotes routine and thorough investigation of livestock disease incidents by rural private veterinarians, through regular communication, provision of disease investigation and epidemiology education, and investigation and laboratory subsidies co-funded by the NSDIP.
- In 2017, the New South Wales Department of Primary Industries worked with private veterinarians to trial a new pen-side PCR test for campylobacter-related infertility in cattle.
- In addition to funding investigations of suspected nationally notifiable animal diseases, the Queensland Government's General Passive Surveillance program fully subsidises laboratory investigations initiated by private veterinarians on suspicion of an emerging or state-regulated endemic disease. Approximately 2000 subsidised submissions are received from private veterinarians annually.

4.3.4 National Sheep Health Monitoring Project

The National Sheep Health Monitoring Project (NSHMP), which commenced in 2007, monitors lines[53] of sheep in abattoirs for several important animal health conditions.

In the 2016–17 financial year, 5 316 447 sheep, from 21 615 lines, were monitored across 15 domestic and export abattoirs; some of these abattoirs were monitored periodically.

The NSHMP currently only reports significant endemic diseases that can be identified by inspecting viscera or at the adjoining carcass-inspection stage. Lines of sheep are monitored by qualified meat inspectors and company-based personnel. The focus is 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*),

50 www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/national-significant-disease-investigation-program

51 agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/animal-diseases/vetsource/vetwatch/vetwatch-october-2017/enhanced-equine-clinical-arbovirus-surveillance-project-final-results

52 pir.sa.gov.au/biosecurity/animal_health/veterinarians/rural_practitioner_enahanced_disease_surveillance

53 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.

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. Information has also become available to producers through the Livestock Data Link portal, developed by Meat & Livestock Australia, in July 2017. 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.

Sheep Producers Australia (formerly the Sheepmeat Council of Australia) and WoolProducers Australia support the NSHMP because of the productivity and welfare effects of uncontrolled disease. Both recognise the 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.

4.3.5 Wildlife health surveillance

WHA administers Australia's general wildlife health surveillance system. Key elements of the system include a network of coordinators reporting into 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 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. Six sentinel veterinary clinics with a large or dedicated wildlife caseload also contribute to the system, including two new clinics from Tasmania which started contributing in 2017. The national wildlife health surveillance system also includes contributions through university veterinary clinics and pathology departments.

Wildlife health reporting focuses on six disease categories: diseases listed by the OIE, bat viral diseases, mass or unusual mortality events, cases of salmonellosis, 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 700 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 2017, 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 disease investigation funds as part of the NSDIP managed by AHA (see Section 4.3.3)
- 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 AI and avian paramyxovirus 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 2017, 889 wildlife disease investigation events were added to the national database (Table 4.1). Approximately 42% of these events were bats (mostly submitted for exclusion testing for ABLV), wild bird morbidity and mortalities accounted for a further 29% of investigations reported, and a further 22% related to marsupials.

Table 4.1 Number of disease investigations reported into eWHIS, January–December 2017[a]

Animals	Number of investigations
Bats[b]	377
Birds	260
Marsupials	200
Feral mammals	18
Snakes and lizards	9
Marine mammals	6
Frogs	3
Marine turtles	11
Monotremes	5

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 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. WHA coordinates a focus group that works to improve national coordination of issues associated with bat health.

Australian bat lyssavirus

ABLV is a nationally notifiable animal disease. Bats are the natural reservoir of ABLV, and both flying-foxes (*Pteropus* spp.) and insectivorous microbats can be infected. ABLV infection has been detected in bats from most states and territories. 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. In 2013, a dog that had contact with a flying-fox was tested seropositive and was euthanased. There was no evidence of ABLV infection on post-mortem testing.

State and territory animal and public health laboratories and AAHL continue to screen Australian bats for ABLV. Bats are tested for a variety of reasons, most commonly following potentially infectious contact with a human, e.g. a bite or scratch, or a domestic animal such as a pet dog or cat. WHA collates and publishes national ABLV bat testing data.[54] A total of 403 bats were tested for ABLV in 2017. Of these, 27 flying-foxes from New South Wales, Queensland, Victoria and Western Australia were found to be infected with ABLV. There were no detections of ABLV infection in 2017 in species other than bats.

Monitoring for diseases of biodiversity concern includes exclusion testing for the exotic disease white-nose syndrome in microbats, a fungal disease that has killed millions of insectivorous bats in North America but has not been identified in Australia. The Department of Agriculture and Water Resources and WHA have been working with stakeholders to reduce the risk of introduction of white-nose syndrome into Australia, and to better prepare Australia for a possible incursion of this disease.[55,56] Activities have included a disease risk assessment, development of response guidelines, and raising awareness of the disease among key groups.

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 4.4.3). Diagnostic testing for wild bird mortality events includes, when appropriate, exclusion of AI, APMV (including ND and PPMV-1) and West Nile virus. In 2017, WHA received 260 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 atoxoplasmosis, avian chlamydiosis, avian pox, botulism, coccidiosis, lorikeet paralysis syndrome, *Macrorhabdus ornithogaster* infection, sarcosystosis, *Salmonella* spp. infection, spironucleosis, parasitism, PPMV-1,[56] poisoning, psittacine beak and feather disease, trichomoniasis and trauma.

No wild bird mortality events were attributed to AI or West Nile virus. AI was specifically excluded by PCR testing for influenza A in 89 of the events. In addition, APMV was excluded in 79 events by PCR testing specific for ND virus and/or PPMV-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.

Other wildlife disease investigations

Wildlife disease investigations are regularly reported to WHA and are recorded in the national database. Examples of some of the findings in these investigations include *Mycobacterium pinnipedii* infection in a seal (*Arctocephalus pusillus doriferus*), *Vibrio cholera* (non-enterotoxigenic strain) infection in a group of ringtail possums (*Pseudocheirus peregrinus*) and encephalitis due to *Salmonella enterica* subsp. *diarizonae* infection in a wild western ringtail possum (*Ps. peregrinus occidentalis*).[57,58]

Tasmanian 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[59,60] and has spread to affect nearly the entire species range. DFTD is caused by a directly transmissible cell line; living cancer cells are

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

55 www.agriculture.gov.au/pests-diseases-weeds/animal/white-nose-syndrome

56 www.animalhealthaustralia.com.au/wp-content/uploads/AHAI1704-AHSQ-Q2-2017_FA2.pdf

57 www.sciquest.org.nz/node/133403

58 www.sciquest.org.nz/node/138376

59 Hawkins CE, Baars C, Hesterman H, et al. Emerging disease and population decline of an island endemic, the Tasmanian devil *Sarcophilus harrisii. Biological Conservation* 2006; 131 ; 307-324.

60 Loh R, Bergfeld J, Hayes D, et al. The pathology of devil facial tumor disease (DFTD) in Tasmanian devils (*Sarcophilus harrisii*). *Veterinary Pathology Online* 2006; 43: 890-895.

transmitted between individuals by close contact during social interactions.[61]

A second transmissible cancer, devil facial tumour 2 (DFT2) has been detected in Tasmanian devils in southeast Tasmania.[62] DFT2 appears to behave like the first-observed DFTD (now referred to as DFT1) and individual devils can be affected by both DFT1 and DFT2.

The species is estimated to have declined by 80% in less than 20 years, with local population declines as high as 97%.[63,64] 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.[65] Tasmanian DFTD is listed as a nationally notifiable animal disease.

Management of the response to DFTD is coordinated by the Save the Tasmanian Devil Program (a Commonwealth and state government initiative), and implemented by the Tasmanian Department of Primary Industries, Parks, Water and Environment. A robust captive insurance population of over 700 individuals is managed across a number of institutions, both within Tasmania and on the mainland. The current phase of the program is focused on securing wild Tasmanian devil populations, minimising the effect 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 and wild-born (born on Maria Island) releases at several sites across the state. It was found that captive-born devils were more prone to being killed on roads than wild-born devils, so all future translocation will be of wild-born devils.[66] Studies into immunotherapies, including development of a vaccine, continue.

61 Epstein B, Jones M, Hamede R, et al. Rapid evolutionary response to a transmissible cancer in Tasmanian devils. *Nature Communications* 2016: 7.

62 Pye RJ, Pemberton D, Tovar C, et al. A second transmissible cancer in Tasmanian devils. *Proceedings of the National Academy of Sciences 2016*; 113: 374-379.

63 Hamede RK, Pearse A-M, Swift K, et al. Transmissible cancer in Tasmanian devils: localized lineage replacement and host population response. Proceedings Biological Science 2015; 282: pii: 20151468. doi: 10.1098/rspb.2015.1468.

64 Save the Tasmanian devil program (2015) *The disease*. www.tassiedevil.com.au/tasdevil.nsf/The-Disease/979FEB5F116CE371CA2576CB0011A26E

65 IUCN 2008 The IUCN Red List of Threatened Species. www.iucnredlist.org

4.4 Targeted national programs

4.4.1 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, Akabane and bovine ephemeral fever (BEF) viruses. Bluetongue virus (BTV) infection does not adversely affect production in Australian livestock, and disease has not been reported from areas of known viral transmission.

Australia's economy benefits from the export of ruminant livestock and their genetic material (semen and embryos). This trade depends on a shared confidence between Australia and its trading partners that risks to the animal health status of the importing country can be accurately assessed and properly managed. 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 for negotiation of import health conditions for Australian livestock and their genetic material for overseas markets.

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.

66 Grueber CE, Reid-Wainscoat EE, Fox S, et al. Increasing generations in captivity is associated with increased vulnerability of Tasmanian devils to vehicle strike following release to the wild. *Scientific Reports* 2017; 7: 2161.

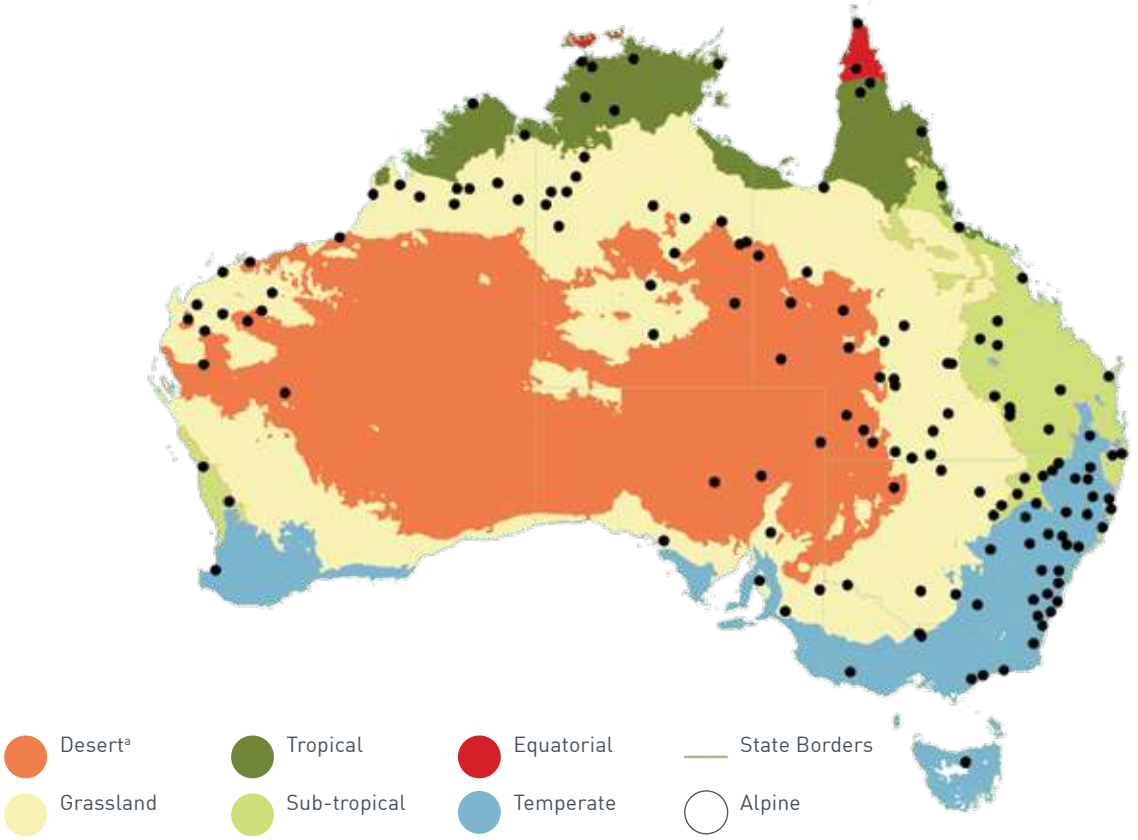

Figure 4.1 Locations of NAMP virological sampling sites, 2016–2017 arbovirus transmission season

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

Objectives of the National Arbovirus Monitoring Program

NAMP has three specific objectives:

- market access – to facilitate the export of live cattle, sheep and goats, and ruminant genetic material, to countries with concerns about bluetongue, Akabane and BEF viruses.
- bluetongue early warning – to detect incursions of exotic strains of BTV and vectors (*Culicoides* species 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 bluetongue, Akabane and BEF viruses and their vectors, to support livestock exporters and producers.

Operation of the National Arbovirus Monitoring Program

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.

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 the bluetongue, Akabane and BEF viruses. The frequency of blood sampling relates to the probability of arbovirus transmission – that is, the greater the likelihood of viral transmission, the more frequent the sampling. Insect traps to detect *Culicoides* species are positioned near the monitored herds during the period of testing or near herds where conditions are favourable for *Culicoides* species survival.

The number and locations of herds (Figure 4.1) are selected to enable the distribution of the specified arboviruses to be determined (e.g. sentinel sites located along the border between the zone where infection is expected and not expected, and sentinel sites in areas where infection occurs sporadically), and the arbovirus-free area is monitored to verify freedom. Known endemically infected areas are sampled to detect any new strains of virus and to assess the seasonal intensity of infection with each arbovirus.

Beatrice Hill in the far north of the Northern Territory is a focus for exotic BTV surveillance; 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, Northern Territory, Queensland and Western Australia after seroconversions are detected. NAMP surveillance data relating to bluetongue early warning are supplemented by targeted surveillance activities conducted by Northern Australian Quarantine Strategy (NAQS) of the Australian Government Department of Agriculture and Water Resources in remote coastal regions of northern Australia, including the Torres Strait Islands.

Epidemiology

Bluetongue, 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. The arboviruses are transmitted only if vectors are present in sufficient density.

Culicoides brevitarsis is the main vector of both 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 different ecological thresholds from *C. brevitarsis*, particularly its tolerance to lower temperatures, which accounts for its wider distribution and its occurrence in regions not affected by BTV or Akabane virus.

Research in Australia since the mid-1970s has provided a detailed understanding of the epidemiology of Australian BTV strains and their *Culicoides* midge vectors. The important vector species in Australia are likely to have all originally arrived on air currents from neighbouring countries.

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

Recent monitoring results

Full monitoring results for the 2016–2017 arbovirus transmission season (September 2016 to August 2017) are published separately in the NAMP Report 2016–2017.[67] Excerpts of the full report follow below to summarise the limits of distribution of the bluetongue, Akabane and BEF viruses.

Bluetongue virus distribution

The limits of BTV transmission in Australia are shown on the interactive Bluetongue Virus Zone Map,[68] which defines areas in which no viral transmission[69] has been detected for the past two years.

BTV transmission 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 4.2). No new serotypes were detected in Australia during 2016–2017.

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

On 13 October 2017, a temporary precautionary BTV zone was established in northern Victoria, extending into southern New South Wales. This action was taken as a precaution in response to the detection of BTV antibodies during pre-export testing in purportedly Victorian-bred cattle, while investigations and surveillance were undertaken.

Analysis of laboratory results from the surveillance, which involved the testing of approximately 2500 dairy and beef cattle in the area of concern, was undertaken. There was no evidence of virus currently circulating in the area, or the presence of a known competent vector. Further investigations

67 www.animalhealthaustralia.com.au/our-publications/namp-report/

68 namp.animalhealthaustralia.com.au

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

also confirmed that the animals that were the cause of the investigation were moved from the recognised bluetongue transmission zone in New South Wales, where it is likely they were exposed to the virus and developed BTV antibodies. The likelihood of BTV being established in Victoria is currently considered remote and, as a result, the BTV risks have been assessed to be negligible and the zone was lifted on 6 December 2017.

As part of Australia's commitment to providing strong assurances to trading partners, the decision to remove the zone has been supported by the placement of additional BTV sentinel herds and vector trapping in northern Victoria.

Akabane virus distribution

The distribution of Akabane virus (Figure 4.3) varies within the limits of its vector, *C. brevitarsis*, occurring endemically in northern Australia (northern Queensland, Northern Territory and Western Australia) and showing a distinct seasonal spread in New South Wales and southern parts of Queensland.

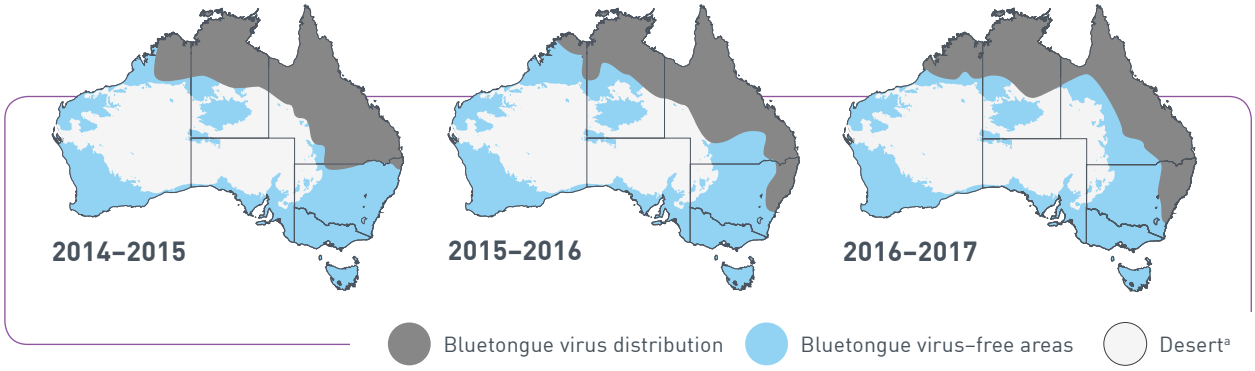

Figure 4.2 Distribution of bluetongue virus in Australia, 2014–2015 to 2016–2017

a Köppen climate classification

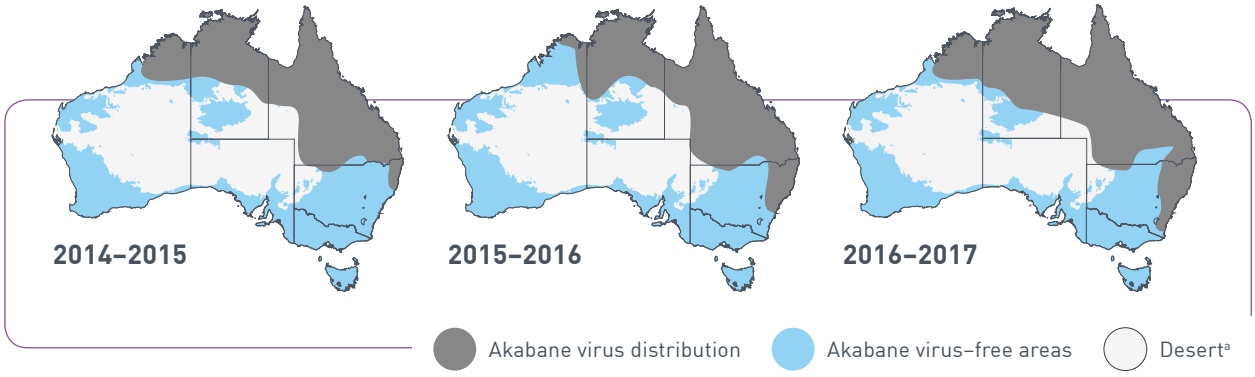

Figure 4.3 Distribution of Akabane virus in Australia, 2014–2015 to 2016–2017

a Köppen climate classification

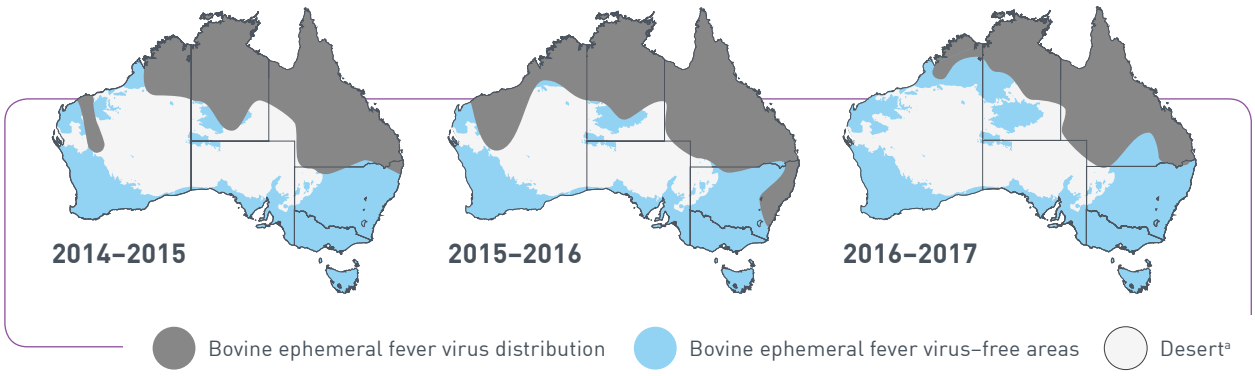

Figure 4.4 Distribution of bovine ephemeral fever virus in Australia, 2014–2014 to 2016–2017

a Köppen climate classification

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

Bovine ephemeral fever virus distribution

BEF virus is endemic in northern Australia (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 4.4).

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

4.4.2 Transmissible spongiform encephalopathies freedom assurance program

In 2017, Australia maintained freedom from classical scrapie and continued to be recognised by the OIE as a country of negligible risk for bovine spongiform encephalopathy (BSE). These diseases are types of transmissible spongiform encephalopathies (TSEs). The purpose of the TSE Freedom Assurance Program (TSEFAP) is to increase market confidence that Australian animals and animal products are free from TSEs. This is achieved through the structured and nationally integrated management of animal-related TSE activities.

Projects that operate under the TSEFAP are:

- The National Transmissible Spongiform Encephalopathies Surveillance Project (NTSESP)
- the Australian ruminant feed-ban scheme, including inspections and testing
- surveillance of imported animals 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',[70] 'fallen'[71] and 'casualty slaughter'[72] 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*.[73]

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 detect at least one BSE case per 50 000 in the adult cattle population at a confidence level of 95%. Surveillance points are assigned to cattle samples according to the animal's age and subpopulation category (i.e. the likelihood of detecting BSE). Australia's target is to achieve a minimum of 150 000 surveillance points during a seven-year moving window. Australia also aims to meet OIE recommendations to investigate all clinically consistent cattle, and ensure that cattle from the 'fallen' and 'casualty slaughter' sub-populations 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.

70 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.

71 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'.

72 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'.

73 NTSESP Field Guidelines 2017-18 at www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/tse-freedom-assurance-program/surveillance-of-tses

Table 4.4 Summary of results from the National Transmissible Spongiform Encephalopathies Surveillance Project, cattle and sheep, 2016–17

	Cattle			Sheep	
State or territory	Number examined	Points	Number positive	Number examined	Number positive
New South Wales	289	50 761.3	0	258	0
Northern Territory	22	7 311.1	0	0	0
Queensland	219	67 841.7	0	75	0
South Australia	36	14 559.1	0	50	0
Tasmania	30	5 810.5	0	23	0
Victoria	160	45 728.6	0	150	0
Western Australia	45	19 730.0	0	219	0
Total	**801**	**211 742.3**	**0**	**775**	**0**

Table 4.4 shows the results from the NTSESP for the 2016–17 financial year. Data for other periods are available from the NAHIS database.[74]

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 2016–17 financial year, 527 operations were inspected by jurisdictional staff, from renderers to end users. This revealed 36 instances of non-compliance, of which all except six were successfully resolved in this period. During the same period, 7075 audits were completed through industry QA programs, very high levels of compliance were recorded and no 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. As of November 2017, there are 15 of these imported cattle still present in Australia.

Program communications

During 2017, 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.

4.4.3 National avian influenza wild bird surveillance program

The National Avian Influenza Wild Bird (NAIWB) Surveillance Program is coordinated by WHA and activities occur 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

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

unexplained morbidity and mortality events in wild birds, including captive and wild birds within zoo grounds (see Section 4.3.5). 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 2017, targeted surveillance activities were expanded to include testing for APMVs, predominantly targeting APMV-1. Anseriformes (waterfowl) were primarily targeted, with a small number of Charadriiformes (shorebirds) also sampled. Locations focused on areas with known mixing of shorebirds and waterfowl and/or those in close proximity to poultry and humans.

Over 99 000 wild birds have been tested for AI viruses since July 2005. In 2017, pathogen-specific, risk-based surveillance was conducted by sampling apparently healthy, live and hunter-killed wild birds at sites in Queensland, South Australia, New South Wales, Northern Territory, Western Australia, Victoria and Tasmania. A total of 5385 faecal environmental swabs and/or cloacal swabs collected from waterbirds were tested for AI viruses, with a subset (*n* = 4304) also tested for APMV-1. No HPAI viruses nor virulent strains of APMV-1 have been identified. However, surveillance activities continue to result in evidence of a wide range of subtypes of AI viruses of low pathogenicity (sub-types H1–H11) and avirulent strains of APMV-1.

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 viruses – particularly 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 for PCR. 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 sub-types 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.

4.4.4 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.[75] Screw-worm fly (SWF) infestation in humans is not notifiable.[76]

OWS and NWS have similar biological profiles and fill similar ecological niches in Africa and Asia (OWS) and the Americas (NWS).[77] 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 and the Middle East, 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 2017.

Screw-Worm Fly Surveillance and Preparedness Program in 2017

The SWFSPP comprises four areas of work:

- surveillance (see Figure 4.5)
    - by fly trapping in Western Australia (four locations), the Northern Territory (two locations) and Queensland (two locations)

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

76 www.health.gov.au/casedefinitions

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

- 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.

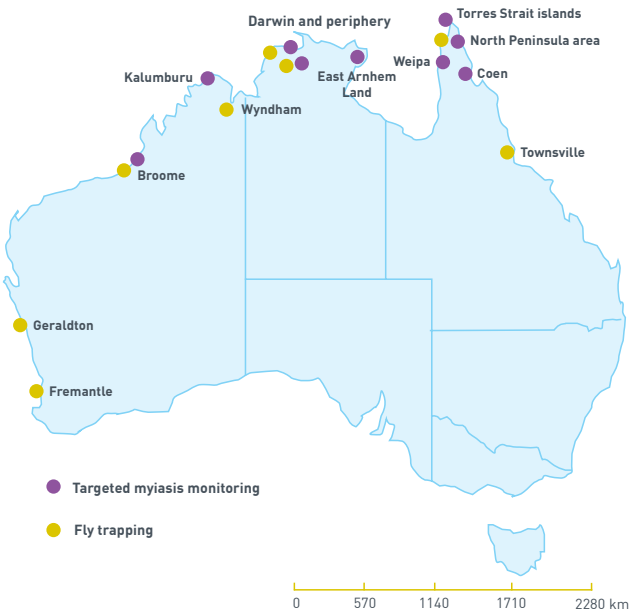

Figure 4.5 Locations of targeted myiasis monitoring and fly trapping in the revised Screw-Worm Fly Surveillance and Preparedness Program

During 2016–17, fly trapping occurred at eight locations, 24 sites (within locations), and a total of 285 fly trapping events[78] were conducted. Targeted myiasis monitoring was conducted at nine locations and 20 sites (within locations), comprising 174 cattle or domestic animal surveys and a total of approximately 11 255 animals inspected. General surveillance data (investigations of myiasis to exclude SWF) are reported in Appendix Table C1. All investigation results were negative.

During 2017, several enhancements to the Program's reference resources were made. The revision of Australia's laboratory manual for SWF surveillance[79] was completed. The revised manual (3rd edition) includes contemporary information on global distribution and the risk to Australia, and several improvements to assist specimen identification (including enhanced diagnostic images using focus-stacking photography). During the year, SWF modelling software was further developed for non-specialist use. The software enables incursion scenarios to be modelled, which informs surveillance design.

During 2017, new SWF posters and maggot collection kits were 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 2017, 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.[80]

Although surveillance indicates a low likelihood of incursion of SWF into Australia, the potential for establishment and spread across several states is significant.[81] 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

78 One SWF trap is set for 10 days.

79 Animal Health Australia. *Old World screw-worm fly: a diagnostic manual*, Third edition. Animal Health Australia, Canberra. www.animalhealthaustralia.com.au/wp-content/uploads/SWF-Manual_Full_digital.pdf

80 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.

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

Image credit: Animal Health Australia

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.[82]

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 became established in Australia.

Biosecurity practices, prompt recognition and reporting (via the EAD 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.[83]

4.4.5 National Bee Pest Surveillance Program

Australia's freedom from exotic bee pests such as *Varroa destructor* has been achieved not only by Australia's isolation, but in many respects through the success of the National Bee Pest Surveillance Program (NBPSP).

The NBPSP is a post-border early warning system for the detection of new incursions of exotic bee pests and pest bees. Early detection of these exotic pests is critical to eradicating an incursion and limiting the economic effects. The NBPSP also supports health certification for exports of queen bees, packaged bees and honey. In addition, surveillance for established, regionalised pests is performed for the significance these play to the industry. The NBPSP is jointly funded by the Australian Honey Bee Industry Council, Horticulture Australia, Rural Research and Development Corporation, and the Department of Agriculture and Water Resources. In-kind contributions for the implementation of the program are provided by state and territory governments and volunteer beekeepers. At a national level, PHA coordinates and administers the program.

The current phase of the NBPSP, the Enhanced NBPSP 2016–2021 project, supports surveillance activities for 14 exotic pests[84] and three regionalised pests[85] at 33 sea and airport entry

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

83 www.animalhealthaustralia.com.au/swf

84 The NBPSP undertakes surveillance for the following exotic pests: varroa mites (*Varroa destructor* and *V. jacobsoni*), tropilaelaps mites (*Tropilaelaps clareae* and *T. mercedesae*), tracheal mite (*Acarapis woodi*), Asian honey bee (*A. cerana*), giant honey bee (*A. dorsata*), red dwarf honey bee (*A. florea*), bumble bee (*Bombus terrestris*), Africanised honey bee (*A. mellifera scutella*), Cape honey bee (*A. mellifera capensis*), Asian hornet (*Vespa velutina* subspecies *nigrithorax*), large hive beetle (*Oplostoma fuligineus*), and exotic honey bee viruses (deformed wing virus, acute bee paralysis virus and slow paralysis virus).

85 The NBPSP undertakes surveillance for the following regionalised pests: braula fly, bumble bee and small hive beetle.

Table 4.5 National bee pest surveillance, January to December 2017, by state and pest

	Jurisdiction										
Surveillance operation	**Northern Australia (via NAQS)**	**National Border Surveillance**	**Qld**	**NSW**	**ACT**	**Vic.**	**Tas.**	**NT**	**SA**	**WA**	**Total**
Hives inspected for varroa and tropilaelaps mites	7	34	111	138	19	86	82	46	123	49	**695**
Adult honey bees inspected for tracheal mites	60	1050	840	780	30	1410	726	450	390	420	**6156**
Floral sweep-netting events to target pest bees[86]	3	NA	21	13	4	17	7	8	31	12	**116**
Catchbox inspections[87]	1	NA	11	0	0	116	7	0	45	0	**180**
Bee swarms collected	1	34	6	0	0	6	2	0	0	0	**49**
Small hive beetle traps inspected[88]	NA	NA	NA	NA	NA	NA	92	82	NA	124	**298**

points across Australia. During 2017, the number of sentinel bee hives increased to 184 (from 167 in 2016), arranged within 2–3 km of target ports. The resulting sensitivity for varroa, tropilaelaps and tracheal mite detection has increased significantly. There will be an increase in the number of catchboxes targeting exotic bee swarms positioned around 17 of the highest-risk ports, with more staff trained, and teams deployed on the ground to undertake floral sweep netting targeting foraging bees.

Since January 2017, a minimum of 5900 data records for surveillance activities performed nationally have been collected by state government biosecurity operators, NAQS staff, Commonwealth border surveillance staff and volunteer beekeepers. Table 4.5 outlines the surveillance undertaken by jurisdictions between January and December 2017. Of the 49 swarms captured and destroyed, 24 were identified as *Apis mellifera* (European honey bee) and 25 as *A. cerana* (Asian honey bee). All swarms were confirmed absent for exotic mites. As there have been no further detections of *V. jacobsoni* since 2016, Australia moved into the proof-of-freedom stage on 1 March 2017.

In addition to the Enhanced NBPSP 2016–2021 project, the Department of Agriculture and Water Resources funded a 24-month research and development project under the **Agricultural Competitiveness White Paper**.[89] This project will develop a national honey bee virus diagnostic network, further improve Asian honeybee

86 Several jurisdictions have commenced this work for the first time in the NBPSP. This explains the low numbers in some jurisdictions; this is anticipated to increase with each year of the Program as a result of the increase in funding to support surveillance of exotic pests.

87 NTSESP Field Guidelines 2017-18 at www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/tse-freedom-assurance-program/surveillance-of-tses

88 Small hive beetle is an established, regionalised pest for Australia and surveillance is undertaken in locations where small hive beetle is absent (Tasmania, Northern Territory, Western Australia).

89 agwhitepaper.agriculture.gov.au

surveillance methodologies, improve smart surveillance technologies such as remote catchboxes, establish Asian hornet surveillance and improve data capture and management. Outcomes and deliverables will be fed into the overarching NBPSP project from mid-2019.

4.5 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.

4.5.1 Northern Australia Quarantine Strategy

NAQS is a program of the Department of Agriculture and Water Resources and was established in 1989 to address the risks associated with the vulnerability of the coastline between Broome and Cairns, and north through the Torres Strait.

Specific activities undertaken by NAQS include:

- targeted animal health surveys and monitoring programs for the early detection of exotic pests and diseases
- 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 surveillance is prioritised for the detection of pests and diseases that meet the following criteria:

- proximity to Australia and potential unregulated pathways for arrival
- likelihood of establishment and spread based on the nature of the organism, and prevailing conditions in the event of introduction
- likelihood of significant effects on agricultural productivity and export markets, human and environmental health, and economic consequences of a response.

In 2017, NAQS priorities included:

- conducting risk-based surveillance for targeted exotic pests and diseases including FMD, classical swine fever, Aujeszky's disease and HPAI
- contributing to national surveillance and animal health reporting programs including NAMP, SWFSPP, NAIWB, and NAHIS
- establishing new sentinel cattle monitoring sites at Coen in north Queensland and Gunbalanya in the Northern Territory, and working with counterpart agencies to establish monitoring sites in Timor Leste and Papua New Guinea
- extending the network of Indigenous ranger groups involved in biosecurity surveillance activities, and providing training to increase knowledge and understanding of biosecurity risks and practices
- funding of development of new diagnostic tests for bluetongue virus surveillance
- activities to enhance preparedness for canine rabies in northern Australia.

4.5.2 Specific disease surveillance strategies

Targeted surveys

Animal health surveys are conducted routinely across northern Australia to detect changes to the health status of target host populations. 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 detected during 2017. Data are reported through NAHIS, and

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

Indigenous ranger groups

Across northern Australia, 70 Indigenous ranger groups deliver biosecurity surveillance activities, including marine debris patrols, community animal health reporting, and animal health survey logistical support. Funding through the *Developing Northern Australia White Paper* and the **Agricultural Competitiveness White Paper** has enabled the development of an app to assist with collection and analysis of these data. Other initiatives included working with the Kimberley Land Council to host a National Indigenous Ranger Forum. At this forum, there were several hands-on biosecurity activities as part of a rotation schedule for the 250 ranger participants from across northern Australia. The North Australian Indigenous Land and Sea Management Alliance Ltd is developing a Certificate IV in tropical biosecurity to increase the knowledge and skills in biosecurity and disease surveillance.

Screw-worm fly surveillance

SWF surveillance is undertaken through the SWFSPP (see Section 4.4.4). Adult fly traps are set quarterly in five locations across the Northern Peninsula area of Queensland and inspections of animals for myiasis is undertaken during NAQS animal health surveys and sentinel cattle monitoring. Indigenous rangers also collect data on wounds in animals and humans through community animal health reporting programs, and maggot collection kits are distributed to remote community health clinics, district hospitals, private vet clinics and pastoralists for submission of maggots found in wounds on live animals or people.

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 in collaboration with Queensland Health. There has been no evidence of virus circulation on the mainland since early 2004.

Biosecurity Top Watch

The Biosecurity Top Watch public awareness campaign continued to focus on enhancing general surveillance through promoting awareness and understanding of the importance of biosecurity in the north with producers, remote communities and the general public. New approaches have included production of a song, 'Frontline', to acknowledge and encourage the collaboration of people living and working in northern Australia to keep watch along the coastline to 'protect our land and waters'. Another initiative has been helping Cairns Aquarium develop a marine pest biosecurity display to educate visitors and residents of northern Australia about the potential effects of marine pests.

4.5.3 Key surveillance achievements

Key surveillance achievements for northern Australia in 2017 included:

- eight targeted animal health surveys delivered across northern Australia, testing 442 cattle, horses, pigs, poultry, donkeys and dogs, with no confirmed detections of exotic pests and diseases
- a total of 1098 environmental faecal samples tested for AI viruses; results included the detection of subtype H6N2 in samples collected from the Northern Territory, with no HPAI viruses detected
- forty-seven sentinel herd visits (at six separate sites), with 770 samples tested
- almost 700 sentinel herd cattle inspections and 352 wild and domestic animal examinations for evidence of myiasis with no SWF detected
- over 483 wounds in humans and animals were reported by Indigenous rangers; five wounds had myiasis and all larval submissions tested negative for SWF
- 204 861 flies from four separate trapping events were processed from adult fly traps either by morphology or PCR, with no SWF detections
- a total of 89 248 biting midges (*Culicoides* spp.)

identified from 40 northern trap sites

- a total of 186 cards[90] sequenced for evidence of flaviviruses, with a small number of detections, none of which were Japanese encephalitis virus (JEV)
- a total of 114 cattle, pigs and horses were tested for JEV as a result of wild and domestic animal surveys, with no positive detections
- forty-six Indigenous ranger groups collected approximately 106 community animal health reports from over 40 communities across northern Australia.

4.5.4 Northern Australia Biosecurity Framework

The Northern Australia Biosecurity Framework (NABF) reference group was established in 2016 under the **Agricultural Competitiveness White Paper** and *Developing Northern Australia White Paper* to facilitate collaboration among communities, industries and governments to safeguard Australia's biosecurity. The Northern Territory, Queensland, Western Australia and the Australian Government have been working together with stakeholders across northern Australia to identify and manage new and growing biosecurity risks, particularly in regional and remote regions of northern Australia.

The objectives are to:

- develop and share information on biosecurity prevention, detection and management, for plant and animal and aquatic pests and diseases across northern Australia
- encourage cooperation between governments, agricultural industries and research institutions on biosecurity issues
- share resources where possible to deliver timely and well informed decisions about biosecurity in northern Australia.

The NABF includes six initiatives:

- northern Australia biosecurity surveillance – to improve plant, animal and aquatic health surveillance
- modern diagnostics – to support biosecurity networks, knowledge and facilities in northern Australia
- better data – to improve the accuracy and usefulness of field biosecurity data
- offshore biosecurity surveillance – to set up collaborative biosecurity surveys in Indian Ocean territories and neighbouring countries
- community engagement – to expand information and tools available to educate the community and other stakeholders about potential biosecurity threats and facilitate reporting
- Indigenous rangers – to expand the scope and volume of biosecurity work undertaken by Indigenous rangers.

Achievements for 2017 include the following:

- A framework for surveillance in northern Australia was developed, including identification and risk assessment of priority livestock diseases. This will be used to inform biosecurity surveillance priorities and approaches for northern Australia as part of an integrated surveillance plan.
- A stakeholder needs analysis was completed to guide approaches to strengthening relationships with private veterinarians and producers. Building on this, a significant disease investigation network to facilitate knowledge and data sharing will be implemented in early 2018.
- Training and sampling kits were provided to veterinarians in northern Australia to ensure disease investigations and laboratory samples are of high quality.
- A group of dedicated industry liaison officers is being established to support collaborative outcomes with livestock, aquatic and plant industries across northern Australia.
- New sentinel cattle herds are being established to monitor for priority pests and diseases at Merepah (Queensland), Gunbalanya (Northern Territory), Papua New Guinea and Timor Leste.
- Work continued across northern Australia, Torres Strait and Papua New Guinea to improve rabies preparedness, communications and prevention.
- A new diagnostic laboratory facility in Darwin, Northern Territory is being built to deliver local, timely and expert biosecurity diagnosis of pests and diseases.

90 Mosquitoes feed on honey-coated FTA® cards. Mosquitoes leave saliva on the cards, which contains viral nucleic acids that can be tested.

- New molecular diagnostic tests for arboviruses are in development, which will allow detection and identification of viruses (such as bluetongue) in animal blood or insects. A quadruple bluetongue virus serotype assay has been developed and applied for the first time in Australia.
- A new biosecurity ranger reporting app was launched, facilitating submission of biosecurity data from Indigenous rangers.

Together, these initiatives will create long-term benefit to communities and farmers in Australia's north by providing practical and innovative improvements to biosecurity surveillance and fostering collaborative partnerships.

More information on the NABF initiatives is available on the Department of Agriculture and Resources website.[91]

4.6 State, territory and industry animal health programs

Australia has a large land mass with wide variability in geography and climatic conditions. As a result, livestock production systems are vastly different depending on where they are located in the country. These factors strongly influence disease prevalence in Australia's states and territories. Therefore, disease control programs vary in each state and territory, depending on climate and the types of livestock production systems that are present.

4.6.1 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 a nationally notifiable animal disease. 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 2017 are shown in Table 4.6.

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

Ovine brucellosis accreditation schemes operate in New South Wales,[92] Queensland,[93] South Australia,[94] Tasmania,[95] Victoria[96] and Western Australia.[97]

Ovine brucellosis is a notifiable disease in Tasmania and Victoria.

Table 4.6 Flocks accredited as free of ovine brucellosis, at 31 December 2017

State or territory	Accredited free
New South Wales	845
Queensland	75
South Australia	538
Tasmania	62
Victoria	456
Western Australia	189
Australia	**2165**

4.6.2 Caprine arthritis–encephalitis

Caprine arthritis–encephalitis (CAE), a multi-systemic, inflammatory condition of goats, is caused by a caprine retrovirus. The disease is present in most countries, including Australia. It has been reported in all Australian states and territories except the Northern Territory and is not a nationally notifiable animal disease.

Australia does not have any official regulatory control programs for CAE; however, there are some voluntary state-based accreditation programs (New South Wales, Queensland, South Australia and Tasmania) that are based on serological testing. Animals that test positive for CAE are destroyed or sold for slaughter, and herd accreditation is then re-established through subsequent testing.

CAE is a notifiable disease in Victoria – producers, private veterinarians and veterinary laboratories are required to notify Agriculture Victoria within

92 www.dpi.nsw.gov.au/animals-and-livestock/sheep/health/ovine-brucellosis/ovine-brucellosis-scheme

93 www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/livestock/animal-welfare/pests-diseases-disorders/ovine-brucellosis

94 pir.sa.gov.au/biosecurity/animal_health/sheep/health/ovine_brucellosis

95 dpipwe.tas.gov.au/biosecurity-tasmania/animal-biosecurity/animal-health/sheep/brucellosis-in-sheep

96 agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/animal-diseases/sheep/ovine-brucellosis

97 www.agric.wa.gov.au/livestock-biosecurity/ovine-brucellosis

Image credit: Animal Health Australia

seven days of detecting or suspecting this disease. Goat producers may retain infected goats; however, they are not permitted to knowingly spread the disease to other goat herds. It is recommended that affected animals are either euthanased or sent to slaughter.

Producers that achieve a negative-tested herd status may apply for accreditation under their respective state regulations.

4.6.3 Cattle tick and tick fever

The cattle tick, *Rhipicephalus microplus* (formerly *Boophilus microplus*) or *R. australis*, 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 the cattle tick is largely determined by climatic conditions: high humidity and ambient temperatures of at least 15–20°C are needed for egg laying and hatching. Cattle ticks mainly infest cattle, but may occasionally affect other species such as horses, sheep, goats, camelids, deer and water buffalo.

Ticks also transmit tick fever (bovine babesiosis or anaplasmosis), caused by *Babesia bigemina*, *B. bovis* or *Anaplasma marginale*. Babesiosis and anaplasmosis are nationally notifiable animal diseases in tick-free areas.

Acaricide treatment is widely used for tick control in endemic areas. Inspection and treatment are compulsory for domestic 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 of a greater resistance to tick infestation in those breeds.

No incursions of cattle ticks or cases of tick fever were reported in South Australia, Tasmania, Victoria or Western Australia during 2017.

4.6.4 Enzootic bovine leucosis

Enzootic bovine leucosis (EBL) is a nationally notifiable animal disease with a low prevalence in Australia. All states and territories 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 Leukosis 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.

In Western Australia, additional EBL surveillance is funded by the Western Australian cattle industry. All Western Australian dairy herds undergo a bulk milk test annually, and an intensive bulk milk test is conducted each year on milking herds with more than 200 cows.

4.6.5 Ovine footrot

Ovine footrot, caused by *Dichelobacter nodosus* infection, 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 a nationally notifiable animal disease.

Several states (New South Wales, South Australia and Western Australia) have eradication or control programs aimed at limiting spread of the disease. The biggest risk to protected or control areas 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.

Ovine footrot is a notifiable disease in the Australian Capital Territory, New South Wales, Queensland, South Australia, Victoria and Western Australia.

4.6.6 Paratuberculosis

Paratuberculosis or Johne's disease (JD) is a chronic mycobacterial infection that causes ill-thrift, wasting and death in several species of livestock. 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. Paratuberculosis is a nationally notifiable animal disease.

The livestock industries collaboratively manage the National Johne's Disease Project (NJDP), which aims to reduce the effects 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. The NJDP includes Australian Johne's Disease Market Assurance Programs for sheep, goats and alpaca (the cattle Market Assurance Program was discontinued in 2016). These provide a high level of assurance that participating herds and flocks are not infected with JD. Details of herds and flocks in the Market Assurance Programs are maintained in NAHIS, and are available on the AHA website.[98]

Alpacas

JD is rare in the alpaca industry, and no cases were reported in 2017.

Beef cattle

In 2016, after extensive industry consultation, the national cattle industries deregulated JD in cattle. There was a move away from the previous zoning system to encourage producers to take increased responsibility for their own biosecurity – for both JD and other endemic diseases.[99] JD remains a nationally notifiable animal disease.

JD in cattle has rarely been detected in the northern and western beef industries. JD is also uncommon in beef herds in south eastern 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[100] to provide health information on cattle for sale and to assess the risk of cattle being purchased.

At the request of the Western Australian cattle industry, JD in cattle remains a regulated disease in Western Australia and state border controls are enforced. In the Northern Territory, there are JD-specific movement requirements for all imported livestock.[101]

Dairy cattle

In south eastern Australia, the dairy industry promotes hygienic calf rearing to help reduce the incidence of JD in replacement heifers. Buyers

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

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

100 www.farmbiosecurity.com.au/toolkit/declarations-and-statements

101 dpir.nt.gov.au/__data/assets/pdf_file/0018/434322/johnes-disease-movement-requirements-info-sheet-4.pdf

seeking JD assurance are also encouraged to ask the seller for a written declaration of the National Dairy Bovine JD Assurance Score[102] for the cattle.

Sheep

Following a major review in 2012, a revised five-year management program for ovine JD (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 Declaration.[100] This is a declaration by the owner about the sheep, which 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 2017, the sheep industry continued working with AHA and the meat-processing industry to support abattoir surveillance at 15 sites across southern Australia. In the 2016–17 financial year, approximately 5064 consignments, comprising 811 773 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[100] 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.

4.6.7 *Salmonella* Enteritidis

Salmonella Enteritidis (SE) causes disease in poultry that may result in depression, poor growth, weakness, diarrhoea and dehydration. SE is a common cause of human food-borne illness; however, most Australian cases are acquired overseas. Possible sources of infection in commercial layer flocks include transmission from breeders, contaminated environments, infected vermin (including rodents) and contaminated feed. Transmission to progeny from breeders is mainly through eggshell contamination, although transmission through the egg may also occur. SE is a nationally notifiable animal disease.

The New South Wales Department of Primary Industries administers the National *Salmonella* Enteritidis Monitoring and Accreditation Program,[103] which is available to all commercial egg producers in Australia exporting eggs to overseas markets. The program offers a staged process to enable flocks to become accredited free from SE.

4.6.8 *Salmonella* Pullorum

Pullorum disease is an infectious poultry disease caused by *Salmonella* Pullorum (SP). The disease mainly affects young chicks. Transmission is primarily via the egg; however, SP can also be spread by direct or indirect contact with infected birds (respiratory or faecal) or contaminated feed, water or litter. SP may also be associated with disease in turkey poults and may be carried sub-clinically or lead to reduced egg production and hatchability, and a range of atypical signs in older birds. Reduced egg production and hatchability may be the only signs of pullorum disease. SP is a nationally notifiable animal disease.

The joint New South Wales–Victoria *Salmonella* Pullorum Monitoring and Accreditation Program[104] is available to commercial producers in New South Wales and Victoria that export day-old chicks, hatching eggs and other poultry products to overseas markets. Poultry species covered in the program include chickens, ducks, geese, turkeys and quail.

102 www.animalhealthaustralia.com.au/what-we-do/endemic-disease/johnes-disease/jd-and-dairy-cattle/national-dairy-assurance-score

103 www.dpi.nsw.gov.au/__data/assets/pdf_file/0020/722081/NSEMAP-Guidelines.pdf

104 www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/693529/Joint-NSW.VIC-SPMAP-guidelines.pdf

Image credit: Emily Onizawa

5

ANIMAL HEALTH LABORATORIES

Animal health laboratories in Australia are an integral part of the national animal health system and play a crucial role in disease preparedness and response.

Australia's animal health laboratories are operated by state and territory governments, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), universities and the private sector. These laboratories undertake surveillance, diagnostic testing, quality assurance (QA) and research for endemic and emergency animal diseases (EADs), including for exotic and zoonotic diseases. These functions support national and international trade for animals and animal products, and help safeguard animal and public health in Australia.

This chapter describes the national animal health laboratory network including its key functions and programs.

5.1 Structures and responsibilities

5.1.1 Government laboratory networks

There are eight government animal health laboratories in Australia. The CSIRO Australian Animal Health Laboratory (AAHL) in Geelong, Victoria is the national animal health laboratory. There are also animal health laboratories in all six states and the Northern Territory. All government laboratories play a key role in testing for EADs to support disease surveillance and response, biosecurity policy and domestic and international trade for animals and animal products. Several of these laboratories also have a national leadership or coordination role in QA, training and research relating to laboratory preparedness and response.

National Laboratory Task Group

The National Laboratory Task Group (NLTG) was established in 2016 after the cessation of the Subcommittee on Animal Health Laboratory Standards. NLTG provides technical, scientific and policy support to the Animal Health Committee (AHC) in terrestrial animal health laboratory diagnostics and related matters. It consists of members from the Department of Agriculture and Water Resources, AAHL, all Australian state and territory government laboratories and the New Zealand Ministry for Primary Industries. Animal Health Australia (AHA) is an observer. The Department of Agriculture and Water Resources provides secretariat support to NLTG.

NLTG provides national leadership for, and coordination of, diagnostic capability and capacity, involving a range of essential laboratory functions for EADs. These functions include QA, standard procedures, test development and evaluation, and training initiatives, which are discussed below.

In 2017, NLTG continued to engage stakeholders for ad hoc laboratory functions and issues, as needed. In support of AHC and Australia's Intergovernmental Agreement on Biosecurity framework, NLTG has continued to engage key government and non-government stakeholders to develop a national roadmap for animal health diagnostics.

A draft diagnostics business plan (2018–2020) will complement the National Animal Health Surveillance and Diagnostics Business Plan.

Laboratories for Emergency Animal Disease Diagnosis and Response network

The Laboratories for Emergency Animal Disease Diagnosis and Response (LEADDR) network reports to AHC and consists of members from the Department of Agriculture and Water Resources, AAHL and state and territory government laboratories. The network is coordinated by AAHL and aims to standardise or harmonise screening performance for targeted EADs of terrestrial and aquatic animals in all member laboratories. This ensures a nationally coordinated approach and maximises the availability of national resources to meet demands for large-scale testing in an EAD outbreak.

LEADDR commenced in 2009 and its QA programs now cover nine targeted terrestrial and aquatic animal diseases, including avian influenza, Newcastle disease, bluetongue, foot-and-mouth disease (FMD), classical swine fever (CSF), Hendra virus, white spot syndrome virus, ostreid herpesvirus 1 microvariant virus and megalocytivirus. These QA programs include standard testing procedures and network quality controls for each test and proficiency testing (PT) activities in some cases.

In 2017, funding was provided to LEADDR for projects to enhance national EAD diagnostic capability and QA programs through the **Agricultural Competitiveness White Paper**. A real-time polymerase chain reaction (PCR) assay for CSF and an enzyme-linked immunosorbent assay for FMD were rolled out to the participating laboratories for use in an outbreak. LEADDR laboratories also continued to explore broader application of their laboratory information management system through AAHL's Sample Tracking and Reporting System.

Next-generation sequencing is a powerful genomic tool for agent detection and characterisation. With funding through the **Agricultural Competitiveness White Paper**, LEADDR conducted a desktop exercise and a workshop to develop national baseline standards and operating guidelines for the use of next-generation sequencing-based capability for EAD surveillance and diagnosis.

5.1.2 Non-government laboratories

Universities

There are seven universities that have veterinary schools in Australia. They are Charles Sturt University (New South Wales), University of Sydney (New South Wales), James Cook University (Queensland), University of Queensland (Queensland), University of Adelaide (South Australia), University of Melbourne (Victoria) and Murdoch University (Western Australia). Although veterinary schools operate as independent entities, they are important to the national animal health system.

Each veterinary school has its own diagnostic laboratory and experts to support their diagnostic, teaching and research activities. The experts cover a broad range of animal health laboratory specialties, including pathology, molecular biology, virology, bacteriology, mycology, parasitology and immunology. Although emphases on their strengths may vary between schools, collectively they represent the major national repository of veterinary-trained laboratory diagnosticians.

While veterinary schools generally have a diagnostic and research focus on endemic animal health matters, some of their experts have involvement in specific EAD-related activities through consultancies and research collaboration.

Some of the veterinary schools provide laboratory screening services for specific national animal disease surveillance programs. Several university veterinary laboratory diagnosticians provide expert advice or training to government and industry on EADs or other major animal health issues independently or through relevant national or sub-national committees, including NLTG and AHC.

Private and industry-based laboratories

Private veterinary laboratories also provide animal health testing and diagnostic services to Australian and international clients. The government of South Australia has outsourced government veterinary diagnostic services to the private sector through contract. Private laboratories that have appropriate QA and government approval may offer official testing services, including those for international trade purposes. Some private laboratories also provide training opportunities for veterinarians to pursue laboratory-based specialist qualifications, especially in pathology.

In Australia, industry-owned veterinary testing laboratories can be found in some vertically integrated companies, especially in the intensive livestock industries. These provide diagnostic services for the companies and their contractors.

Image credit: Emily Onizawa

Image credit: Emily Onizawa

5.1.3 Communications and coordination

NLTG plays a key role in communicating matters of national interest about animal health diagnostic laboratories to government and non-government laboratory stakeholders. It also provides policy and technical advice to AHC and other key stakeholders as needed. NLTG maintains current data and information on its key activities and relevant national laboratory policies, procedures and resources through its website.[105] For specific national laboratory functions (described below), respective coordinating bodies are usually responsible for engaging their stakeholders and communicating relevant information to them as appropriate.

To strengthen Australia's preparedness for, and response to, major disease emergencies, the LEADDR network laboratories work closely with each other through monthly teleconferences and annual face-to-face meetings. To ensure Australia's access to specific expertise or materials that are not immediately available in Australia, the LEADDR laboratories also maintain strong working relationships with various overseas animal health laboratories. LEADDR laboratories work closely with human health laboratories, as required, for zoonoses and other veterinary public health issues.

The World Organisation for Animal Health (OIE) Australian National Focal Point for Veterinary Laboratories, based in the Department of Agriculture and Water Resources, supports Australia's OIE Delegate on various regional and international issues relating to animal health laboratories, including laboratory capacity building for disease emergencies.

5.2 Quality Assurance

5.2.1 Laboratory standards and accreditation

AAHL and all state and territory government animal health laboratories are accredited against ISO/IEC 17025:2005 by the National Association of Testing Authorities (NATA)[106] to perform a range of animal health testing services, including those for trade and public health purposes. Many of the major private or industry-based animal health laboratories in Australia are also accredited by NATA for their relevant scope of testing services. Two universities involved in EAD testing activities have maintained their NATA accreditation status for specific testing purposes. Maintaining NATA accreditation for the relevant class of test is obligatory for all government and non-government laboratories to participate in official EAD testing. NATA is a member of the International Laboratory Accreditation Cooperation.

105 www.agriculture.gov.au/animal/health/laboratories

106 www.nata.com.au/nata

5.2.2 Standard diagnostic procedures

For official EAD testing purposes, Australian laboratories support the guidelines recommended by the OIE Diagnostic Manual. In 2017, diagnostic experts from AAHL, governments and universities contributed to the development or revision of various chapters in the OIE Aquatic and Terrestrial Diagnostic Manuals.

Australian and New Zealand laboratories collaborated to produce and maintain a comprehensive series of Australian and New Zealand Standard Diagnostic Procedures (ANZSDPs)[107] for major aquatic and terrestrial EADs. The series aim to standardise testing procedures to ensure testing consistency between laboratories and facilitate PT programs in Australia and New Zealand. They also reflect specific needs for regulatory or disease-management purposes in Australia or New Zealand when corresponding chapters of the OIE Diagnostics Manual and other international standard procedures do not meet these requirements. The coordination of ANZSDP activities has been undertaken by NLTG under AHC. In 2017, several ANZSDPs have been identified for development and revision.

5.2.3 New test evaluation

NLTG has a role to evaluate new or modified testing methods before approval by AHC, through a peer-review process. Once approved by AHC, testing methods are included in the relevant ANZSDP. NLTG has published a new test evaluation policy, requirements and process, including specific test validation templates, to facilitate applications.

5.2.4 Proficiency testing

PT is an effective external QA practice commonly used by Australian laboratories to demonstrate their relevant testing competency, especially for accreditation purposes.

The Australian National Quality Assurance Program (ANQAP) is managed by the Victorian Department of Economic Development, Jobs, Transport and Resources through a fee-for-service system. It is an international PT provider accredited by NATA to the ISO/IEC 17043:2010 standards. ANQAP provides a number of PT programs to support continuous improvement of individual Australian laboratories in EAD testing performance, including some LEADDR tests. These programs cover serology, virology, bacteriology and molecular diagnostics (mainly PCR testing). Most of its PT programs are used by participating laboratories that perform veterinary tests associated with quarantine, export health certification and disease control programs. About 26 animal health laboratories in Australia, New Zealand, Asia, Europe, Africa and North America participate in various ANQAP PT programs.

AAHL, which is also accredited by NATA to the ISO/IEC 17043:2010 standards, is another major PT provider in Australia and the region. AAHL supports the LEADDR PT programs for targeted EADs, mainly in serology and molecular diagnostics.

The Australian Animal Pathology Standards Program (AAPSP) is a national joint initiative under the auspices of AHA with support from governments, industry and professional organisations. It aims to improve QA in veterinary pathology by developing and delivering PT programs, a registry of national digital reference materials, and continuing professional development programs. State and territory government and private laboratories participate in a quarterly histopathology PT program, which was launched in 2006.

In addition, some animal health laboratories are involved in international PT programs run by independent private companies, especially concerning conventional microbiological methods.

5.2.5 Laboratory diagnostician training

In Australia, universities and professional bodies or networks play a major role in providing scientific and technical training opportunities to laboratory diagnosticians. Some of their training activities may support individuals to gain recognisable laboratory specialist recognitions, especially through professional bodies such as the Australian and New Zealand College of Veterinary Scientists and overseas equivalents.

107 www.agriculture.gov.au/animal/health/laboratories/procedures/anzsdp

In 2017, the Australian Association of Veterinary Laboratory Diagnosticians (AAVLD), the Australian Society for Veterinary Pathology (ASVP), the Australian Society for Microbiology and the AAPSP continued to provide regular training programs.

The AAPSP digital slide archive, comprising images of endemic and exotic diseases in a wide range of terrestrial and aquatic animal species, continued to grow, and AAPSP currently contains thousands of histopathological slides. The AAPSP continued to provide online training and educational materials to its members. The AAPSP conducted a series of roadshows across the country with a theme of emerging diseases of wildlife species, backyard poultry and aviary birds. The ASVP conducted a three-day conference titled 'Following the Diagnostic Pathway' in Melbourne, and the AAVLD held a two-day scientific meeting in Sydney covering a broad range of topics relevant to EADs and advanced diagnostic technologies.

5.3 Reference centres

5.3.1 Reference laboratories

Reference laboratories provide a range of specific functions important to their respective EAD preparedness and response in Australia. In addition to performing confirmatory diagnosis and in-depth investigation, they play a national leadership or coordinating role in test development and transfer, production or supply of reference materials, expert scientific training and advice and other essential QA functions.

AAHL is a national and OIE-designated reference laboratory for bluetongue, avian influenza, Newcastle disease, Hendra and Nipah virus diseases, yellowhead disease, infection with abalone herpesvirus, epizootic haematopoietic necrosis (with University of Sydney) and infection with ranavirus (with University of Sydney). AAHL also serves as a national reference laboratory for rabies and brucellosis.

AgriBio Centre of the Victorian Department of Economic Developments, Jobs, Transport and Resources is a designated national reference laboratory for Johne's disease (with University of Melbourne) and anthrax. At the international level, the Elizabeth Macarthur Agricultural Institute, which is under the auspices of the New South Wales Department of Primary Industries, has continued to serve as an OIE reference laboratory for bovine viral diarrhoea. Queensland Health's Forensic and Scientific Services laboratory is an OIE reference laboratory for leptospirosis.

5.3.2 Collaborating centres

International reference or collaborating centres provide specific expert services to support the management of animal health issues, including, in some cases, capacity building.

AAHL has continued to serve as an OIE Collaborating Centre for New and Emerging Diseases and for Laboratory Capacity Building. In 2017, a consortium of AAHL, University of Melbourne and Massey University (in New Zealand) obtained the status of an OIE Collaborating Centre for Diagnostic Test Validation Science in the Asia–Pacific Region. AAHL is also a designated Food and Agriculture Organization of the United Nations reference centre for animal influenza and Newcastle disease and for laboratory biological risk management.

5.4 Biosafety and Biosecurity

5.4.1 Biosafety and biosecurity standards and practice

Biosafety and biosecurity practice for the storage and handling of materials containing infectious microorganisms in laboratory facilities in Australia is generally based on relevant standards and guidelines developed by international and/or national bodies (e.g. ISO/IEC, Standards Australia and the World Health Organization). The Australia/New Zealand Standard (AS/NZS) 2243.3 is a national standard for the control and containment of microorganisms, good laboratory practices, work health and safety of laboratory personnel and design of biocontainment facilities. It supports the development of regulatory requirements and certification guidelines.

Many EAD agents are exotic to Australia, so to handle their causative agents for research or diagnostic purposes, laboratories must meet the

minimum relevant regulatory requirements for Approved Arrangements under the *Biosecurity Act 2015* (Cwlth). Laboratory facilities certified under an Approved Arrangement by the Department of Agriculture and Water Resources are subjected to regular and ad hoc audits. These laboratories also need to comply with relevant jurisdictional regulations and policies.

Laboratories that handle living modified organisms and security-sensitive biological agents (SSBAs) must be certified by the Office of the Gene Technology Regulator and the SSBA Regulatory Scheme, respectively. Both these facilities are under the Australian Government Department of Health's portfolio.

AHC, especially through support from NLTG and LEADDR, provides national leadership for strengthening biosafety and biosecurity practice in animal health laboratories in Australia. All government animal health laboratories have standard operating procedures for biosafety and biosecurity, including decontamination plans, in place.

5.4.2 Biocontainment facilities

AAHL is one of only six high-containment animal research centres in the world. It has facilities up to physical containment (PC) level 4 (i.e. the maximum level) suitable for both laboratory testing and animal studies for EADs that could threaten Australia's animal industries and public health. All state and territory government laboratories have certified PC2-level or PC3-level facilities adequate for their EAD testing purposes. Elizabeth Macarthur Agricultural Institute in New South Wales also has a PC3-level animal facility suitable for investigational study.

5.5 Networked response to disease emergencies

In the event of an EAD outbreak, a Laboratory Subcommittee–Consultative Committee on Emergency Animal Disease (LSC-CCEAD) may be formed to provide networked laboratory advisory and technical support to CCEAD (see Section 6.1) or aquatic CCEAD (see Section 7.3.1). LSC-CCEAD consists of relevant experts from the LEADDR network and, as required, from other laboratories.

The AUSVETPLAN *Laboratory preparedness management manual*[108] details the roles of LSC-CCEAD during an EAD response and assists LEADDR and other testing laboratories in all jurisdictions to prepare for a disease emergency. Under direction from the LSC-CCEAD, the LEADDR Coordinator (or delegate) will maintain the coordination of available laboratory resources for sample testing and, if necessary, laboratory supplies, to ensure the effective use of laboratory resources for surge capacity and biosecurity of testing laboratories.

Laboratories approved by CCEAD to conduct EAD testing and diagnosis should have relevant standard operating procedures, QA programs and an appropriate scope of testing accredited by NATA. They should also document their preparedness as an EAD Contingency Plan and test their plans regularly.

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

Image credit: Australian Alpaca Association

6

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 2017.

Information on the management of aquatic animal health emergencies and aquatic animal disease incidents during 2017 is provided in Chapter 7.

6.1 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])
- the Australian Veterinary Emergency Plan (AUSVETPLAN).

Coordination of the response to EAD incidents is further enhanced by the use of established consultative committees and management groups.

6.1.1 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) Consultative Committee for Emergency Animal Diseases
- sharing the eligible response costs of EAD incursions using pre-agreed formulas.

The EADRA is reviewed on an ongoing basis so it remains relevant, flexible and functional and has undergone a formal review every five years since its inception. The last formal review was conducted in 2017. The latest version of the EADRA is on the AHA website.[109]

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

6.1.2 Australian Veterinary Emergency Plan

AUSVETPLAN[110] 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*[111] describes the components of AUSVETPLAN and outlines their functional relationships.

Following AUSVETPLAN's 25th anniversary last year, in 2017 the AUSVETPLAN project has focused on reconfirming its purpose and priorities. This will help ensure that AUSVETPLAN meets the needs of contemporary EAD response personnel and that it is well placed to adapt to their future needs.

The main focus in 2017 has been on the approach to the disease-specific documents in AUSVETPLAN – the disease strategies and response policy briefs. In close consultation with the AUSVETPLAN Technical Review Group, AHA has been working to improve

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

111 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 *AUSVETPLAN: Overview*)

consistency across these documents and their cohesion with other elements of AUSVETPLAN.

In conjunction with industry and government experts, the Technical Review Group, Animal Health Committee and the AHA Industry Forum, AHA has made progress in the revision of:

- disease strategies for avian influenza (AI), Newcastle disease, bluetongue, scrapie, Australian bat lyssavirus, rabies and screw-worm fly
- response policy briefs for influenza A viruses in swine and for porcine epidemic diarrhoea
- the operational manual for livestock welfare and management
- enterprise manuals for artificial breeding centres and dairy processing enterprises.

Collectively, these groups have also made progress in the development of the *AUSVETPLAN: Overview* document and a data management manual. Reviews of the disease strategies for foot-and-mouth disease (FMD) and lumpy skin disease have also been initiated.

Also in 2017, the revised operational manual on valuation and compensation was published.

6.1.3 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[112] 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.

6.1.4 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, when applicable,

112 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/nationally-agreed-standard-operating-procedures

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.[113]

6.1.5 Improved national arrangements for emergency preparedness and response

Under Schedule 7 of the Intergovernmental Agreement on Biosecurity,[114] the Australian, state and territory governments, AHA and Plant Health Australia (PHA) continue to work together to improve emergency preparedness and response arrangements. In 2017, the focus was on:

- maintaining nationally consistent response arrangements for all biosecurity incidents
- developing, exercising and implementing arrangements for sharing staff and other resources across jurisdictions, to assist with the management of response to biosecurity incidents
- converting the EAD-focused Rapid Response Team to a cohort of response specialists that can be called on to assist in all biosecurity incidents – now known as the National Biosecurity Response Team
- developing a national suite of training and assessment materials that can be used by all jurisdictions to train biosecurity response personnel
- developing a nationally agreed approach for the real-time evaluation of biosecurity response activities.

6.2 Preparedness initiatives

6.2.1 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

The National Animal Health Training Steering Committee (NAHTSC), comprising representatives from relevant government and livestock industry organisations, provides guidance to AHA's EAD training program. It facilitates national consistency in the 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.

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

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

Image credit: Animal Health Australia

Team training

Each state and territory is responsible for maintaining a team of personnel capable of responding to biosecurity emergencies. A '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 2017, training personnel participated in a three-day workshop on evaluation for emergency management. The training was based on a nationally recognised competency that covers managing evaluations relevant to the full range of processes and outcomes in the public sector. Training included initiating and managing implementation of evaluations, conducting evaluations and reporting and using evaluation findings.

Training materials

AHA facilitates the development of training resources that can be shared nationally and delivered to government and industry response staff by qualified, experienced trainers. Training resources include online modules, such as the online Emergency Animal Disease Foundation course[115] (a generic introduction to emergency response arrangements in Australia) as well as training modules, videos and face-to-face workshops.

A national project is underway to develop training and assessment materials for three biosecurity response qualifications: Certificate III Public Safety (Biosecurity Response Operations), Certificate IV Public Safety (Biosecurity Response Leadership) and Diploma Public Safety (Biosecurity Response Management). These qualifications accredit government and industry officers who have undertaken training and developed skills in responding to biosecurity incidents. The project is expected to be complete by the end of 2018.

Consultative Committee on Emergency Animal Diseases and National Management Group training

AHA holds twice-yearly workshops to prepare industry executives, technical specialists and senior government officers for service on the two key

115 www.animalhealthaustralia.com.au/emergency-animal-disease-training-program

decision-making bodies, the NMG and the CCEAD (see Section 6.1.4), during an EAD response. In 2017, AHA collaborated with consultants to produce new training resources for CCEAD and NMG training.

National Biosecurity Response Team

The National Biosecurity Response Team (NBRT) is funded by governments and managed through AHA. The NBRT is a group of almost 70 government response personnel with expertise in emergency management positions. The NBRT is cross-sectoral and could deploy in response to an animal, plant, aquatic animal or environmental biosecurity incident. During their three-to-five-year membership on the team, members take part in professional development activities to maintain and develop their response skills.

The NBRT replaced the previous Rapid Response Team (RRT) in July 2017. The last professional development activity for the RRT was Exercise Fintan, a discussion exercise conducted by AHA with the support of the Department of Primary Industries, Parks, Water and Environment (Tasmania), the Department of Agriculture and Water Resources, and Tasmanian industry. The focus of the exercise was aquatic animal disease – relating to the fictional outbreak of abalone viral ganglioneuritis in abalone, the first emergency aquatic animal disease exercise for the RRT.

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 (through funding from the **Agricultural Competitiveness White Paper**) and AAHL contributes to their delivery. In 2016 and 2017, AHA supported an evaluation of these workshops on behalf of the Department of Agriculture and Water Resources.

Livestock industry training

In 2017, AHA conducted five workshops for livestock industry personnel who may be required to work in a liaison function in an EAD response affecting their industry sector.

6.2.2 Emergency Animal Disease exercises

Exercise Icarus

Exercise Icarus was a functional exercise based on a hypothetical outbreak of highly pathogenic avian influenza (HPAI) on a poultry farm on the Mornington Peninsula, Victoria. The exercise was conducted over an eight-day period commencing with notification of disease on 19 April 2017 and concluding on 28 April 2017 with completion of operations activities and review.

Image credit: Animal Health Australia

Exercise Icarus aimed to assess and improve the capability of Agriculture Victoria's Animal Health and Welfare staff to effectively, humanely and safely respond to an outbreak of HPAI. The objectives of the exercise were to:

- assess on-farm decision making skills
- assess current procedures for the safe and humane handling of poultry on a farm infected with HPAI
- strengthen and develop skills required for the safe and humane euthanasia and disposal of poultry
- identify gaps in policy, procedures and training that will need to be addressed to improve preparedness.

The evaluation outcomes of the exercise will guide Agriculture Victoria's ongoing efforts to improve EAD preparedness.

Exercise Synergy

Victorian government agencies came together on 15 June 2017 to practise the state's emergency management arrangements for a biosecurity emergency through a simulated outbreak of HPAI. The aim of the exercise was to evaluate the Biosecurity Sub-plan of the State Emergency Response Plan (SERP), by conducting a functional exercise to practice the relevant command, control, communications and response arrangements at the state level.

The participation of approximately 30 Victorian government representatives further enhanced Victoria's capability to respond to biosecurity emergencies; and, the recommendations from an evaluation of the exercise will be used to improve the SERP Biosecurity Sub-plan and the interagency collaboration for biosecurity emergencies.

6.2.3 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) of the Food and Agriculture Organization of the United Nations (FAO) for the provision of real-time and online FMD training for Australian veterinarians and livestock workers. This training aims to provide participants with the skills necessary to identify and manage an outbreak of FMD.

Costs of the agreement were shared between the Australian Government (funded through the **Agricultural Competitiveness White Paper**), certain state governments, and industry organisations. Government counterparts in the quadrilateral countries (Canada, New Zealand and the United States) funded their personnel to participate in real-time training.

During 2017, four real-time courses were held in Nepal (where FMD is present) and one online FMD emergency preparation course was conducted.

At the end of 2017, 227 Australians had participated in real-time training and 192 Australians had participated in the online course. Real-time participants have reported more than 380 post-course activities to increase FMD awareness among veterinarians and students, producers and livestock industry organisations.

6.2.4 Modelling studies to support planning for emergency animal diseases

An important part of EAD planning and preparedness in Australia is to assess and test 'what if' scenarios and control strategies in the event of an EAD outbreak. Part of this planning has been the development of Australia's first national-scale simulation model for animal disease spread and control, the Australian Animal DISease model (AADIS). AADIS came into operation in 2015 through a 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. In 2017, AADIS was used in a number of national and international studies.

AADIS was used in two projects funded by the Centre of Excellence for Biosecurity Risk Analysis in 2017. The first, 'Incorporating economic components in Australia's FMD modelling capability

and evaluating post-outbreak management to support return to trade', was a collaborative project between the Department of Agriculture and Water Resources and the Australian National University. The project expanded the functionality of AADIS to include capacity to evaluate different approaches to post-outbreak surveillance in the event of an FMD outbreak, including the management of vaccinated animals. The study found there were higher costs associated with keeping vaccinated animals in the population ('vaccinate and retain') following an outbreak, compared to removing them from the population ('vaccinate and remove'). Although there is growing interest in a vaccinate-and-retain policy for the control of FMD to avoid the need for large-scale culling of at-risk animals, keeping vaccinated animals in the population will make achieving recognition of FMD-free status more difficult under current international rules.

The second project, 'Vector-borne spread of animal disease', was 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 resulted in the addition of a vector module to the AADIS model, the first step to enable simulation of vector-borne animal diseases. Work is ongoing to develop a module to represent infection dynamics in the vector population and spread between vector and livestock populations.

Modelling studies are also being used at a jurisdictional level to support animal health policy development. In 2017, the Department of Agriculture and Water Resources, the Centre of Excellence for Biosecurity Risk Analysis and the University of Melbourne ran a workshop to train jurisdictional personnel in the use of AADIS to enable them to apply it toward their own specific purposes and areas of interest.

To strengthen EAD preparedness, Australia also collaborates with other countries on epidemiology and disease modelling. In 2017, Australia continued to contribute actively to multi-country FMD-modelling studies coordinated through the EpiTeam, a sub-group 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 Sweden, continued to explore indices that could be used early in an outbreak to help predict outbreak size and duration; factors which could be used to inform decisions on control methods (such as emergency vaccination). Initial work examined a small number of possible 'early decision indicators' and further analysis is being done on a broader range of indices. By involving several countries and modelling platforms (including Australia's AADIS model), the robustness of various criteria and frameworks can be assessed in different settings.

6.2.5 Vaccine banks

AHA's Emergency Preparedness and Response Services business stream oversees several other preparedness initiatives on behalf of its members, including the management of Australia's vaccine banks for 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.

6.2.6 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 2017, under the IAHER arrangement, New Zealand requested assistance for a response to *Mycoplasma bovis*. Over a period of three months, Australia provided a total of 15 veterinary epidemiological and laboratory personnel from the Department of Agriculture and Water Resources and AAHL to assist with the response.

Activation of the IAHER arrangement has allowed Australian personnel to receive valuable practical response experience and this strengthens Australia's response capacity. The activation has also identified areas of improvement in the IAHER Operations Manual which will enhance the agreed policies, procedures and templates and ensure

the manual effectively supports rapid deployment of personnel under the IAHER arrangement. The activation and ongoing improvements to the IAHER arrangement continue to foster and strengthen the good relations between signatory countries.

6.2.7 Swill feeding compliance and awareness

The Prohibited Pig Feed (Swill) Compliance and Awareness Project, which commenced in 2015, 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 2016–17, there were 429 industry audits within the Australian Pork Industry Quality Assurance Program (APIQ✓®) and 213 government inspections of piggeries, with no major incidents of swill feeding found in any of them. Four warning letters were issued by jurisdictions for minor breaches. Work is progressing to reflect previously agreed definitions of prohibited pig feed in state and territory legislation.

6.3 Increasing awareness and understanding

6.3.1 National communication arrangements for biosecurity incidents

The National Biosecurity Communication and Engagement Network (NBCEN) produces nationally consistent public information in response to emergency 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 PHA. Observers from Wildlife Health Australia (WHA) and the Centre for Invasive Species Solutions are included.

The NBCEN supports the consultative committees and the NMG during biosecurity incidents. It also coordinates communication and engagement activities that support pest and disease prevention and preparedness.

In 2017, most responses fell largely in the plant sector. However, during 2017, the NBCEN remained actively involved in the white spot disease incident (in prawns) in Queensland.

NBCEN played a critical role in developing nationally consistent messages for the response. It was proactive in sharing recreational and commercial fishing campaign materials and resources, which reduced costs and the duplication of effort across jurisdictions.

Several NBCEN members were deployed to the State Coordination Centre in Brisbane to assist the Queensland Department of Agriculture and Fisheries with the response to white spot disease.

A major preparedness project for the NBCEN during 2017 was updating the Biosecurity Incident Public Information Manual (BIPIM) which is an AUSVETPLAN resource document. The BIPIM guides personnel working in the public information function within a local control centre, state coordination centre or in the national coordination centre. It describes the communication and engagement activities that are required for an effective response, and outlines the national arrangements that are in place to make sure these activities are effective and coordinated across Australia.

The NBCEN continues to engage with various industry groups and, in 2017, met with representatives from the Australian Dairy Farmers and AUSVEG. This engagement is valuable for the NBCEN, in understanding how industry groups communicate with their members, and for industry representatives to understand NBCEN's role. It also sets a solid foundation for working together when an incident occurs.

The NBCEN meets twice a year face-to-face and publishes a communiqué after each meeting that is available on the NBCEN page on the Outbreak website.[116]

116 www.outbreak.gov.au/about/biosecurity-incident-national-communication-network

6.3.2 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 engagement. The program promotes use of the Emergency Animal Disease Watch Hotline[117] and the Exotic Plant Pest Hotline[118] to report unusual signs of diseases or pests.

In 2017, several key activities took place, all of which were designed to build on producers' awareness about on-farm biosecurity:

- A third survey of over 1200 producers nationwide, following similar surveys in 2010 and 2013, revealed positive trends in awareness, understanding and uptake of on-farm biosecurity across all industries. The data will be used to identify which topics and delivery formats are preferred by producers.
- The FarmBiosecurity smartphone app was launched across iOS, Android and Windows phone systems, allowing producers to investigate the risks to their property and create their own biosecurity action list. The app has been installed on over 4000 devices to date.
- AHA and PHA partnered with the Department of Agriculture and Water Resources to sponsor a Producer of the Year category at the 2018 Australian Biosecurity Awards. This award recognises the important role producers play in the national biosecurity system.
- A suite of resources were developed targeting new and emerging livestock industries, highlighting their need for biosecurity.
- The monthly e-newsletter has continued in its current format, providing subscribers with the latest news and information about on-farm biosecurity. In a bid to raise the reach and effectiveness of the e-newsletter, it has been cross-promoted across several AHA and PHA channels. This has seen the number of subscribers grow by 70%.

117 Emergency Animal Disease Watch Hotline: 1800 675 888

118 Exotic Plant Pest Hotline: 1800 084 881

6.3.3 Strategic foresight

The Australian 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 Department of Agriculture and Water Resources also addresses major issues of national interest, including the threat of antimicrobial resistance (see Section 9.1). As the complexity of issues and their rate of change increases, strategic foresight becomes necessary for managing uncertainty, both now and in the future. For this reason, the Department of Agriculture and Water Resources uses 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. This allows the generation and evaluation of response options before a preferred response is determined. Foresight assists the Department of Agriculture and Water Resources and animal health stakeholders to identify, understand and respond to significant emerging issues before they establish or become critical.

Some of the strategic foresight activities in 2017 included the following:

- Environmental scanning in areas such as biotechnology, emerging diseases, science and society, climate change and food safety.
- Key emerging issues were considered using foresight techniques, to provide insights into topical issues such as the growth of insect-based feed and food production in Australia, the growing complexity of food chains, the rapid growth in protein demand and production in Asia, and changing global patterns of disease spread.

- Representatives of the Department of Agriculture and Water Resources participated in the Australian Public Service Strategic Futures Network, which consists of representatives from 16 government agencies from Australia who share information and learning about foresight projects.
- Representatives of the Department of Agriculture and Water Resources participated 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.[119] In 2017, the Department of Agriculture and Water Resources hosted the first two-day AJASN forum, attended by Australian and international members.
- The Australian CVO's National Animal Health and Biosecurity Review (ACVO Review) was conducted to provide an objective, contemporary assessment of the key issues affecting Australia's animal health and biosecurity system, now and into the future. Continuous progress to forge new markets and create opportunities for Australia's producers, coupled with evolving biosecurity pathways, means that Australia's biosecurity risks are predicted to increase. The ACVO Review provided a summary of these priority issues, seen to be the Australian CVO's responsibility, which must be addressed to ensure Australia's biosecurity system is well prepared for future risks.

6.4 Biosecurity planning

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

The farm-level biosecurity plans describe 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 a range of industry quality assurance (QA) and verification programs – these include APIQ✓®, EggCorp Assured and the National Feedlot Assurance Scheme (see Section 2.2). For these programs, a third party audits each of the participating producers annually against the standards. In October 2017, a biosecurity module commenced for Livestock Production Assurance, the QA program for cattle, sheep and goats, and is based on the National Farm Biosecurity Reference Manual for Grazing Livestock Production.

All farm-level biosecurity plans can be found on the AHA[120] and Farm Biosecurity websites.[121]

6.5 Preparedness for specific diseases

6.5.1 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.

119 www.ajasn.com.au

120 www.animalhealthaustralia.com.au/what-we-do/biosecurity-services/biosecurity-planning-and-implementation

121 www.farmbiosecurity.com.au/toolkit/plans-manuals

AHC considers that preparedness for an outbreak of FMD is a high priority, and this view is shared by peak industry bodies. In 2017, AHC members collaborated on several areas of work, including:

- improving the likelihood of early detection by training veterinarians and industry members in the clinical signs of FMD. This includes co-investment in a training program in the real-time detection and control of FMD, run in Nepal and an online only training program. Both of these were provided by EuFMD (see Section 6.2.3).
- undertaking targeted research and development activities to inform policy, including epidemiological modelling (see Section 6.2.4), diagnostic technologies (see Section 5.1.1) and studies on vaccine matching
- raising awareness of the risks of illegal swill feeding, and promoting a nationally consistent approach to legislation and compliance (see Section 6.2.7).

In 2016, a project 'Improved surveillance, preparedness and return to trade for emergency animal disease incursions using FMD as a model' commenced and continued into 2017. This project is supported by Meat & Livestock Australia (MLA), through funding from the Australian Government Department of Agriculture and Water Resources as part of its Rural Research and Development for Profit program, and by producer levies from Australian FMD-susceptible livestock (cattle, sheep, goats and pigs) industries and Charles Sturt University (CSU), leveraging significant in-kind support from the research partners. The research partners for this project are CSIRO, CSU through the Graham Centre for Agricultural Innovation, the Bureau of Meteorology and the Department of Agriculture and Water Resources, supported by AHA. This project is in line with the Rural Research and Development for Profit program call for collaboration between industry, researchers and the Rural Development Corporations.

The project aims to strengthen preparedness and facilitate a return to trade for Australia in the event of an EAD incursion, using FMD as a model. The project takes a strong multi-disciplinary approach, working closely with animal industries to optimise EAD management systems in Australia.

The project has four main objectives, managed as four sub-projects:

- Rapid diagnostic and vaccination strategy preparedness: assurance that Australia continues to have a fit-for-purpose FMD vaccine bank effective against the highest risk FMD viral strains for the country and quality-assured rapid diagnostic tests suitable for testing strains pre-emptively and during an outbreak. This sub-project will constitute Phase 3 of a previous FMD risk preparedness program that commenced in 2010.
- Farmer-led surveillance systems: development of a national surveillance system for improved early detection of incursions and effective control and management of diseases, using FMD as a model.
- Decision-support tools for decision-making during outbreaks: use of epidemiological models that simulate FMD outbreaks, to help predict:
    - how different response strategies (e.g. how prioritising vaccine use or removing infected vaccinated animals from the population) might influence the course of an outbreak
    - the costs and benefits of different response strategies, including the implications for proof of freedom and return to international trade
- Analytical tools to determine the path of farm-to-farm disease transmission: use of 'big data', including use of atmospheric data-dispersion models and nucleotide sequencing of the viruses from the affected premises, to predict and trace virus spread during a disease outbreak.

Several stakeholder meetings have been held to encourage involvement from different parties and ensure the project outputs will be relevant. Several communications activities have also taken place to promote the work of the project. The project is governed by a committee with partners from CSIRO, MLA, the Department of Agriculture and Water Resources, AHA and CSU.

6.5.2 Avian influenza

HPAI is a nationally notifiable animal disease that can cause severe mortality in most poultry and some wild bird species, and occasional fatal infection in humans. Since 1996, there have been

several major HPAI epizootics in poultry worldwide requiring substantial effort and resources to control. Notably, the Goose/Guangdong H5 HPAI lineage, which was first detected in 1996 and then re-emerged in 2003 in southeast Asia, has not only persisted in poultry populations in parts of Asia and Africa but has also repeatedly infected wild birds. This represents a key risk pathway for subsequent intercontinental spread and has resulted in outbreaks in Europe and North America but not Australia. The effects of HPAI infection in both wild and domestic birds are variable and often strain specific.

Australia has not experienced an outbreak of HPAI since October 2013 (H7N2). 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 World Organisation for Animal Health (OIE) *Terrestrial animal health code* (see Section 4.3.1).

There is a high level of HPAI activity globally, highlighting the need for Australia to be prepared for HPAI. In 2017, overseas detections of H5N8 predominated and H5N1, H5N6 and H5N5 combinations were also reported in poultry. The low pathogenicity avian influenza (LPAI) H7N9 strain continued to cause human deaths in China in 2017. This virus appears to have mutated to HPAI in poultry populations, with H7N9 HPAI and LPAI reported in poultry and humans in China on multiple occasions over the past 12 months.

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 AI on a continuous basis, and to maintain awareness of biosecurity among poultry owners.

A research project on next-generation sequencing of AI viruses, funded by the Australian Government (through the **Agricultural Competitiveness White Paper**) and conducted by the Centre for AgriBioscience (AgriBio centre) of Victoria during 2017, improved knowledge of the handling and processing of field samples from wild birds and the application of next-generation sequencing in surveillance. A second project conducted at AAHL applied next-generation sequencing and phylogenetic analyses to AI viruses detected in wild birds and showed evidence for mixing of viral populations across Australia with occasional introductions of LPAI viruses to Australia from Eurasia.

The Department of Agriculture and Water Resources also focuses on border security activities to detect illegally imported poultry and poultry products.

Image credit: Animal Health Australia

Through WHA, the Department of Agriculture and Water Resources coordinates a national surveillance program for AI in wild birds (see Section 4.4.3). The program provides information on the prevalence and subtypes of AI viruses in wild birds and acts as an early warning system for the poultry industry. It also allows the generation of data on evolution and genetic sequence variation of the viruses present in Australian wild bird populations. This provides valuable context and facilitates rapid production of evidence on the likely source of introduction following detections in Australian poultry. It also contributes to Australian diagnostic polymerase chain reaction test performance evaluation, contributing to assurance that the tests applied to Australian poultry samples are fit for purpose.

In 2017, surveillance of poultry flocks for AI continued. In September, LPAI (H9N2) was detected in a commercial poultry farm in Western Australia (see Section 6.6.3). No other cases of AI were detected in commercial poultry flocks in Australia during 2017.

6.6 Emergency animal disease responses in 2017

This section details incidents and responses involving disease in livestock. Significant disease events that primarily involved wildlife are discussed in Section 4.3.5.

6.6.1 Anthrax in New South Wales, Queensland and Victoria

Anthrax is a nationally notifiable animal disease and 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 (Figure 3.1). In these areas, anthrax has a low prevalence and occurs only sporadically.

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.

In 2017, outbreaks of anthrax were reported in three states. In New South Wales, 33 lambs died on a property in the Forbes district in February 2017. In Queensland, 119 cows and an undetermined number of calves died on a property in St George in March 2017. In Victoria, anthrax was diagnosed in 25 sheep that died on five properties near Swan Hill between 28 February and 5 April 2017.

In each case, control measures were implemented based on agreed national response policy, including quarantine and tracing, burning of carcasses and vaccination of livestock. Human health authorities were notified, and public health precautions were implemented.

6.6.2 Hendra virus in New South Wales and Queensland

Hendra virus (HeV) is a zoonotic pathogen that causes natural infection and disease in horses and humans and is a nationally notifiable animal disease. A number of HeV incidents have occurred in New South Wales and Queensland since 1994, involving more than 90 horses (Figure 3.1). Most infected horses have died as a result of the disease.

Flying foxes are the natural host for HeV, and research suggests that infection can occur in flying fox populations across Australia. 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.[122]

In 2017, four incidents of Hendra virus infection were reported: one in May in the Gold Coast Hinterland, Queensland; two separate cases in July and August near Lismore, New South Wales; and one in August near Murwillumbah, New South Wales.

122 Middleton D, Pallister J, Klein R, et al. Hendra virus vaccine, a One Health approach to protecting horse, human, and environmental health. *Emerging Infectious Diseases* 2014; 20: 3: 372-379.

The New South Wales[123] and Queensland[124] governments implement well established biosecurity and public health responses to HeV incidents.

6.6.3 Low pathogenicity avian influenza in Western Australia

Avian influenza A viruses are designated as HPAI or LPAI based on molecular characteristics of the virus and the ability of the virus to cause disease and mortality in chickens. Only HPAI or AI caused by H5 or H7 subtypes are reportable to the OIE.

In September 2017, LPAI (H9N2) was detected in a commercial poultry farm in Western Australia after a poultry breeder notified the Western Australian Department of Primary Industries and Regional Development (DPIRD) of a 10% drop in egg production.

A field investigation determined there were no clinical signs indicative of AI; however, laboratory testing was positive for influenza A (H9N2) and negative for H5 and H7. Further sequencing revealed the virus belonged to the Y-439-like lineage of H9N2 viruses but not the Asian G1-like or G9/Y280-like H9N2 lineages that can be associated with significant poultry disease and zoonotic potential.

DPIRD worked with the Western Australian Department of Health to develop a response plan to minimise any potential risk to poultry and human health. Despite the very low risk posed by this virus to poultry or public health, on-farm management measures were implemented to ensure the state's poultry health status was maintained. This included the owner's voluntary decision to depopulate and dispose of the flock via composting and to implement decontamination procedures to minimise any potential environmental viral persistence.

123 www.dpi.nsw.gov.au/animals-and-livestock/horses/health-and-disease/hendra-virus

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

Image credit: Joshua Smith

7

AQUATIC ANIMAL HEALTH

Australia's national aquatic animal health arrangements are in place to support aquaculture productivity, product quality, trade, fisheries resource management and biodiversity.

This chapter describes Australia's aquatic animal health status, which is maintained through the continued application of scientifically based biosecurity initiatives. In addition, a range of surveillance and research activities, together with disease emergency preparedness programs, operate to maintain the excellent health status of Australia's aquatic animal populations.

7.1 Status of aquatic animal health in Australia

Australia has a robust reporting system for aquatic animal diseases of national significance. Australia's National List of Reportable Diseases of Aquatic Animals[125] includes all the diseases currently reportable to the World Organisation for Animal Health (OIE) and other aquatic animal diseases of national significance.

Consistent and accurate reporting is important to demonstrate Australia's claims to freedom from diseases of international significance – to support trade of seafood products and to justify our biosecurity measures. Our disease reporting demonstrates transparency to trading partners and a commitment to disease management and biosecurity.

In 2017, ten fish diseases, seven mollusc diseases, nine crustacean diseases and two amphibian diseases were reportable to the OIE. Australia is free from most of these diseases. Australia's status

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

for each OIE-listed aquatic animal disease in 2017 is shown in Table 7.1. For OIE-reportable diseases that are present, the maps in Figure 7.1 indicate states and territories from which those diseases are reported.

Australia's status in relation to other nationally reportable aquatic animal diseases in 2017 is listed in Table 7.2.

Table 7.1 Australia's status for OIE-listed diseases of aquatic animals, 2017

Disease or agent	Status
Finfish diseases	
Epizootic haematopoietic necrosis disease	Last reported 2012
Infection with *Aphanomyces invadans* (epizootic ulcerative syndrome)	Last reported 2017
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
Mollusc diseases	
Infection with abalone herpesvirus	Last reported 2011
Infection with *Bonamia exitiosa*	Last reported 2017
Infection with *B. ostreae*	Never reported
Infection with *Marteilia refringens*	Never reported
Infection with *Perkinsus marinus*	Never reported
Infection with *P. olseni*	Last reported 2017
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	Last reported 2017
Infectious myonecrosis	Never reported
Necrotising hepatopancreatitis	Never reported
Taura syndrome	Never reported
White spot disease	Last reported 2017
White tail disease	Last reported 2008
Amphibian diseases	
Infection with *Batrachochytrium dendrobatidis*	Last reported 2017
Infection with ranavirus	Last reported 2008

OIE = World Organisation for Animal Health.

Note: Aquatic animal diseases that were reportable to the OIE in 2017 are those listed in the 2017 OIE *Aquatic animal health code*.

Image credit: Animal Health Australia

Table 7.2 Australia's status for other significant diseases of aquatic animals, 2017

Disease or agent	Status
Finfish diseases	
Aeromonas salmonicida – atypical strains	Last reported 2007
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*)	Last reported 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 pancreatic necrosis	Never reported
Infectious spleen and kidney necrosis virus (ISKNV)-like viruses	Last reported 2015
Piscirickettsiosis (*Piscirickettsia salmonis*)	Never reported
Viral encephalopathy and retinopathy	Last reported 2017
Whirling disease (*Myxobolus cerebralis*)	Never reported
Mollusc diseases	
Infection with *Bonamia* species	Last reported 2017
Infection with *Marteilia sydneyi*	Last reported 2017
Infection with *Marteilioides chungmuensis*	Never reported
Infection with *Mikrocytos mackini*	Never reported
Infection with ostreid herpesvirus 1 microvariant	Last reported 2017
Iridoviroses	Never reported
Crustacean diseases	
Acute hepatopancreatic necrosis disease	Never reported
Gill-associated virus	Last reported 2017
Monodon slow growth syndrome	Never reported

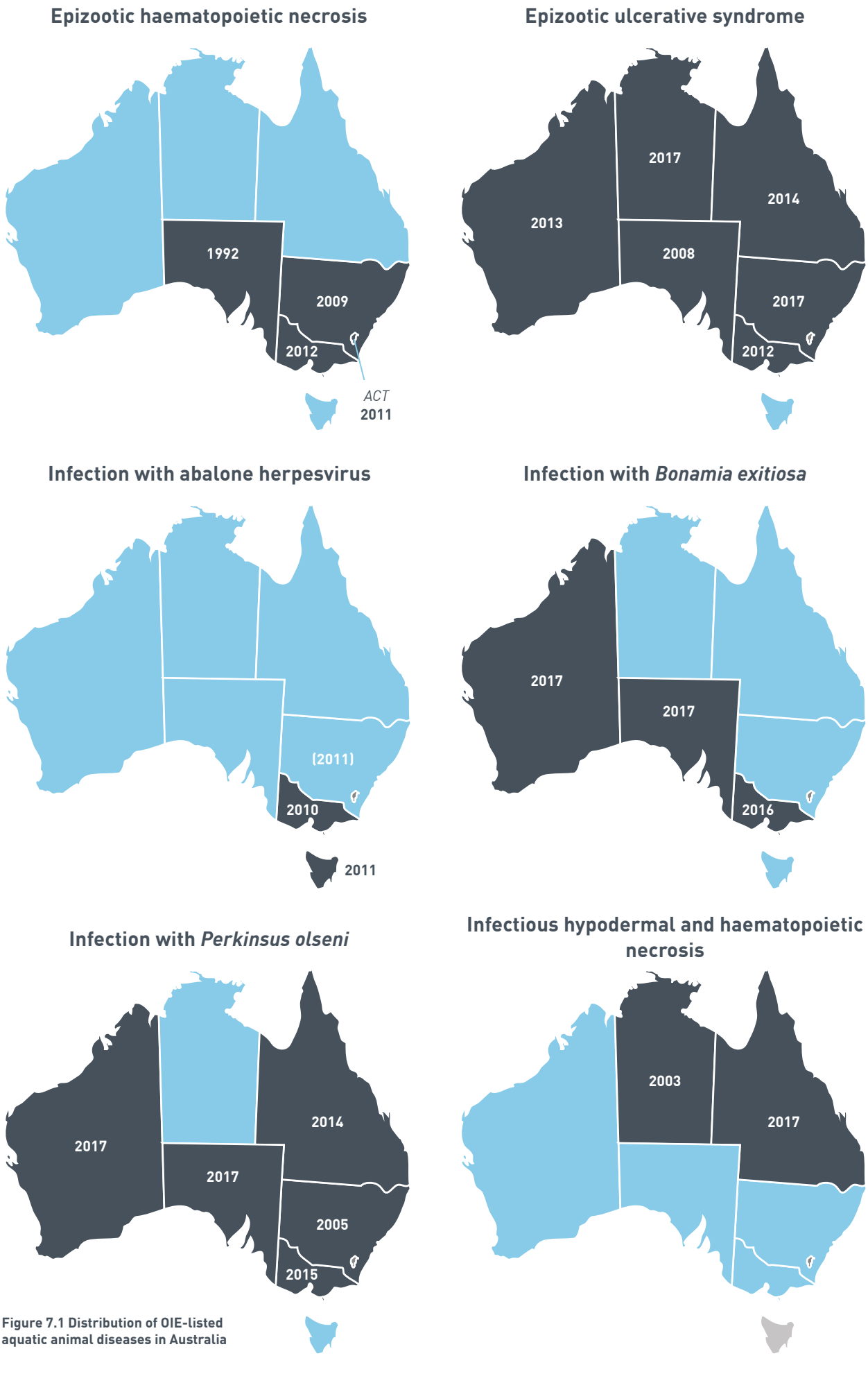

Figure 7.1 Distribution of OIE-listed aquatic animal diseases in Australia

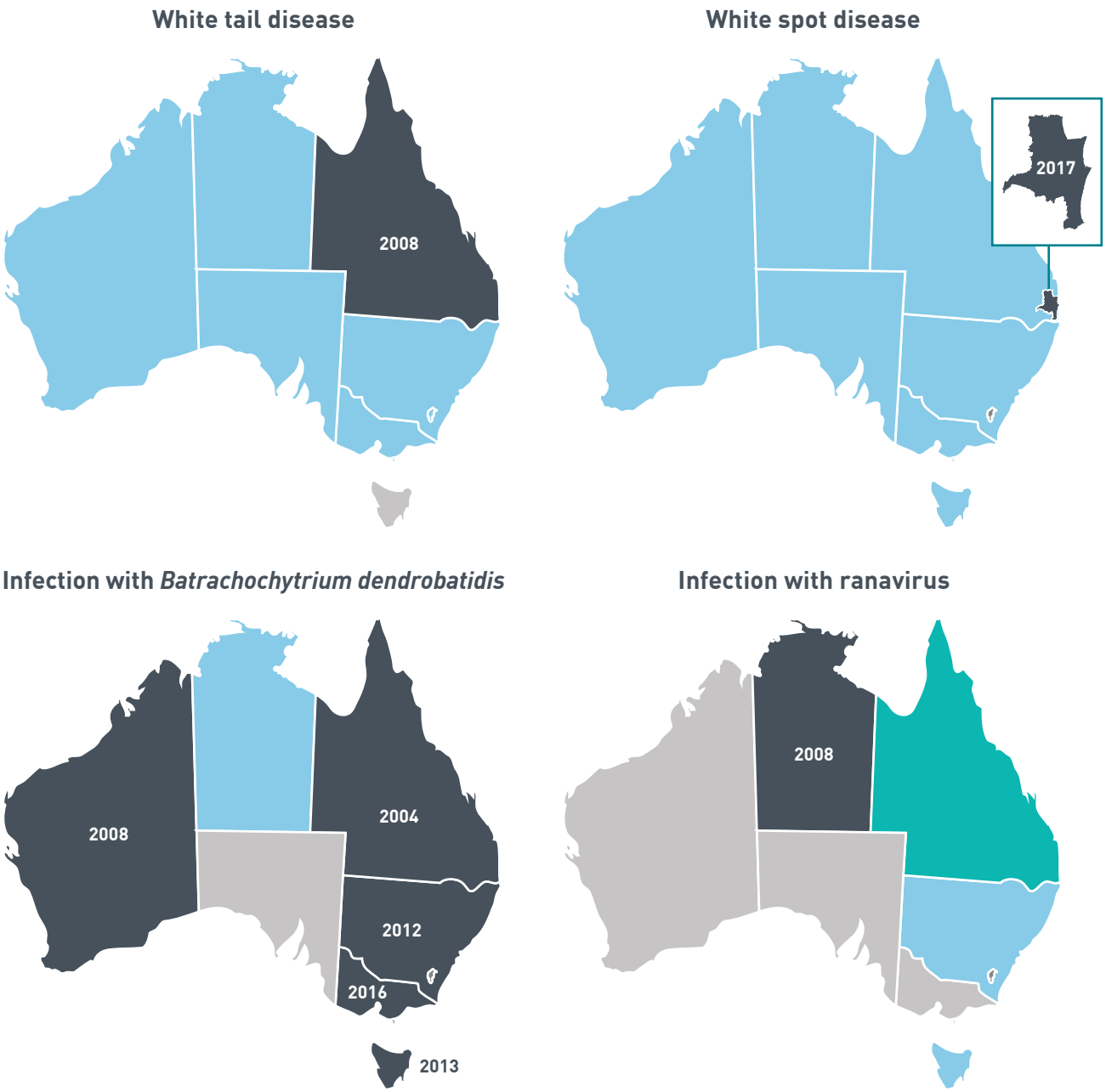

Figure 7.1 Distribution of OIE-listed aquatic animal diseases in Australia

7.2 National aquatic animal health policy and programs

Australia's national aquatic animal health policy and programs are developed from sound scientific evidence. The Sub-Committee on Aquatic Animal Health (SCAAH) is an advisory committee to the Animal Health Committee (AHC) (see Section 1.1.1). It supports AHC in its animal health policy deliberations by providing robust scientific and technical advice on aquatic animal health issues. SCAAH comprises representation from the Australian Government, the state and Northern Territory governments, the New Zealand Government, the Commonwealth Scientific and Industrial Research Organisation Australian Animal Health Laboratory (AAHL) and Australian universities. The AHC reports to the National Biosecurity Committee for high-level endorsement of decisions and policy (see Figure 1.1 for the structure of animal health management organisations and committees).

7.2.1 AQUAPLAN 2014–2019

AQUAPLAN 2014–2019[126] 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 the 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 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 2017 included:

- endorsement and publication of *Aquaculture farm biosecurity plan: generic guidelines and template*[127] (see Section 7.2.3)
- release of a mobile phone app version of the *Aquatic animal diseases significant to Australia: identification field guide*. The app is available for download on iOS, Android and Windows platforms[128]
- development of positive control materials for 32 PCR assays and internal controls for molecular tests to detect important endemic and exotic pathogens
- strengthening of the national first-response capability by including specific aquatic animal disease expertise within the National Biosecurity Response Team
- further development of industry–government response arrangements for emergency aquatic animal diseases (see Section 7.3.1).

7.2.2 Antimicrobial use and resistance in aquaculture

The Australian Government has released its first National Antimicrobial Resistance Strategy (see Section 9.1). The Strategy provides a framework to guide actions on antimicrobial resistance and use, and coordinate activities among stakeholder groups, including the aquaculture sector.

There are no registered antibiotics for use in Australia for food-producing aquaculture species. Instead, a permit-based system allows only a

126 www.agriculture.gov.au/animal/aquatic/aquaplan

127 www.agriculture.gov.au/fisheries/aquaculture/farm-biosecurity-plan

128 www.agriculture.gov.au/animal/aquatic/guidelines-and-resources/aquatic_animal_diseases_significant_to_australia_identification_field_guide

few types of antibiotics for use. The Department of Agriculture and Water Resources continues to monitor and regulate frameworks for the appropriate use of antimicrobials to prevent development of antimicrobial resistance and ensure the aquaculture sector has access to appropriate veterinary chemicals for responsible and sustainable farming.

7.2.3 Development of a biosecurity plan template

Under *AQUAPLAN 2014–2019*, SCAAH developed the *Aquaculture farm biosecurity plan: generic guidelines and template.*

The purpose of this plan is to:

- reduce the risk of diseases being introduced into farms (entry-level biosecurity)
- reduce the risk of diseases spreading within farms (internal biosecurity)
- reduce the risk of diseases escaping from farms (exit-level biosecurity)
- provide emergency response protocols for a disease outbreak (all levels of entry, internal and exit biosecurity)

The document is the basis for development of sector-specific biosecurity plan guidelines. These guidelines will be tailored to each sector's production systems and disease hazards. Plans for the oyster and abalone sectors have been developed and are expected to be ready for implementation by the end of 2017. The Australian Prawn Farmers Association is developing a sector-specific biosecurity plan consistent with the generic Aquaculture Farm Biosecurity Plan. Expressions of interest for other industries to develop potential plans are being assessed.

7.2.4 Domestic proficiency-testing program

The Proficiency Testing Program for Aquatic Animal Disease for Australian laboratories, established in 2010, enables Australian laboratories to assess their capabilities to correctly detect priority aquatic animal diseases using molecular methods. The program is funded by the Department of Agriculture and Water Resources and implemented by AAHL in partnership with the Australian National Quality Assurance Program (see Section 5.2.4). Participants include private, university and state/territory government laboratories.

The program was reviewed in 2013 and 2015. The review found that participating laboratories experience a range of benefits including providing a benchmark to support reproducibility and validation of tests, aiding in strengthening competencies and effective laboratory techniques, and supporting accreditation.

Based on the review findings, the Department of Agriculture and Water Resources has funded renewal of the program from 2017 to 2019. Australian laboratories can participate in proficiency testing for the following eight aquatic animal diseases over three annual rounds of testing:

- abalone herpesvirus
- yellow head virus genotype 1
- ostreid herpesvirus 1 microvariant
- nervous necrosis virus
- white spot syndrome virus
- megalocytiviruses
- *Bonamia exitiosa*
- *Perkinsus olseni*

Program results have confirmed that Australia has strong diagnostic capabilities for these priority aquatic animal diseases.

7.2.5 Strengthening surveillance

In July 2015, the **Agricultural Competitiveness White Paper** (see Section 4.2.2) resulted in a commitment of $200 million to 'improve biosecurity surveillance and analysis to better target critical biosecurity risks, including in northern Australia'. The biosecurity surveillance and analysis initiative contributes to four broad themes: strengthening surveillance, community-based action, improving scientific capability, and improving information and analysis. Under the theme of strengthening surveillance, the White Paper funds the following initiatives:

- onshore surveillance to enhance Australia's existing aquatic animal health by improving the early detection of pests and diseases, and to generate information to improve trade and market access

- offshore surveillance to minimise biosecurity risks to Australia by undertaking at-risk surveillance, intelligence gathering and capacity-building activities
- modern diagnostics activities to increase and improve diagnostic services, skills and tools.

The Department of Agriculture and Water Resources is managing several projects under the White Paper for both aquatic animal health and marine pests. Current aquatic animal health projects include:

- Onshore and modern diagnostics:
    - validation of molecular tests for several aquatic diseases
    - national surveillance for megalocytiviruses
    - Neptune – a comprehensive database of Australian aquatic animal pathogens and diseases
    - active disease surveillance for southern aquatic animal industry sectors
    - review of Australia's passive surveillance system for aquatic animal diseases
    - update of the *Aquatic animal diseases significant to Australia: identification field guide* 4th edition (web and mobile phone app versions).
- Offshore projects:
    - Asia–Pacific laboratory proficiency testing for aquatic animal diseases.

7.3 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.

7.3.1 Aquatic animal disease response arrangements

The Aquatic Consultative Committee on Emergency Animal Diseases (Aquatic CCEAD) coordinates the national response to aquatic animal disease emergencies, which helps ensure the most effective technical response. The Aquatic CCEAD comprises:

- the Australian Chief Veterinary Officer
- representatives from the Department of Agriculture and Water Resources
- the Chief Veterinary Officer (or the director of the fisheries department) in each state and territory government
- the Director of AAHL.

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. The Department of Agriculture and Water Resources provides a national coordination role for response activities through chairing and supporting the operation of the Aquatic CCEAD. The Aquatic CCEAD assesses the current situation and provides advice on the management of the outbreak until it is collectively decided that the disease is no longer a threat and that a national response is no longer required.

The Aquatic CCEAD has met on 31 occasions since 1 December 2016 and throughout 2017 to coordinate response, surveillance and biosecurity activities for the white spot disease outbreak in farmed prawns from southeast Queensland. The white spot disease event in Queensland is discussed in Section 7.4.1. The Aquatic CCEAD continues to meet and provide technical expertise to Queensland as the response progresses.

7.3.2 Aquatic Deed

Emergency response agreements outline how responses to emergency pest and disease outbreaks should be managed and paid for. Three emergency response agreements have been developed in Australia, to cover animal diseases,

plant pests, and pest and disease emergencies with predominantly environmental impacts. These are formal agreements between governments only, in the case of the environment agreement, and industry and government in the case of the animal disease and plant pest agreements. 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) (see Section 6.1.1).

The Department of Agriculture and Water Resources is working closely with the aquatic animal industry and state and territory governments to develop an Aquatic EAD Response Agreement (an 'Aquatic Deed'). Animal Health Australia is being funded by the Department of Agriculture and Water Resources to employ a project officer for four years (2014–2018) to oversee the development of the Deed. The Aquatic Deed is intended to improve management of aquatic animal diseases and, in doing so, aims to reflect good public policy for governments and a sound business proposition for industry.

In 2017, work towards developing the Aquatic Deed was accelerated with the Department of Agriculture and Water Resources dedicating additional resources to the project. A draft Aquatic Deed was largely completed in 2017 and all prospective parties will work together in 2018 towards to finalise some outstanding policy issues and progress towards and ratification of the Deed. The deed addresses six desirable elements that form the framework of the Aquatic Deed:

- *Participation and cooperation* – parties to the deed would commit to joint decision making both during a response and in peacetime for risk-mitigation activities.
- *Risk management* – parties would commit to improving biosecurity practices to prevent disease outbreaks and to have appropriate capabilities in place should there be an outbreak.
- *Detection and response* – the deed would provide incentives for early reporting to facilitate earlier detection and response to disease, which will provide an increased likelihood of a successful response. Systems will also be in place to ensure response activities are rapid, cost-effective and represent the shared biosecurity objectives of all parties. Response objectives will include containment and eradication, as well as an option to transition to ongoing management if needed.
- *Arrangements to share response costs* – costs of a response will be shared equitably among those who benefit. This includes the ability to reimburse owners who have experienced direct losses associated with measures aimed at achieving an agreed response objective.
- *Training* – industry and government personnel will be supported to participate in response training as part of their ongoing responsibilities under the deed.
- *Communication and awareness* – industry and governments will work together to raise awareness of risk mitigation and biosecurity measures and formulate agreed communication messages during a response.

Further information about the project can be found on the Animal Health Australia website.[129]

7.3.3 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.

Manuals are considered for revision every five years or in the event of significant new developments. Revisions of three disease strategy manuals were progressed in 2017: viral encephalopathy and retinopathy, withering syndrome of abalone

129 www.animalhealthaustralia.com.au/what-we-do/emergency-animal-disease/development-emergency-aquatic-animal-disease-response-arrangements

and infectious salmon anaemia. The revision of two operational manuals, those covering decontamination and disposal, commenced in 2017 and are due to be completed in 2018. These operational manuals will be revised partly by considering lessons learnt from the 2016–2017 EAD response to white spot disease in prawns.

AQUAVETPLAN manuals can be downloaded from the Department of Agriculture and Water Resources website.[130]

7.4 Disease events in 2017

7.4.1 White spot disease

Mass mortalities and clinical signs of white spot disease in giant tiger prawns (*Penaeus monodon*) on a farm on the Logan River, Queensland, were reported in late November 2016. On 1 December 2016, the presence of white spot syndrome virus was confirmed by AAHL and an immediate notification was made to the OIE. By February 2017, seven properties, all along the Logan River, were confirmed as being infected with white spot syndrome virus.

Containment was immediately implemented for all affected farms, along with response and surveillance plans with a view to eradication. In May 2017, destruction of stock and disposal and decontamination of ponds on all affected farms were complete, and all ponds on the affected farms will lie fallow until May 2018 to assist with virus eradication.

The Queensland Government conducted delimitation surveillance from March to July 2017 and detected the virus in wild crab and prawn populations in the Logan River, Brisbane River and Moreton Bay. In response, the Queensland Government has implemented movement restrictions prohibiting raw prawns, marine yabbies and marine worms being moved from the restricted area, which extends from Caloundra to the New South Wales border. High-value crustacean products, solely for human consumption, are exempted from this movement restriction. Fishing remains prohibited near land-based prawn farms and waterways within the restricted area.

The Queensland and New South Wales governments conducted surveillance outside the restricted area from April to July 2017, and all prawn and crab samples returned negative results for white spot syndrome virus. Between August and September 2017, the Queensland Government resumed surveillance within the movement-restricted area and all samples tested negative.

These test results suggest that the disease-control activities may have been effective in containing the virus and preventing further spread. However, they are considered to be interim results and no conclusions can be drawn as to whether the virus has or has not established in wild crustacean populations.

A national surveillance plan for white spot syndrome virus has been endorsed by the Aquatic CCEAD. The plan outlines a staged approach to surveillance that ultimately aims to demonstrate Australia's freedom from white spot syndrome virus, should the virus not establish in the wild. The plan identifies specific sample sites around Australia that will be surveyed, based on an assessment of risk factors.

The cause of the outbreak is yet to be determined.

In response to the white spot disease outbreak, the Department of Agriculture and Water Resources suspended the importation of uncooked prawns into Australia for a period of six months, effective from January 2017. In July 2017, this suspension lapsed and new enhanced import measures were implemented. These measures allow for the safe resumption of trade in uncooked prawns and prawn products, with strict testing and inspection requirements to ensure biosecurity risks are managed.

A range of biosecurity measures, implemented at the Australian border and after border crossing by the Department of Agriculture and Water Resources, in collaboration with state governments, is part of a concerted effort to reduce risks of reintroduction of the disease.

130 www.agriculture.gov.au/animal/aquatic/aquavetplan

Image credit: iStock

7.4.2 Hepatopancreatitis in farmed tiger prawns

Penaeus monodon mortality syndrome, a syndrome of chronic mortality of farmed prawns, was first reported on a farm in Queensland in March 2015, followed by another case on a separate farm in Queensland in January 2016. During the 2016–2017 season, three new detections were made on Queensland prawn farms. Although gross clinical signs, histopathological changes and the presence of toxin genes were suggestive of acute hepatopancreatic necrosis disease (an OIE-listed disease), the reported causative bacterial agent of acute hepatopancreatic necrosis disease, *Vibrio parahaemolyticus*, was not found in these cases. Instead, a separate species of *Vibrio* bacterium has been identified. Experimental inoculation trials have commenced at AAHL to investigate the possible agent and determine its effect on live prawns.

7.4.3 Pacific oyster mortality syndrome

Pacific oyster mortality syndrome is caused by the ostreid herpes virus 1 microvariant. The disease has caused high mortalities of farmed Pacific oysters (*Crassostrea gigas*) in Europe, New Zealand, Korea and Australia. It does not affect other species of oysters. There are no known food safety or human health implications associated with Pacific oyster mortality syndrome.

The disease was first detected in farmed Pacific oysters in an estuary (Georges River) in New South Wales in 2010, and subsequently detected in two other estuaries in New South Wales in 2011 (Parramatta River) and 2013 (Hawkesbury River). In late January 2016, it was detected in hatcheries and oyster production areas in southeast Tasmania. Wild Pacific oysters from the Derwent River estuary were also affected.

Tasmanian Pacific oyster industry production was valued at $23 million in 2014–15. The Tasmanian industry supplied the majority of Pacific oyster spat to oyster farms in New South Wales and South Australia before the 2016 outbreak. The Tasmanian Government conducted state delimitation surveillance and the surveillance results were used to establish infected zones and movement restrictions to limit spread of the disease.

Two outbreaks of Pacific oyster mortality syndrome occurred in the same infected areas during summer 2016–2017, the first in early December 2016 and January 2017, and the second in late March 2017. To date, the disease has not spread outside the known infected areas.

A joint industry and government working group meets once every six months to provide additional national coordination and communication between industry and government on issues of significance to health management in the Pacific oyster industry.

Affected farmers were provided financial support for disease diagnosis by the Australian Government through the Immediate Assistance Fund. The

Image credit: Department of Agriculture and Water Resources

Fisheries Research and Development Corporation (FRDC) funded a range of oyster-related research projects, including a grant to establish a Future Oysters Cooperative Research Centre Project to address technical disease issues.

7.5 Research and development

The Australian aquatic animal industry has seen strong financial growth in the past two years, with the gross value of production rising from $2.8 billion (2014–15) to over $3.0 billion (2015–16). The aquaculture industry continues to grow and currently contributes $1.2 billion to the Australian economy, accounting for 42% of the total value of aquatic animal production, which includes commercial wild fisheries.

The FRDC invests in areas of research and development that are intended to benefit all sectors of Australian fisheries: the commercial sector (wild catch, aquaculture and processing), the recreational sector and the Indigenous sector.

The FRDC continues to lead national research and development infrastructure addressing whole-of-industry and community priorities, including sustainable fishing, improved productivity and profitability for fishing and aquaculture, and development of new and emerging aquaculture growth opportunities.

The FRDC's Aquatic Animal Health and Biosecurity Subprogram was established specifically to develop, support and manage national aquatic animal health and biosecurity-related research, and research into new and emerging aquaculture species.

A few major aquatic animal disease outbreaks that occurred during 2017 increased the awareness of biosecurity and research and development needs. These are essential for the profitability, productivity and sustainability of Australia's aquatic animal industries, and to protect Australia's natural resources and biodiversity.

More information including the Aquatic Animal Health and Biosecurity Subprogram research and development plan can be found on the Subprogram website.[131]

7.6 Regional aquatic animal health initiatives

Australia collaborates with many countries, particularly its neighbours in the Asia–Pacific region, to help improve aquatic animal health. Australia's cooperation extends through its membership of the Network of Aquaculture Centres in Asia–Pacific (NACA), the Food and Agriculture Organization of the United Nations, the OIE Regional

131 frdc.com.au/Partners/Subprograms-advisory-groups/Aquatic-health-and-biosecuirty

Representation for Asia and the Pacific, 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.

7.6.1 Network of Aquaculture Centres in Asia–Pacific

NACA focuses on building capacity in aquaculture production through education and training, improving support to government institutions, and facilitating effective research and development and information sharing. The improvement of aquatic animal health management in the region is a key priority activity for NACA. 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, and a representative from the Department of Agriculture and Water Resources. The advisory group meets annually and its report is available on the NACA website.[132]

Active participation in the advisory group of NACA provides Australia with improved knowledge and intelligence of new and emerging threats while promoting regional cooperation to mitigate biosecurity risks. Through NACA, Australia also facilitates joint regional and international initiatives to build capacity in the region for aquatic animal diagnostic, health surveillance, disease reporting and EAD response activities.

7.6.2 International standards

Australia continues to contribute strongly to the development of international aquatic animal health standards of 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. Australia's official responses to the OIE are provided through Australia's Delegate, the Australian Chief Veterinary Officer.

Australia also provides aquatic animal disease experts to a number of OIE ad hoc groups, and a departmental officer is the current President of the Aquatic Animal Health Standards Commission.

7.6.3 Regional proficiency testing program

The Australian Government is funding, through the **Agricultural Competitiveness White Paper**, and jointly managing with AAHL, an aquatic animal disease proficiency testing program for laboratories in the Asia–Pacific region. The Australian Government previously funded a regional aquatic proficiency testing project from 2012 to 2014. Review of that program indicated that it was successful in achieving its objective to strengthen regional capability to diagnose important aquatic animal diseases that affect trade, productivity and the environment. The review also indicated that there is an ongoing need for an aquatic proficiency testing program in the Asia–Pacific region.

The current program will allow more than 30 laboratories in 14 countries to further improve the accuracy and reliability of testing for 10 pathogens of significance to the region. The first round of testing is scheduled to take place in May 2018.

The project will be reviewed on completion to determine its effect on diagnostic capability, the benefits to individual participants, and likely models for ongoing participation by laboratories.

132 enaca.org

Image credit: Arthur Mostead

8

TRADE

This chapter summarises import and export-related activities of the Department of Agriculture and Water Resources.

Trade in animals and animal products is facilitated by the following:

- Office of the Chief Veterinary Officer (CVO)
- Biosecurity Animal Division
- Biosecurity Plant Division
- Exports Division
- Trade and Market Access Division
- Biosecurity Policy and Implementation Division
- Compliance Division

The Australian CVO provides oversight of Australia's animal health status and policy.

The Biosecurity Animal, Biosecurity Plant, and Exports divisions support 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 (DFAT) 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 pose minimal risk, from the perspective of animal and plant health and food safety.

8.1 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 (SPS Agreement). The SPS Agreement aims to promote trade while recognising the need for WTO members to protect themselves from the risk of spread of pests and diseases.

The agreement encourages WTO members to harmonise all sanitary and phytosanitary measures which may, directly or indirectly, affect international trade. Members should base their sanitary and phytosanitary measures on international standards, guidelines or recommendations, set by the following organisations:

- International Plant Protection Convention
- World Organisation for Animal Health (OIE)
- *Codex Alimentarius* Commission

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 unnecessarily restrict trade.

8.2 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 works with DFAT to reach commercially meaningful outcomes for Australia's primary producers in FTAs. Existing FTAs with China, Japan and Korea have seen further tariff reductions during the reporting year, as well as significant growth in trade of agricultural goods.

The Australian Government supports the negotiation of comprehensive FTAs that are consistent with the WTO rules and guidelines and which complement and reinforce the multilateral 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.

8.2.1 China–Australia Free Trade Agreement

China is Australia's top market for our agricultural, food and fisheries commodities. The China–Australia Free Trade Agreement (ChAFTA) came into force 20 December 2015. The ChAFTA has provided Australian exporters with an early advantage over major competitors without FTAs, such as the European Union and the United States. The ChAFTA has also helped to restore Australia's competitive position against countries with an FTA, such as New Zealand and Chile.

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 after entry into force (by 2019 to 2024), and tariffs on seafood will be eliminated by 2019.

Australia received an exclusive duty-free country-specific quota of 30 000 tonnes of clean wool (approximately 43 000 tonnes of greasy wool) from 1 January 2016. This volume will grow by 5% each year to 44 324 tonnes clean (approximately 63 500 tonnes greasy) by 2024, all at duty-free rates.

Since ChAFTA entered into force in December 2015, there have been three tariff cuts, which are supporting strong export growth. For example, dairy exports totalled $783 million in 2016, up 68% compared to 2015.

8.2.2 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

Image credit: Mick Hurran

2015. The agreement delivered an immediate tariff cut, followed by three more rounds of tariff cuts (the most recent occurring on 1 April 2017), which provide an advantage for Australia over competitors that do not have an economic partnership agreement with Japan.

In 2016, Japan was Australia's second largest agricultural export market and second largest export market for beef. Through JAEPA, tariffs on beef will progressively be reduced from 38.5% to 23.5% for chilled beef by 2028, and from 38.5% to 19.5% for frozen beef by 2031. Live cattle tariffs were also reduced by 20% when the agreement came into force. The value of beef exports to Japan increased 10% to $1.8 billion in 2016 compared to 2014.

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 $35 million in 2016.

8.2.3 Korea–Australia Free Trade Agreement

Korea is one of the top five markets for Australian agricultural exports. The Korea–Australia Free Trade Agreement (KAFTA) came into force on 12 December 2014. Australian exporters benefited from an immediate tariff cut, followed by three additional tariff cuts, the most recent occurring on 1 January 2017.

KAFTA has been in place for more than three years and promotes Australia's competitive position by eliminating tariffs on a range of agricultural and fisheries commodities, including removing a 40% beef tariff by 2028. 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 a number of pork lines (of 22.5%–25%) will be progressively eliminated between 1 January 2018 and 1 January 2028.

8.2.4 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 (ATMAC) 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 ATMAC funding priorities for 2017–18 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.

8.2.5 Package Assisting Small Exporters program

The Package Assisting Small Exporters program was established in 2014 to provide assistance to improve market access for small Australian agricultural exporters. Assistance was delivered through three components; a rebate for export establishment registration fees and charges in 2014–15; a review of these fees and charges conducted by the Department of Agriculture and Water Resources with industry consultative committees; and grant funding for projects to improve market access for small exporters (including projects relating to regulatory compliance, and administration improvement and innovation). The program will conclude in June 2018.

8.3 Exports

Australia has a reputation as a reliable source of high-quality agricultural exports. The Department of Agriculture and Water Resources is responsible for oversight of the export of live animals, animal genetic material, foods of animal-origin (meat, dairy, fish and eggs), animal by-products and plant and plant products.

The powers of the Department of Agriculture and Water Resources are defined in the *Export Control Act 1982* (Cwlth). This legislation supports trade by ensuring that export commodities meet importing country requirements. If the commodity is a food, it must be fit for human consumption, accurately described and labelled, and fully traceable.

Export commodities controlled by the Department of Agriculture and Water Resources are listed in the Export Control Act. These commodities are known as 'prescribed' goods and include the following: milk and milk products, eggs and egg products, fish and fish products, fresh fruit and vegetables, grains and seeds, hay and straw, live animals, meat and meat products, organic produce, plants and plant products, frozen raw meat (used for animal food) and raw animal materials (used for pharmaceuticals).

8.3.1 Managing Australian exports

Export certification for edible animal products and animal by-products

The Department of Agriculture and Water Resources regulates the export of meat, dairy, fish, and eggs by:

- licensing meat exporters
- registering businesses involved in the production and export of edible animal products
- auditing export establishments and performance verification, as appropriate
- requiring all export-registered establishments (including seafood vessels) involved in the preparation, handling and storage of dairy, egg, fish and meat products, destined for human consumption to have an 'approved arrangement' that:
    - is specifically written for that establishment
    - includes the specific processes and procedures that will enable the establishment to successfully export
    - ensures the safety of products (based on hazard analysis critical control point [HACCP] principles)
    - ensures compliance with importing country requirements
    - covers all commodities the establishment wants to export and the requirements of destination markets
- auditing export establishments and performance verification against their approved arrangements.

The Department of Agriculture and Water Resources issues export certification on the basis of the above systems that are in place to ensure that products have been produced in compliance with Australian export and importing country requirements.

Australia's food and animal by-product export establishments may be subject to audit by trading partners. Several audits are hosted each year (see Section 8.3.2).

Export certification and inspection services for live animals and reproductive material

The Department of Agriculture and Water Resources regulates and issues export certification and documentation for a wide range of live animals (including livestock, companion animals and zoo animals) and reproductive material exported from Australia.

The Tracking Animal Certification for Export (TRACE) system manages the application and approval processes for consignments of all live animals exported from Australia.

The department regulates the export of live animal exports by the following assessment, inspection and certification procedures:

- issuance of livestock export licences and regular auditing of livestock export licence holders
- registration approval and regular auditing of premises used for the pre-export assembly, preparation and isolation of livestock intended for export
- accreditation of veterinarians for the preparation and inspection of livestock for export
- registration approval and regular auditing of facilities and personnel for the collection, processing and storage of animal reproductive material
- verification that exporters have complied with Australian legislation and importing country animal health requirements in the preparation of the animals or reproductive material
- inspection of livestock by departmental veterinarians to confirm fitness for travel, in accordance with the *Australian standards for the export of livestock*, and the importing country's animal health requirements
- issuance of animal health certification and export permits to accompany live animal and animal reproductive material consignments.

8.3.2 Negotiating market access for animal commodities

The Department of Agriculture and Water Resources 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 to food safety and animal health requirements and animal or public health status. The Department of Agriculture and Water Resources seeks to ensure that standards set by trading partners are scientifically based and are no more trade-restrictive than required to meet the particular sanitary or phytosanitary requirement.

The Department of Agriculture and Water Resources maintains Australia's favourable market access in several ways, including hosting visits by competent authorities of trading partners, who regularly audit or inspect Australia's export systems and export companies, and by responding to requests for information on our export systems.

In 2017, Australia hosted 13 overseas delegations from eight international trading partner countries. These delegations audited Australia's animal health and food safety systems to maintain or expand export access for a wide range of Australian commodities. Examples include:

- system and commodity establishment audits conducted by Korea, Indonesia and China
- a Chinese delegation audit of Australia's disease-management systems for the prevention and management of highly pathogenic avian influenza (HPAI).

8.3.3 Negotiating market access for live animals

The Department of Agriculture and Water Resources negotiated animal health requirements for the export of live animals (such as livestock, horses and bees) and their genetic material (such as

bovine semen and embryos, and day-old chicks and hatching eggs) to 35 countries.

This included improving and maintaining existing market access, and gaining new market access, by responding to changes in animal health status and negotiating health certificates with trading partners to facilitate the export of live animals and their genetic material.

An example is finalising health conditions for the export of day-old poultry chicks and their hatching eggs to the Republic of Korea, Sri Lanka and Taiwan. HPAI outbreaks in Asia, Europe and North America affected overseas poultry industries and international supply of elite breeding flocks, creating a demand for Australian day-old poultry chicks and hatching eggs. The Department of Agriculture and Water Resources worked with the states and territories to provide information to trading partners about Australia's avian health status and to finalise health conditions so trade could commence.

The Department of Agriculture and Water Resources also hosts trading partner delegations to audit Australia's export and processing facilities, such as ruminant germplasm collection centres.

8.3.4 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 exported and domestically consumed commodities.

The programs are risk-based and are designed to identify and monitor chemical inputs into Australian agricultural production systems. Results from monitoring programs are assessed against relevant Australian and importing country standards. When 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 domestic and international requirements. Peak industry councils are consulted to ensure monitoring programs address trading partner requirements as well as Australian standards.

The National Residue Survey (NRS) within the Department of Agriculture and Water Resources undertakes residue monitoring programs for the cattle, sheep, goat and pig industries, and for buffalo, camels, deer, donkeys, game deer, horses, kangaroos, poultry, ratites (ostriches and emus), wild boar, honey, eggs and aquaculture and wild-caught seafood. Results of NRS monitoring programs are available on the Department of Agriculture and Water Resources website.[133]

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 survey provides a national, independent monitoring program for residues of agricultural and veterinary chemicals, and environmental contaminants in cow's milk. Dairy Food Safety Victoria coordinates the survey on behalf of the Australian dairy industry. The 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 in place for the use of chemicals in the dairy industry to ensure food safety outcomes.

8.3.5 Agricultural export regulation review

As a part of a wider initiative to strengthen agricultural exports and market access, the Department of Agriculture and Water Resources is improving the current agricultural export legislative framework. In 2015, a review of existing legislation found there was scope to make improvements to enable us to better support exporters, farmers and other primary producers in a changing trade environment.

Improvements to the export legislative framework will make it easier to understand, administer and use, and to safeguard Australia's reputation as a reliable, high-quality source of exports for our trading partners. Changes will mean farmers

133 www.agriculture.gov.au/ag-farm-food/food/nrs/nrs-results-publications

and exporters are supported by contemporary, responsive and efficient legislation.

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.

The new framework will maintain existing regulatory oversight and achieve current regulatory outcomes while removing duplication and making export provisions consistent across commodities, where possible.

The improved legislation will provide the flexibility to support export certification of existing commodities, as well as new and emerging commodities, while maintaining Australia's commitment to upholding our reputation as a high-integrity exporter. There will be no change to Australia's commitment to meet importing country requirements of our trading partners.

The Minister for Agriculture and Water Resources released an exposure draft of the *Export Control Bill 2017* (Cwlth) and a *Regulation impact statement* on 25 August 2017 for public comment. The consultation period has now closed and the Bill will be introduced into the Australian Parliament for consideration. Work on the legislative instruments to support the new Act (the rules) will commence in 2018. Consultation will be undertaken on the rules as they are developed.

The improved legislative framework for Australian agricultural exports is expected to be implemented shortly before 1 April 2020.

8.4 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.

As part of the strengthening biosecurity surveillance and analysis component of the **Agricultural Competitiveness White Paper**,[134] the Department of Agriculture and Water Resources began an operational review of all animal and biological import conditions on the Biosecurity Import Conditions (BICON) database in mid-2016, which will continue through to mid-2019. The import conditions review will ensure that import conditions are easier to understand and based on current risk-management methods while being a minimum burden to all those involved.[135]

8.4.1 Post Entry Quarantine Facility

The new Post Entry Quarantine Facility in Mickleham, Victoria was officially opened on 26 October 2015 after completion of Phase 1 construction. This included capacity for the delivery of post-entry quarantine services for cats, dogs, plants, horses and bees. Phase 2 construction was finalised at the end of 2017, with the completion of the avian facilities. Other facilities completed throughout 2017 as part of Phase 2 construction included additional capacity for cats and dogs and a purpose-built facility for camelid and ruminant imports.

Throughout 2018, the avian facility will undergo rigorous testing to ensure it is ready, before accepting imported stock including live pigeons and fertile poultry eggs. On the commencement of avian operations at the Facility, the current avian facilities in Spotswood, Victoria and Torrens Island, South Australia will be decommissioned. The single site will enable greater efficiencies in operations and consolidation of staff expertise, and will better meet Australia's post-entry quarantine needs.

8.4.2 Biosecurity import risk analyses

The Department of Agriculture and Water Resources 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 risk review by the department.

134 www.agriculture.gov.au/biosecurity/agwhitepaper-bio-surveillance-analysis#growing-scientific-capability

135 www.agriculture.gov.au/import/online-services/bicon/review-import-conditions

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 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, or economic or community activities.

BIRAs are consistent with Australian Government policy, the obligations of the WTO SPS Agreement, and the standards developed by the OIE and the International Plant Protection Convention (see Section 8.1).

The *Biosecurity import risk analysis guidelines 2016* provide further information on how the risk analysis process is conducted and are available on the Department of Agriculture and Water Resources website.[136]

8.4.3 Biosecurity risk reviews and competent authority evaluations

As part of the strengthening of biosecurity surveillance and analysis component of the **Agricultural Competitiveness White Paper**,[137] the Department of Agriculture and Water Resources has been able to increase resources and streamline the risk analysis process. This has facilitated the progression or commencement of a number of long-standing policy reviews.

The Department of Agriculture and Water Resources made progress on the following reviews for animal biosecurity in 2017:

- Biosecurity policy for the importation of ultra-high temperature processed pig meat was finalised in January 2017.
- A review of import conditions for captive non-human primates for zoos was finalised in March 2017.
- The Department of Agriculture and Water Resources released a final report on its risk review for frozen bovine in-vitro produced embryos from Canada and the United States in March 2017.
- A risk review for fresh (chilled or frozen) beef from Japan, the Netherlands, New Zealand, the United States and Vanuatu, which began in late 2015, was finalised in August 2017. The Department of Agriculture and Water Resources is undertaking competent authority assessments of each country to enable market access.[138]
- A risk review of psittacine birds (household pet and non-commercial) commenced in May 2016, and continued throughout 2017, in response to requests that the Department of Agriculture and Water Resources consider allowing imports of pet birds. The Department of Agriculture and Water Resources intends to release a draft report in mid-to-late 2018.
- The Department of Agriculture and Water Resources commenced a review of all existing import conditions in mid-2016 to ensure they are efficient and effective at managing biosecurity risks. This review project will continue until June 2019.
- The review of the biosecurity risks associated with importing cooked turkey meat from the United States, which began in December 2014, continued throughout 2017. The Department of Agriculture and Water Resources released its draft report to stakeholders in August 2016 for comment by October 2016 (subsequently extended until November 2016). The review is on hold pending receipt of information from the United States.
- The Department of Agriculture and Water Resources commenced a review of import conditions for prawns and prawn products from all countries in May 2017. This was followed by announcements in June 2017 advising the end of the prawn and prawn products suspension (implemented as a result of the white spot syndrome virus outbreak that occurred in

136 www.agriculture.gov.au/biosecurity/risk-analysis/guidelines

137 www.agriculture.gov.au/biosecurity/agwhitepaper-bio-surveillance-analysis#growing-scientific-capability

138 www.agriculture.gov.au/biosecurity/risk-analysis/animal/fresh-chilled-frozen-beef

December 2016), and advising enhanced import conditions for prawns and prawn products for human consumption, which will stay in place until the broader review is completed.

- The Department of Agriculture and Water Resources commenced a review to consider appropriate risk-management measures for importing cooked duck meat from Thailand in June 2017. A draft report is anticipated in 2018.
- The Department of Agriculture and Water Resources invited comments from stakeholders in June 2017 on proposed changes to include high-pressure processing as an equivalent risk-management measure for the importation of chicken meat. The comment period closed in September 2017 and comments are being reviewed before any changes to the existing policy are made.

The Department of Agriculture and Water Resources 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 2017, the Department of Agriculture and Water Resources competent authority assessment program included evaluations of beef, pig meat and salmon. The Department of Agriculture and Water Resources also undertook familiarisation visits to help trading partners meet the interim import conditions for prawns entering Australia.

8.4.4 Imports of biological products, live animals and reproductive material

The Department of Agriculture and Water Resources regulates the import of biological goods, live animals and reproductive material into Australian territory, under the Biosecurity Act.

Biological goods that may be imported include products derived from animals and microbes, such as foods, human and animal therapeutics; laboratory materials; animal feed; and veterinary vaccines. Such goods may not be imported to Australia unless they meet specified conditions.

Live animals that may be imported include dogs (pet, military and assistance); cats; horses; ruminants; fertile eggs; birds; zoo animals; laboratory animals; aquatic animals; bees; and reproductive material. Live animals may be imported for commercial, research, breeding and personal uses.

The Department of Agriculture and Water Resources provides advice to prospective

Image credit: Department of Agriculture and Water Resources

importers on the processes and requirements for preparing specific goods for import; assesses import applications; and grants import permits with appropriate conditions. When required, the Department of Agriculture and Water Resources inspects and approves overseas pre-export facilities that are used to prepare goods, for example through processing, testing or quarantine. The Department of Agriculture and Water Resources liaises with overseas competent authorities to verify that certification is consistent with Australia's import conditions and international standards.

The Department of Agriculture and Water Resources works across the biosecurity continuum to manage biosecurity risks from imported live animals and biological goods by:

- undertaking risk assessments of the biosecurity risks associated with specific goods, or class of goods, and applying an ALOP for Australia through those assessments
- developing import conditions to mitigate the biosecurity risks to an acceptable level
- auditing overseas facilities to verify the integrity of:
    - manufacturers' systems for sourcing raw materials, processing, preventing contamination and tracing products, or
    - arrangements for preparing and quarantining live animals prior to export
- assessing information provided with import applications to decide if the biosecurity risk can be reduced to an acceptable level through:
    - manufacturing processes, or
    - testing and treatment regimens, or
    - restrictions on what the goods may be used for after import
- liaising with international competent authorities
- granting import permits, if the relevant conditions can be met.

Import permits may be suspended, revoked or amended if biosecurity risks change, for example, if there is an exotic disease outbreak in a country from which goods are sourced, processed and/or approved for export to Australia.

In 2017, the Department of Agriculture and Water Resources granted approximately 7988 import permits for biological goods and 6929 for live animals.

During 2017, the Department of Agriculture and Water Resources continued to work closely with stakeholders on biosecurity regulation and related issues, and helped importers and users of imported goods comply with Australia's biosecurity requirements. The Department of Agriculture and Water Resources consults with stakeholders to share information and seek industry advice and opinions on the design of effective biosecurity systems and risk management. These stakeholders include national government and international agencies; importers; industries; community interest groups; producers; processors; consumers and users of imported goods; research and development organisations; and travellers. The two main consultative forums the Department of Agriculture and Water Resources facilitates are the Biological Consultative Group (BCG) and the Horse Industry Consultative Committee (HICC).

The BCG includes representatives from the pet food industry, veterinary medicine manufacturers and distributors, government bodies, universities, food importers and other peak bodies. The BCG provides the Department of Agriculture and Water Resources and industry with a forum for consultation on departmental policy and industry initiatives affecting importers of biological goods with the goal of ensuring effective biosecurity outcomes are delivered without unnecessary impediments to trade. In 2017, the group met in March and October.

The HICC includes representatives from horse shipping agents, breeding and racing authorities, the Australian Veterinary Association and other peak bodies within the equine industry. The HICC provides the Department of Agriculture and Water Resources and industry with a consultative forum that ensures the biosecurity risks associated with imported horses are managed effectively without unnecessary impediments to trade, racing and equestrian sport. In 2017, the committee met once in July.

Image credit: Taryn Mokotupu

Image credit: iStock

9

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, regionally and globally, to achieve the best health outcomes for people, animals and our environment. A One Health approach is critical for the growing global threat of antimicrobial resistance (AMR) and emerging zoonotic diseases (approximately 70% of all emerging human infectious diseases originate from animals). The development of AMR threatens human and animal health. It is globally driven by antimicrobial misuse and overuse in humans and animals, and the subsequent spread of organisms resistant to antibiotics between humans and animals and the wider environment.

9.1 Antimicrobial resistance

9.1.1 Antimicrobial resistance prevention initiatives

AMR is a global risk that poses a serious and imminent threat to human and animal health. It 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.

The profile of AMR continues to rise internationally. On 21 September 2016, the United Nations General Assembly (UNGA) declared a commitment to act on AMR. This is only the fourth time a health issue has been taken up by the UNGA.

Australia has a good record on AMR, from an animal health perspective, by having one of the most conservative approaches to the use of antimicrobial agents in agriculture in the world. In December 2015, the United Kingdom review on AMR showed Australia as the fifth-lowest user of antibiotics in agriculture among the countries examined. Australia has not registered colistin or carbapenems (last-resort antibiotics for humans) or any fourth-generation cephalosporins for animal use, and fluoroquinolones are not approved for use in food-producing animals (including horses). As a result, there is little microbial resistance to these drugs in Australia, in contrast to most other countries in the world. The Australian Pesticides and Veterinary Medicines Authority (APVMA)[139] evaluates and registers antimicrobial agents for animal use in Australia. The evaluation process involves conducting a risk assessment, including for AMR. Consideration is given to whether antimicrobial agents destined for veterinary use are classified as being of critical importance in human medicine. To do this, the APVMA uses the Antibacterial Importance Ratings[140]. These ratings are an important guidance resource in assessing the consequence of AMR development associated with a proposed use of an antimicrobial product in animals.

Almost all antimicrobial agents used in animals are Schedule 4 medicines, which means they are prescription-only medicines.

The Department of Agriculture and Water Resources, and through the Australian Chief Veterinary Officer (CVO), has a leadership role in the strategic management of AMR. At an international level, the Department of Agriculture and Water Resources is involved in the work of several multilateral organisations, such as the World Health Organization, the World Organisation for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO). These organisations work together as a tripartite partnership and provide global guidance on the best way to limit AMR.

At a national level, the Department of Agriculture and Water Resources worked with its counterpart, the Australian Government Department of Health, to launch a One Health AMR website[141] and publish a progress report of Australia's First National Antimicrobial Resistance Strategy 2015–2019 (AMR Strategy), among other activities.

The Department of Agriculture and Water Resources also participates in the following groups:

- Antimicrobial Resistance Prevention and Containment Steering Group: brings together the Department of Health and the Department of Agriculture and Water Resources Executive Group, and includes the Australian Chief Medical Officer (CMO) and Australian CVO. This group provides governance and leadership on AMR issues, and oversees implementation and progress of the AMR Strategy.
- Australian Strategic and Technical Advisory Group[142] on Antimicrobial Resistance: an expert group from the health and veterinary sectors, is co-chaired by the Australian CMO and Australian CVO. This group provides strategic, technical, scientific and clinical advice to the steering group.
- Antimicrobial Resistance Surveillance Task Group: includes animal health industry participants. This group focuses on developing and implementing Australia's AMR surveillance program for livestock.
- Quadrilateral Animal Health AMR Network:

139 https://apvma.gov.au/node/1018

140 www.amr.gov.au/resources/importance-ratings-and-summary-antibacterial-uses-humans-australia

141 www.amr.gov.au

142 www.amr.gov.au/australias-response/objective-7-governance/amr-advisory-group

comprises AMR representatives from Australia (as the Chair), Canada, New Zealand and the United States, to share information about tackling AMR.

Antibiotic Awareness Week

As part of World Antibiotic Awareness Week on 13–19 November 2017, the Department of Agriculture and Water Resources was involved in activities[143] which included:

- launching of a single government website on AMR, in collaboration with the Australian Government Department of Health
- a global Twitter chat on AMR
- promoting awareness about AMR including a jointly released statement by the Australian CMO and Australian CVO, asking all Australians to pause and consider their antibiotic use
- media coverage on 17 November 2017, when the Australian CVO visited a piggery in Young, which is modelling an approach to minimising antimicrobial use without compromising the health and productivity of its stock
- supporting the joint Australian Government Department of Health and Department of Agriculture and Water Resources Implementation Plan for the National Antimicrobial Resistance Strategy (2015–2019) through AMR activities.

9.1.2 Antimicrobial resistance surveillance activities

From a roundtable meeting with industry and other stakeholders in December 2014, an AMR Surveillance Task Group was established to develop a proof-of-concept model for AMR surveillance in food animals. The developed model is being used with a proposed capability for transitioning into an ongoing, self-sustaining program for the various food animal industries. This work was initially commenced with Australian Pork Limited. The final report of this AMR surveillance project will be available in early 2018. A second phase of this work is progressing with the Australian Chicken Meat Federation. Following a workshop to raise awareness of AMR, a pilot survey for AMR has commenced in the salmon industry.

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

Further projects were granted in the second quarter of 2017 to undertake AMR surveillance in *Salmonella* isolates from Australian chicken eggs, and to optimise risk management of critical AMR bacteria in food-producing animals.

Australian Pork Limited, Rural Industries Research and Development Corporation, Australian Chicken Meat Federation, University of Adelaide, Murdoch University, and New South Wales Department of Primary Industries will be jointly undertaking a Rural Research and Development for Profit program project funded by the Australian Government on high-throughput technology for defining the AMR status of pork and chicken meat enterprises. The research aims to use robotics that work extremely quickly, precisely and cost-effectively, to provide efficient, accurate and cost-effective methods to determine bacterial AMR present on-farm.

9.1.3 Antimicrobial usage and stewardship

Australian livestock industry production is mostly extensive, and there is limited use of antimicrobial agents for growth promotion in intensive industries. There is increasing momentum nationally and internationally from consumers and the medical community to address the use of antimicrobial agents for non-therapeutic and non-prophylactic purposes in animals. In response to this, the Department of Agriculture and Water Resources consulted stakeholders in late 2017, including the pharmaceutical and livestock industries, on the voluntary removal of growth-promotant claims from currently registered antimicrobials that are important for human health. Both industries are broadly supportive of this approach.

The Australian Chicken Meat Federation, Meat & Livestock Australia, Australian Pork Limited, and Australian Eggs Limited have formed the Intensive Animal Antimicrobial Stewardship working group, which is actively discussing antimicrobial stewardship efforts in each industry. An agreed stewardship framework has been developed for all parties to use as a basis for antimicrobial stewardship activities. Each member of the working group is producing a report on these activities (past, present and future) for their industry that will contribute to a compendium on antimicrobial stewardship in Australian intensive livestock industries. The report is due at the end of 2017.

In May 2017, the Australian Government funded an antimicrobial stewardship project with the Veterinary Schools of Australia and New Zealand to develop an education module for veterinarians in practice.

9.2 Public health surveillance for zoonotic diseases

The suspicion or confirmation of nationally notifiable zoonoses are required to be reported to the agricultural authorities or a veterinarian. The relevant health authorities are also notified by the government.

A memorandum of understanding exists between the Department of Health and the Department of Agriculture and Water Resources to work together in the management of regulatory functions that have a direct or indirect impact on human health; such as those related to the import of food and animal products, and management of disease outbreaks and emergencies, including the management of emerging and zoonotic diseases. Other portfolio agencies that may be called on include (but are not limited to) the Office of the Gene Technology Regulator, Food Standards Australia New Zealand and the APVMA.

The Zoonosis Group of the Australian Government Department of Health, and Agriculture and Water Resources meets regularly to share information about zoonotic diseases and other cross-cutting public health issues.

Investigations of potential zoonotic diseases, endemic in animals in Australia, include anthrax and swine brucellosis. Anthrax 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 are well defined, with a low prevalence and sporadic occurrence (see Section 6.6.1). 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. Humans can also be infected, and in Australia feral pigs are the usual source of infection. For investigations of anthrax and brucellosis, see Table C1.

There was a focus on Q fever in 2017. Q fever is a zoonotic disease caused by the bacterium *Coxiella burnetii*, which is found worldwide except in New Zealand. The primary route of infection for humans is airborne, usually from inhaling infected particles from animal birth products, urine, faeces, and contaminated dust, or from ingestion of unpasteurised milk. Human Q fever infections are most often associated with exposure to livestock (cattle, sheep and goats), although cases have been reported from exposure to wildlife (kangaroos) and household pets (dogs and cats). Q fever became a nationally notifiable disease of humans in Australia in 1991.

The Australian Government, through the Department of Health, provides funding to the only global manufacturer of Q fever vaccine and the Q fever test kit (Seqirus) to ensure there is ongoing supply to the open market. Q fever is a Nationally Notifiable Disease in humans and the Department of Health conducts national surveillance for human cases of Q fever through the National Notifiable Diseases Surveillance System (see Section 9.2.2). The Communicable Diseases Network Australia (Section 9.2.1) is developing national guidelines to assist with the public health management of Q fever cases. The guidelines will be available from the Department of Health website when finalised.[144] The Department of Agriculture and Water Resources also monitors Q fever from an animal health perspective to provide assistance to the Department of Health, when required.

9.2.1 Communicable Diseases Network Australia

The Communicable Diseases Network Australia (CDNA[145]) 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 (including the Department of Agriculture and Water Resources), 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

144 www.health.gov.au/cdnasongs

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

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.

9.2.2 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[146] (updated daily) and the quarterly journal *Communicable diseases intelligence,*[147] 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*.[148]

Table 9.1 shows the number of notifications of selected zoonotic diseases in 2017 and compares these data with those for 2016 and the five-year mean.

9.2.3 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 relating to 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 2017 were campylobacteriosis[149] (26 622 notifications) and salmonellosis (16 400 notifications).

Table 9.1 Notifications of selected zoonotic diseases in humans

	Number of notifications		
Zoonotic disease	**2016**	**2017**	**5-year mean (2013–2017)**
Anthrax	0	0	0
Barmah Forest virus infection	329	443	1276
Brucellosis	18	17	17
Kunjin virus infection	0	7	2
Leptospirosis	129	140	102
Murray Valley encephalitis virus infection	0	0	0
Ornithosis	22	14	28
Q fever	556	430	511

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

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

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

149 In New South Wales, campylobacteriosis is only notifiable as a foodborne disease or gastroenteritis if it occurs in an institution.

Image credit: iStock

10

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),[150] the Australian Government Department of Agriculture and Water Resources,[151] the Australian Government Department of Health,[152] state and territory government authorities, and Animal Health Australia[153] all undertake activities to protect public health and safety. These activities include:

- developing nationally consistent food standards
- monitoring microbial pathogens, chemical residues and environmental contaminants in products
- implementing and managing systems that deliver hygienic food products to the marketplace
- monitoring and surveillance to identify, prevent and control outbreaks of foodborne illness.

150 www.foodstandards.gov.au
151 www.agriculture.gov.au
152 www.health.gov.au
153 www.animalhealthaustralia.com.au

10.1 National arrangements and consultation

The Australian and New Zealand joint food regulation system is made up of laws, policies, standards and processes that ensure our food is safe to eat. The four key parts of the system are policy development, standards development, implementation and enforcement of standards, and responding to food incidents.

Policy which is 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 Assistant 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.

10.2 Food standards

10.2.1 Australian and New Zealand standards

The food standards in the Code cover food additives, processing aids, novel foods, foods produced using gene technology, vitamins and minerals, irradiated foods, special purpose foods (such as infant formula), commodity standards and contaminants.

The standards include labelling requirements for both packaged and unpackaged foods, e.g. including specific mandatory warnings or advisory labels. Mandatory declarations of allergens apply to all packaged foods containing a defined list of substances as ingredients, food additives or processing aids.

The Code also contains Australian-only standards, e.g. Chapter 3 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.

Chapter 4 of the Code, which is also an Australian-only standard, contains primary production and processing standards for the primary production sector. These standards aim to strengthen food safety and traceability throughout the food supply chain, from paddock to plate. Standards 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.

10.2.2 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.

10.2.3 Scientifically based risk analysis process

Changes in the food supply resulting from new technologies, expanding trade opportunities, ethnic diversity and changing diets mean that government, industry and consumers must be vigilant to maintain food safety.

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 10.1) 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.

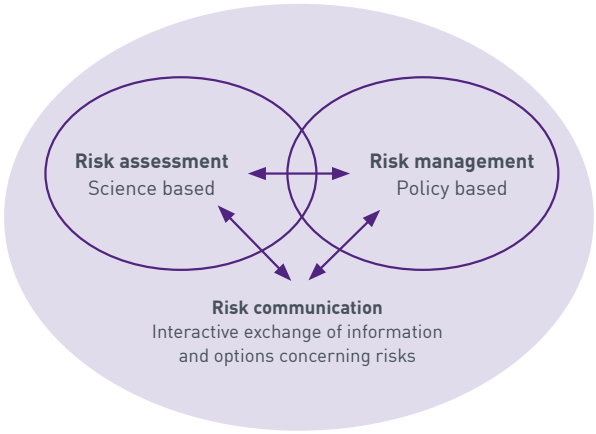

Figure 10.1 Risk analysis process[154]

10.2.4 FSANZ applications and proposals

Any individual, business or organisation can apply to FSANZ to amend the Code. Applicants are legislatively obliged to provide certain information and data to support their application according to a published application handbook. FSANZ can also initiate action to amend the Code for public health and safety reasons by initiating a proposal to amend the Code.

154 www.foodstandards.gov.au/publications/riskanalysisfoodregulation/Documents/risk-analysis-food-regulation-full-pdf.pdf

10.3 Microbiological limits, maximum residue limits and contaminant levels

10.3.1 Microbiological limits

FSANZ periodically reviews the role of microbiological testing and the use of existing microbiological limits in food safety management. Internationally recognised principles, such as those of Codex, are used to review microbiological criteria and establish criteria for food safety and process hygiene.

Guidance is currently being developed for 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
- help identify situations (products and processes) requiring investigative and/or control action.

10.3.2 Maximum residue limits

FSANZ and the Australian Pesticides and Veterinary Medicines Authority have shared responsibilities for establishing the maximum residue limits (MRLs) for agricultural and veterinary chemicals listed in 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 10.9). The process is methodical, streamlined and transparent, and includes public consultation. Domestic MRLs, including those arising from requests from stakeholders for food import purposes (import MRLs), are included in the Code only if the level of chemical residue in the food does not pose any health and safety risks to consumers.

10.3.3 Contaminant levels

FSANZ sets maximum levels for specific metal and non-metal contaminants and natural toxicants in nominated foods. Despite the maximum levels outlined in Standard 1.4.1 of the Code, the principle of 'as low as reasonably achievable' 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.

10.4 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.

The Implementation Sub-Committee for Food Regulation defines a food incident 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…'.[155] 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. 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 maintains close contact with Australia's international partners, and is an active participant in the FAO/WHO International Food Safety Authorities Network.[156]

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. Chapter 3 (*Food safety standards*) and Chapter 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.

10.5 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.

155 National Food Incident Response Protocol: foodregulation.gov.au/internet/fr/publishing.nsf/Content/incident-response

156 www.who.int/foodsafety/areas_work/infosan/en


Image credit: iStock

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.

10.6 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 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 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 conducts biosecurity risk analysis for countries wishing to export fresh beef (chilled or frozen) to Australia and implements import certification requirements at the border.

Under the revised policy, FSANZ has 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.[157] Applicant countries that are assigned a 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.

10.7 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 of Agriculture and Water Resources uses this risk advice to determine appropriate risk-management measures at the Australian border for imported food products.

FSANZ has completed a review of 'risk category' foods (i.e. medium-to-high risk, as listed in the Imported Food Control Order 2001), and is now focusing on other foods and hazards that potentially pose a medium to high risk to public health and safety. The completed risk advice is published on the FSANZ website.[158]

10.8 International engagement

Collaboration with international agencies involved in ensuring food safety is extremely important, given the global trade in food. 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 information, data and best practices on food regulatory science can promote consistent approaches to analysing risk.

The Asia–Pacific Economic Cooperation Food Safety Cooperation Forum (FSCF) 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. During 2017, the FSCF held its biennial conference and several technical workshops.

Australian Government representatives, including from FSANZ and the Department of Agriculture and Water Resources, actively lead and participate in various Codex committees (see Section 10.2.2).

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.

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.

10.9 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.

157 www.foodstandards.gov.au/industry/bse/bsestatus/Pages/default.aspx

158 www.foodstandards.gov.au/consumer/importedfoods/Pages/FSANZ-advice-on-imported-food.aspx

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. One 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 the consumption of certain foods due to the presence of chemicals, for example, fish, which contains mercury.

10.10 Monitoring safety of the food supply

The Australian Government, and state and territory food safety authorities routinely audit, inspect and monitor the food supply to ensure its safety for consumers. 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 derived 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 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 through the website.

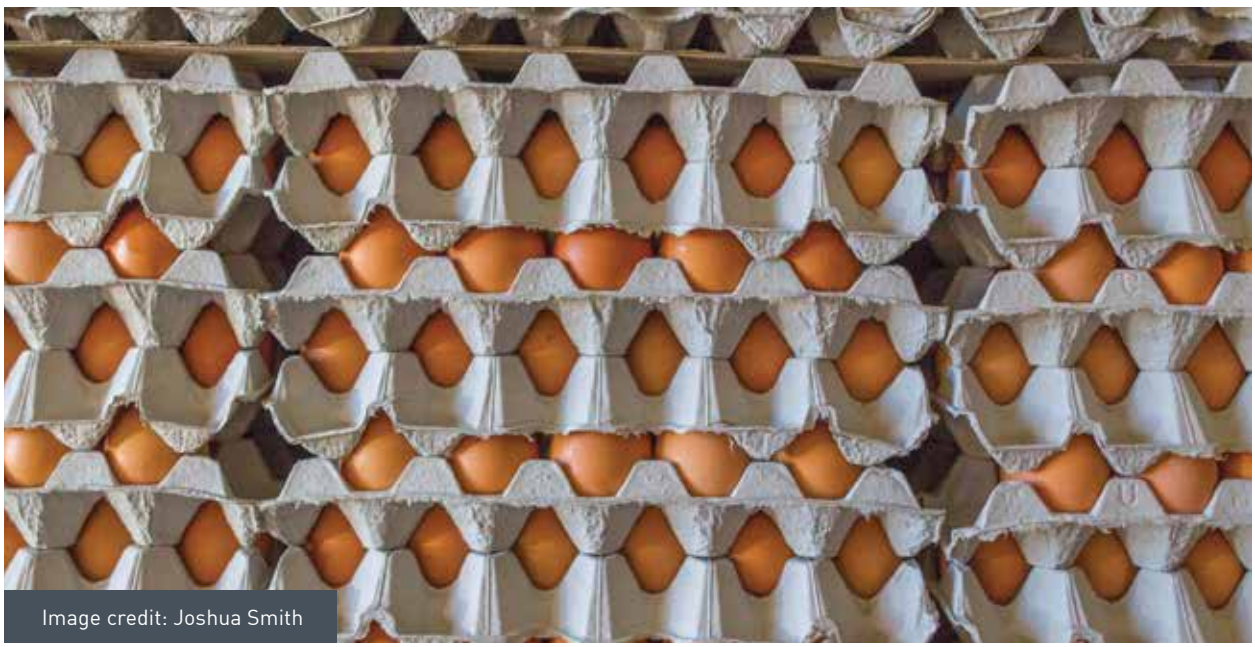

Image credit: Joshua Smith

FSANZ also collects food surveillance data, including the results of general compliance testing and more targeted surveys conducted by public health units in jurisdictions across Australia and New Zealand. Australia's most comprehensive assessment of consumers' dietary exposure to pesticide residues, contaminants and other substances is the Australian Total Diet Study (formerly the Australian Market Basket Survey). This study is conducted at regular intervals, every two to three years, to monitor the national food supply to ensure that existing food regulatory measures adequately protect consumer health and safety.

FSANZ may also undertake food analytical 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.

10.11 Foodborne disease surveillance

10.11.1 OzFoodNet

OzFoodNet was established 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.[159]

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.

10.11.2 Communicable Diseases Network Australia

The CDNA[160] provides national leadership and coordination for the surveillance, prevention and control of communicable human diseases that pose a threat to public health (see Section 9.2.1).

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

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

Image credit: Department of Agriculture and Water Resources

Image credit: Australian Pork Limited

11

ANIMAL WELFARE

Australia has a collaborative approach to managing animal health and welfare. Australia's three tiers of government (federal, state and local) work with industry and private veterinarians to provide oversight for the welfare of farm animals, companion animals, zoo and exhibited animals, native wildlife, introduced species and animals in research.

Under the Australian constitution, legislative responsibility for animal welfare within Australia rests primarily with state and territory governments. All states and territories are responsible for compliance with animal welfare legislation within their jurisdictions. Local governments have legislation relating to the management of companion animals.

The Australian Government's responsibilities for animal welfare arise from specific powers relating to trade and international treaties that encompass some animal welfare issues, including the welfare of animals involved in the live animal export trade and animals processed at export-registered slaughter establishments. The government is also responsible for providing input to international negotiations on animal welfare and the development of international standards. It holds overall responsibility for the welfare of kangaroos harvested for commercial purposes, the conduct of introduced (feral) animal management, and animal welfare aspects of wild (native) animal management and animal research on Australian Government lands.

Animal welfare and livestock industry profitability are often strongly linked. The Australian Government and state and territory governments work with livestock industries to improve animal welfare outcomes, which can contribute to the productivity and profitability of the industry.

Improved animal welfare contributes to:

- increased productivity: improved animal welfare practices lead to contented, healthier animals that often 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 animal industries will be increasingly influenced by research, development and strategies that improve animal welfare outcomes.

11.1 Jurisdictional updates

11.1.1 Australian Government

The Australian Government administers a regulatory framework to ensure that animals in the live export trade are handled and slaughtered in accordance with animal welfare standards set by the World Organisation for Animal Health (OIE), and the *Australian standards for the export of livestock*. The government is currently undertaking a comprehensive review of the *Australian standards for the export of livestock* to ensure the standards are fit for purpose and align with contemporary animal health and welfare research. The standards represent the basic animal health and welfare requirements which the government expects the industry to meet, to enable the export of livestock for slaughter.

In the 2017–18 Budget, the Australian Government announced a package of legislative and non-legislative measures which would lead to a ban on the testing of cosmetics on animals. This implements the Government's 2016 election commitment package and is supported by $2.1 million from 2017–18 to 2018–19. Through the announced package, the Government would:

- work with states and territories to incorporate a testing ban through their respective legislation, triggered by changes to the National Health and Medical Research Council *Australian code for the care and use of animals for scientific purposes;* it is expected that this will be completed by the end of 2018
- work with the cosmetics industry, in consultation with key animal welfare stakeholders, to develop a voluntary code of practice on the sale of cosmetic products; this will include an information package for consumers and industry about promotional claims that can or cannot be made on cosmetic products
- introduce a national ban on the use of new animal test data, to support the introduction of chemicals used exclusively as cosmetic ingredients, through the new Industrial Chemicals Bill as part of the broader reforms to industrial chemicals regulation.

The *Industrial Chemicals Bill 2017* (Cwlth) (which implements the legislative components of the package) passed the House of Representatives on 17 October 2017, and is currently before the Senate.

Significant ongoing support has been provided for the National Animal Welfare Research Development and Extension Strategy. Animal industry research and development corporations provide funding for research initiatives to contribute sound, science-based options for improved animal welfare, community confidence and market access (see Chapter 13 for specific projects). The government provides matched funding for eligible research and development expenditure by the research and development corporations.

The Australian Government continued to:

- undertake verification activities to ensure that Australian abattoirs meet applicable animal welfare standards and report identified non-compliances to state and territory governments

Image credit: Sandra Baxendell

- issue export certification for live animals (including commercial livestock species, companion and assistance animals, greyhounds and horses) to meet importing country requirements; these include ensuring that the animal is fit to travel
- participate in international animal welfare matters by engaging at the global, regional and country levels
- support the development of nationally consistent animal welfare arrangements, such as animal welfare standards and guidelines, biosecurity arrangements, and national approaches to policy matters in areas of national interest
- work 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
- maintain awareness of consumer trends and global developments, to prepare for and respond to animal welfare issues that may affect agriculture and international trade.

11.1.2 Australian Capital Territory

In early 2017, the Australian Capital Territory Government released the draft Animal Welfare and Management Strategy 2017–2022 for community consultation. The final version was released in September 2017. The Strategy takes a preventive, proactive approach to animal welfare and management in the Territory.

One of the key actions under the Strategy is to engage with the community and provide education about responsible pet ownership. To implement this, the Australian Capital Territory Government launched the 'Paws for Thought' campaign to raise awareness of registration, micro-chipping and de-sexing requirements, and appropriate dog control and exercise.

The *Domestic Animals (Racing Greyhounds) Amendment Bill 2017* (ACT) was presented to the Australian Capital Territory Legislative Assembly on 2 November 2017, including proposed amendments to the *Animal Welfare Act 1992* (ACT) to introduce an offence for conducting or facilitating a greyhound race in the Australian Capital Territory.

Further reviews of current animal welfare and domestic animal management legislation were also conducted, with several amendments to the *Domestic Animals Act 2000* (ACT) introduced to tighten certain provisions, including those relating to animal ownership bans and dog control.

During 2017, the Australian Capital Territory Animal Welfare Advisory Committee recommended that the *Australian animal welfare standards and guidelines for the land transport of livestock* be implemented in the Australian Capital Territory as a code of practice under the Animal Welfare Act, and continued

to consider the implementation of the national standards and guidelines for sheep and cattle as codes of practice. The Committee also progressed draft Australian Capital Territory codes of practice for the welfare of wildlife and cats.

11.1.3 New South Wales

The New South Wales Government is currently considering amendments to the *Prevention of Cruelty to Animals Act 1979* (NSW), arising from an inquiry into companion animal breeding practices in New South Wales by a joint select committee appointed by the New South Wales parliament. Additional proposed amendments to the Prevention of Cruelty to Animals Act and the subordinate Prevention of Cruelty to Animals Regulation are also being considered in relation to livestock welfare.

In line with the recommendations of the Companion Animals Breeding Practices Joint Select Committee, the New South Wales Animal Welfare Advisory Council has reviewed the New South Wales animal welfare codes of practice for breeding dogs and cats, and animals in pet shops, and provided advice on improvements. Work is now well underway to prepare revised standards and targeted consultation is being undertaken to inform the drafts.

A publicly accessible online register for companion animals has been developed to replace the existing paper-based system. The new online New South Wales Pet Registry is a significant step to ensuring comprehensive traceability of dogs and cats from breeders to owner and work is underway for future improvements.

The New South Wales animal welfare codes of practice for keeping dogs and cats in animal boarding establishments, animals used in rodeo events, and the private keeping of reptiles are currently being revised in the form of standards and guidelines.

A guideline document has been published to assist animal ethics committees with administration, and to outline the responsibilities of researchers when reporting to animal ethics committees. The guidelines were drafted by the Animal Research Review Panel, which is a statutory body that provides advice to the New South Wales Minister for Primary Industries on the use of animals in research and teaching.

A Greyhound Welfare and Integrity Commission was established in New South Wales to regulate the greyhound racing industry, target wrongdoing and enforce animal welfare standards.

11.1.4 Northern Territory

Animal welfare is regulated by the Northern Territory Department of Primary Industry and Resources. The *Animal Welfare Act 2000* (NT) and Animal Welfare Regulations are implemented by the Animal Welfare Branch, which responds to reports of cruelty, neglect and abandonment. In partnership with key stakeholders, the Animal Welfare Branch uses a range of approaches including training and education to better inform the community of their responsibilities under the Animal Welfare Act and Regulations. Codes of practice are adopted under the Act by the Minister on the recommendation of the Northern Territory Animal Welfare Advisory Committee.

The Northern Territory Government has committed to a full review of the current Act. An Animal Protection Bill has been drafted for consideration by the government. It is anticipated that the bill will be tabled in the Legislative Assembly in early 2018. Once passed and enacted, the new legislation will result in stronger, more effective animal welfare protection measures in the Northern Territory, including increased penalties.

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 progressed. This is to align with current implementation of the welfare standards for land transport of livestock. These standards are principally enforced by an infringement notice system.

The Northern Territory has an animal welfare in emergencies plan, focusing on cyclone and flood scenarios. In the event of a natural disaster, the Department of Primary Industry and Resources emergency management team will set up an animal welfare coordination centre and activate the plan.

The Australian Water Buffalo Manual[161] was published by the Department of Primary Industry and Resources and the Rural Industries Research and Development Corporation (RIRDC). The technical manual provides advice on all aspects of buffalo production, including husbandry and health aspects of buffalo welfare.

11.1.5 Queensland

The *Animal Care and Protection Act 2001* (Qld.) and subordinate Regulation is Queensland's core animal welfare legislation, providing good welfare outcomes and protection for all animals in Queensland.

In August 2017, the *Code of practice for the breeding of dogs* was made mandatory under the Regulation to introduce compulsory standards for dog breeders in Queensland. The code will commence in October 2018, allowing time for breeders to become familiar with new legislation and make necessary adjustments to their breeding practices.

Mandatory dog breeder registration and restrictions on the supply of dogs commenced on 26 May 2017 under the *Animal Management (Cats and Dogs) Act 2008* (Qld.) which was amended in 2016. This will enable lifetime traceability of a dog to the breeder by imposing registration obligations, regulating dog supply and sharing information about dog breeders between agencies responsible for animal welfare. As of 19 December 2017, more than 11 000 dog breeders had registered on the new Queensland Dog Breeder Register.

The *Exhibited Animals Act 2015* (Qld.) continues to be implemented across the industry. Over 100 exhibitors have been licensed under the new Act. Animal welfare is a key exhibition risk that must be managed, and licence applicants are required to develop a management plan identifying the exhibition risks for each species or group of animals being exhibited. Guidelines and supporting information are available to assist applicants with submitting management plans. The legislation supports world-class wildlife experiences for tourists and the community in Queensland.

Australian animal welfare standards and guidelines for cattle and sheep are being progressed for adoption into legislation to support improved animal welfare outcomes for these species in Queensland.

11.1.6 South Australia

Several amendments were made to the *Animal Welfare Regulations 2012* (SA) in 2017:

- The nationally agreed standards for the welfare of sheep and cattle have been regulated and came into effect in April 2017.
- The *South Australian standards and guidelines for breeding and trading companion animals* was regulated and came into effect in August 2017.
- The prohibition on the use of electronic collars was amended to allow their use in research protocols if approved by an animal ethics committee. This came into effect in December 2017 (a total prohibition on their use for other purposes was retained).
- The regulations were amended to allow interstate animal ethics committees to provide their annual report to the chief executive of the department responsible for the *Animal Welfare Act 1985* (SA), in the same form that is provided to their governing institution or jurisdictional government, as a measure to reduce 'red tape'.

The process of developing regional response plans to underpin the state wildlife response plan for oil spills has commenced.

In 2017, there have been restructures and realignments within the South Australian Health portfolio, including changes in university structures and development of new university research and teaching facilities and infrastructures. Over the past few years, the South Australian Health and Medical Research Institute has been established, and research and teaching institutions have entered deeds of access with their collaborators. These changes have resulted in new arrangements for the administration of the use of animals for research and teaching. To date, these arrangements have been effective and cooperative, with no impacts on animals.

11.1.7 Tasmania

The *Animal Welfare (Dogs) Regulations 2016* (Tas.) commenced on 1 January 2017. These regulations help ensure the welfare of all dogs in Tasmania,

161 www.agrifutures.com.au/wp-content/uploads/publications/17-003.pdf

and include extra provisions for commercial establishments such as breeding facilities and boarding kennels.

The Animal Welfare Advisory Committee (Tasmania) approved the *Australian animal welfare standards and guidelines* for sheep and for cattle, with minor amendments to reflect the Tasmanian situation. The standards component of these documents will now be made into enforceable regulations under the *Animal Welfare Act 1993* (Tas.).

The formal agreement between the Royal Society for the Prevention of Cruelty to Animals (RSPCA) Tasmania and the Tasmanian Government has been renegotiated and renewed for a further year. This agreement outlines the responsibilities of each organisation in relation to animal welfare cases. RSPCA Tasmania continues to be the first point of contact for animal welfare complaints, and the Department of Primary Industries, Parks, Water and Environment leads investigations relating to commercial livestock.

11.1.8 Victoria

In October 2017, the Victorian Government announced the formation of Animal Welfare Victoria, a new public sector body, to consolidate public sector animal welfare policy, research, education and compliance. RSPCA Victoria and local governments will continue to play an important role in Victoria's animal welfare system.

The Victorian Government is now developing the Animal Welfare Action Plan, in close consultation with key stakeholders including the Victorian community, after releasing a draft plan in September 2016. It sets out proposals for future legislative reform, collaboration, education, and compliance and enforcement. It recognises the sentience of animals and will be the first governmental plan to improve animal welfare in Victoria.

Victoria published the *Farmed bird welfare science review* in October 2017.[162] The report was compiled by the University of Bristol and examined contemporary scientific evidence on the care, management and slaughter practices for farmed poultry, game birds and ratites. It was independently peer-reviewed by Australian and New Zealand animal welfare scientists and will help inform Victoria's policy development.

Victoria's intensive dog breeding (puppy farm) and pet shop industries are being reformed to achieve improved welfare standards for cats and dogs.

A public consultation on the draft *Code of practice for the keeping of racing greyhounds* received almost 1300 submissions. The Victorian Government is revising the code and working to finalise it by the end of 2017.

In May 2017, Victoria ran Exercise IRIS which tested the *Victorian emergency animal welfare plan* for multiple fire scenarios. The exercise showed how well the arrangements worked with key partners at a state level and, as a result, similar support for local governments during emergencies is being developed.

Victoria continued to tightly regulate the use of animals in research and teaching, introducing initiatives to support benchmarking and drive continuous improvement in animal welfare.

11.1.9 Western Australia

On 1 July 2017, the former Department of Agriculture and Food was amalgamated with the Department of Regional Development and the Department of Fisheries to form the Department of Primary Industries and Regional Development (DPIRD). DPIRD is the department that is assisting the Minister for Agriculture and Food in the administration of the *Animal Welfare Act 2002* (WA).

In 2015, the then Minister for Agriculture and Food appointed an independent panel to review and report on the investment in and administration of the Animal Welfare Act in Western Australia. The final report made 19 recommendations, all of which were supported by the Western Australia Government. DPIRD is in the process of implementing these recommendations, which include the development of an animal welfare strategic plan and policy framework, a review of the Animal Welfare Act and a new framework for inspector governance.

As an interim step, amendments to the Animal Welfare Act are being considered by the Western Australia Government. These amendments provide

162 agriculture.vic.gov.au/agriculture/animal-health-and-welfare/animal-welfare/farmed-bird-welfare-science-review

heads of power for regulations to implement the national animal welfare standards and guidelines for livestock that have been endorsed by agriculture ministers nationally.

DPIRD has convened a Companion Animal Welfare Advisory Group to address a current gap in companion animal policy, including the development of standards and guidelines for the health and welfare of dogs in Western Australia.

In a separate body of work, DPIRD is developing a plan for the coordination of animal welfare in emergencies, as part of Western Australia's Emergency Management Framework. This plan will address roles and responsibilities for the welfare of companion animals, livestock and wildlife during an emergency such as a bushfire or flood.

11.2 Industry updates

11.2.1 Australian Alpaca Association

The Australian Alpaca Association (AAA) is the premier membership organisation and stud register for the Australian alpaca industry. With about 200 000 registered alpacas, and a national herd close to 400 000, the industry is now well established as part of the Australian agricultural scene. The industry has now made the transition from one initially based on the breeding of stud and show stock, to enterprises ranging from hobby farmers through to large-scale commercial breeders, producing breeding stock, fibre and, increasingly, meat.

Recent research related to alpaca welfare

Two projects, co-funded by AAA and RIRDC (now AgriFutures Australia), have been completed or were underway during 2017.

The first, recently completed, was conducted at the University of Western Australia, and reviewed possible castration methods for use in alpacas. This research explored different methods for analgesia to investigate possible alternatives to surgical castration under full sedation.

The second study, conducted at the University of Melbourne, will be completed in April 2018 and investigates internal parasite burdens, suitable anthelmintics and dosage rates to control gastrointestinal nematodes in alpacas.

11.2.2 Australian Chicken Meat Federation

The Australian Chicken Meat Federation (ACMF) is the industry's peak body representing chicken farmers and chicken meat processing companies. The ACMF represents the industry at the national level in matters relating to 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.

Over the past year, the ACMF has been actively engaged with governments and other stakeholders in the development of poultry welfare standards and guidelines. It is expected that this process will conclude next year, with the standards to be implemented in jurisdictional legislation. The ACMF will work closely with industry participants over the coming years to ensure that they understand their responsibilities with respect to the new standards, and also to encourage the adoption of enhanced welfare practices through the voluntary adoption of the endorsed guidelines.

Most chickens produced in Australia today are grown on farms that are accredited under the RSPCA Approved Farming Scheme. RSPCA staff assess compliance with scheme standards. The ACMF has actively engaged with the RSPCA over the past year in the review of these standards. Close to 70% of all chickens produced in Australia are accredited under this program.

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. Approximately 18% of chickens in Australia are accredited under this program. In many cases, farms are accredited under both the RSPCA and FREPA programs.

Chicken meat processing companies are also required to meet the welfare standards of 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.

11.2.3 Australian Dairy Industry Council

The Australian Dairy Industry Council (ADIC) is the peak body representing dairy farmers and dairy processors, with membership made up of the Australian Dairy Farmers and the Australian Dairy Products Federation. The industry is also supported by Dairy Australia, the industry service body, providing support services across the dairy supply-chain.

Through the Australian Dairy Industry Sustainability Framework, the Dairy Promise – to provide nutritious food for a healthier world – commits the industry to 'strive for health, welfare and best care for all our animals throughout their lives'.

Animal health and welfare goals for 2020 are set out in the Framework:

- all of industry complying with legislated animal welfare standards
- all of industry adopting relevant recommended industry practices, including:
    - limiting the use of routine calving induction
    - ceasing tail docking
    - not disbudding calves before two months of age
    - having a lameness strategy
    - having infrastructure to keep cows cool during heat
- feeding bobby calves within six hours before transport.

Key actions to support these commitments include:

- investing in research, development and extension (RD&E) programs that address disease and illness
- helping industry identify, prioritise and respond positively to key welfare issues
- supporting farmers to adopt recommended animal welfare practices
- building confidence in animal husbandry practices and welfare outcomes.

The dairy industry monitors and publicly reports progress on these commitments. To gather data on animal health and welfare performance, the industry has conducted an animal husbandry survey since 2005, to be undertaken every two years.

In the 2016 survey, significant improvements were evident from the situation of the previous survey, conducted in 2014. There has been a reduction in the proportion of farms using routine calving induction and the proportion of farms tail docking. There has been an increase in the proportion of farms using professional disbudding and dehorning services and monitoring and caring for 'down cows'. There has been less use of antibiotics in sale calves and increased use of captive bolts for calf euthanasia.

As part of the Australian Dairy Industry Sustainability Framework, ADIC is currently developing a new mechanism to monitor animal health and welfare practices on all dairy farms for the industry-agreed goals and targets.

11.2.4 Australian Duck Meat Association

The Australian Duck Meat Association (ADMA) was formed by the industry in 2008 as a representative body for the duck industry, providing policy advice and support to the industry in matters relating to biosecurity and animal welfare, and in future research and development activities.

Key achievements in duck welfare by ADMA in 2017 include the following:

- A systematic analysis of welfare issues in the sector identified the most important issues as surface water and behavioural repertoire, crusty eyes and nostrils, duck handling for depopulation, and bill trimming to prevent serious feather picking.
- A paper was prepared on 'Surface Water for Commercial Duck Production' for the Animal Welfare Task Group (AWTG) in the preparation of the *Australian animal welfare standards and guidelines for poultry* undertaken by Animal Health Australia (AHA) and the AWTG.

Image credit: Animal Health Australia

- An alternative technology (misting) was negotiated for wet-preening of ducks. This provides a mechanism to improve the behavioural repertoire without compromising health outcomes and egg hygiene.
- The industry developed auditable industry animal welfare standards for all steps in the duck meat production process and many companies integrate the standards into their in-house quality assurance (QA) systems.
- QA monitoring for plumage condition, eyes and nostrils will be adopted to ensure that wet-preening and litter management is effective in eliminating these concerns from commercial production.
- ADMA 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 i.e. the *Australian animal welfare standards and guidelines for poultry* for incorporation into state legislation. ADMA has been a supporter of this process to see the best outcome for ducks, based on scientific evidence and welfare best practice.

11.2.5 Australian Eggs Limited

Australian Eggs Limited is the industry services body for the egg industry, providing RD&E and marketing services for the benefit of Australian egg farmers and other stakeholders. Egg Farmers of Australia, the national representative body for Australian egg farmers, works with its members to promote continuous improvement in all aspects of egg farming.

Australian Eggs Limited has undertaken significant change over the last 12 months, with a rebrand from Australian Egg Corporation Limited to Australian Eggs, changes to the board of directors and management, an overhaul of the industry's QA program and a new five-year strategic plan.

Animal welfare is a key focus area of the new Strategic Plan 2017–21, as egg farmers recognise that good hen welfare is critical to running an efficient and sustainable egg-farming business.

Key achievements in hen welfare in 2017 include the following:

- A new QA program for the egg industry was introduced, Egg Standards of Australia (ESA), which replaced the previous scheme, Egg Corp Assured (ECA). ESA provides greater clarity and a more robust set of compliance standards for rearing and layer farms to meet the needs of regulators, retailers, farmers and egg buyers in areas such as hen welfare and egg quality. In October 2017, there were 59 businesses, comprising 167 farm sites, registered with ESA/ECA, representing the vast majority of the national flock.

- A total of 36 farm workers completed their Certificate III in Poultry Production – the egg industry's flagship training program covering the full scope of egg farm operations from bird health and welfare to workplace safety.
- A total of 27 farm workers completed the EggStart induction program for new employees in the industry. Topics covered include hen welfare, food safety and biosecurity procedures.
- *Managing fowl behaviour – a best practice guide to help manage feather pecking and cannibalism in pullet, layer and breeder flocks* was published and launched. The book aims to be the most up-to-date reflection of international best practice and is contextualised for Australian farmers. As part of the launch, workshops run by the authors were held in every state and farmers with hens representing over half of the national flock attended.
- There was continued participation in the National Primary Industries Animal Welfare RD&E Framework, which aims to deliver better industry outcomes from animal welfare RD&E and to provide a platform for identification and delivery of RD&E where there is common interest across sectors.
- Results of a University of Queensland project into dietary strategies to reduce the incidence of feather pecking, funded by Australian Eggs, was published. The research showed that differences between individual hens in relation to their appetite for feathers and specific nutrients is key to preventing feather-pecking behaviour.
- Australian Eggs Limited participated in the Stakeholder Advisory Group for the review of *Australian animal welfare standards and guidelines for poultry*, including providing egg industry information to the review process.

11.2.6 Australian Live Exports Council

Australia's livestock exports were worth $1.427 billion in 2016–17, with 2.8 million head, mostly cattle and sheep, exported. The volumes, in particular cattle (and dairy) were significantly reduced from the previous year. However, independent analysis of the industry shows that the live trade continues to generate employment for up to 10 000 Australians each year.

In 2016–17, the livestock export industry service provider LiveCorp, in consultation with the Australian Live Exports Council and our exporter members, has driven a program of research into animal welfare and supply chain efficiency. This program has continued to deliver innovative and world-class projects recognised by international agencies such as the OIE for its contribution to global animal welfare.

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, 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 those related to animal health and welfare. Most LEP expenditure is committed to animal welfare initiatives and related RD&E programs.

Four LEP in-market programs provided training to 1029 people in areas which included animal health and welfare, low stress animal handling, slaughter theory and technique, and stunner use and maintenance. Since the implementation of ESCAS in 2011, the LEP in-market programs have delivered training to more than 11 856 participants.

LiveCorp facilitated the Australian Accredited Veterinarians (AAV) consultation workshop in December 2016 with significant engagement and interest from the AAV community. With participation from a total of 49 AAVs from across the country and supply chain, technical issues relating to preparation and loading, on-board management and the AAV accreditation program were discussed.

LiveCorp also sponsored a detailed control and traceability study specifically for Vietnam, to respond to publicised, in-market, animal welfare incidents in 2016.

In July, exporters welcomed confirmation that the Australian Government will conduct a formal review of the *Australian standards for the export of livestock*. These standards govern the handling of animals in Australia's livestock export supply chain from selection on-farm through to pre-export

preparation, quarantine and transport to the point of discharge in the importing country.

The Livestock Global Assurance Program (LGAP) research project was enhanced through the sector's facilitation of a red meat cross-sector LGAP Implementation Steering Committee, and its reported findings were mostly adopted within an industry resolution in November 2017, supporting LGAP's introduction (see Section 2.2.7).

During early 2018, the livestock export sector will establish a company to deliver a range of services under ESCAS, regulated by government, while undertaking further research into its final form. The proposed future introduction of LGAP will further enhance already world-leading animal welfare practices and outcomes for livestock transported overseas, while improving industry efficiency and sustainable activity in its primary markets.

The financing of LGAP has been an important consideration, but was provided significant Commonwealth support in the 2017 Federal Budget. A sum of $8.3 million will be provided over four years on the basis that industry formally endorses LGAP in line with certain Government requirements.

11.2.7 Australian Lot Feeders' Association

The Australian Lot Feeders' Association (ALFA) is the peak national body for the grain-fed cattle feedlot industry. The core attribute of the Australian cattle feedlot industry is its systems, including the National Feedlot Accreditation Scheme (NFAS). In addition to this, the cattle feedlot industry has comprehensive training and focused research and development specifically to improve animal welfare on feedlots.

ALFA recognises the importance of animal health and welfare in a governance setting, and has a dedicated Animal Health and Welfare Committee which meets regularly and interacts with and informs the research and development funding, which is through MLA. This has been achieved through several avenues, including the following:

- The National Feedlot Animal Health Program provides feedlots with access to evidence-based infection-prevention and control measures, and ensures that when animal health treatments are required, they are used appropriately and prudently.
- ALFA has improved the industry's understanding and management of seasonal heat stress, cattle acclimation, wet pen and dag management, backgrounding and objective measures of animal welfare.

ALFA has an expertise-led, professional network of Australian and international feedlot veterinarians and nutritionists. The network meets to discuss animal health and welfare trends in the industry and to identify research and development opportunities. Network members also often provide informal workshops and training, with practical information on best-practice management of animal health and welfare on feedlots. In 2018, ALFA will deliver a third 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.

Through prestigious annual awards, the industry recognises feedlot excellence in areas such as animal welfare, thus 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 2017, ALFA's industry conference, SmartBeef, held in Armidale, conducted another successful 'Communicate Your Research' competition promoting scientific professionalism for the advancement of communication between tertiary institutions and the Australian feedlot industry. This provided tertiary students with the opportunity to share their research with the industry, with outstanding results, which augurs well for the future of animal health and welfare.

ALFA's dedicated Technical Services Officer continues 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. Supported by MLA and consulting with AHA, the Technical Services Officer visited over 300 feedlots to provide advice and support to numerous others on feedlot matters, including animal health, welfare and biosecurity.

11.2.8 Australian Meat Industry Council

The Australian Meat Industry Council (AMIC) is the peak body representing Australia's cattle, sheep and goat processors, smallgoods manufacturers and meat retailers. The red-meat processing sector has a responsibility to ensure that all livestock under its care are treated humanely and in as pain-free and stress-free an environment as practical.

AMIC's processor members recognise that animal welfare is of paramount importance to the sector, for community acceptance of the industry, workplace health and safety, competitive advantage in export markets, and the eating quality of red meat.

The Animal Welfare Policy Position of AMIC was updated in 2017 as follows:

- AMIC members place considerable importance on, and are committed to, animal welfare systems underpinned by legislation
- AMIC supports the *Australian standard for the hygienic production and transportation of meat and meat products for human consumption*, which incorporates processing standards for ritual slaughter, but also supports a review of that Standard to ensure it meets industry expectations.

AMIC has also engaged with the state jurisdictions in the development of the *Australian animal welfare standards and guidelines for the welfare of livestock at processing establishments*, which is expected to be released for public consultation in early 2018.

AMIC developed the *Industry animal welfare standards at livestock processing establishments: preparing meat for human consumption*, which were incorporated into the Australian Animal Welfare Certification System in 2013 and are independently audited by AUSMEAT. The Standards have had significant uptake since then, and in 2016, over 85% of Australian cattle, 65% of lambs, 48% of sheep and 58% of goats were processed in establishments accredited under this system.

11.2.9 Australian Pork Limited

Australian Pork Limited (APL) is the national representative body for Australian pork producers. APL is a producer-owned, not-for-profit company combining marketing, export development, research and innovation and policy development to assist in securing a profitable and sustainable future for the Australian pork industry.

The Australian pork industry employs more than 36 000 people in Australia and contributes approximately $5.2 billion in gross domestic product to the Australian economy.

The industry places great emphasis on the welfare of pigs, with animal welfare policies and initiatives underpinned by strong investment in animal welfare research and development. Animal welfare is a key module in the Australian Pork Industry Quality Assurance Program (APIQ✓®). The APIQ✓®

Image credit: Taryn Mokotupu

program covers 90% of the sow herd and therefore production. Each year APIQ✓®-accredited producers are independently audited against all the APIQ✓® standards and performance indicators, including those in the animal welfare module.

One of the greatest examples of the Australian pork industry's commitment to continuous improvement in animal welfare was the decision to phase out gestation stalls. In 2010, the Australian pork industry agreed to voluntarily phase out gestation stalls by 2017 from five days after mating until one week before sows are due to farrow. Today, four out of five sows are loose-housed in accordance with the voluntary decision undertaken by industry in 2010.

The requirement for a maximum six-week confinement of sows in sow or gestation stalls became mandatory, according to the *Model code of practice for the welfare of animals: pigs*, in 2017. APL reminded producers of this mandatory requirement, which had to be complied with by April 2017 for all states, except New South Wales, which had a compliance date of July 2017.

Agriculture ministers endorsed the *Model code of practice for the welfare of animals: pigs* over 10 years ago. Consequently, the Australian pork industry asked APL to facilitate a review of the Model Code, including its revision into the *Australian animal welfare standards and guidelines for pigs*. In preparation, APL has consulted the Australian, state and territory governments and key stakeholder groups, including pork producers, state farming and pork organisations, the RSPCA and Animals Australia. The AWTG has endorsed the business plan, which outlines the review process, including the terms of reference for a science review. This science review is currently underway and will be the primary input into the Model Code review, which is now likely to commence in the 2018–19 financial year.

11.2.10 Cattle Council of Australia

The *Australian animal welfare standards and guidelines for cattle* were endorsed by the Australian Government in 2016. Cattle sectors of Australia continue to await widespread state and territory government adoption of these standards and guidelines.

In the meantime, Cattle Council of Australia:

- is developing, with MLA, a training and accreditation course for lay spayers using the Dropped Ovary Technique (accreditation will be mandatory under the new laws for all spaying by non-veterinarians)
- supported the inclusion from 1 October 2017 of an animal-welfare module into the accreditation process for producers choosing to use the Livestock Production Assurance (LPA) system.

There are currently approximately 218 500 LPA-registered property identification codes. For the codes to remain registered beyond their expiry dates, the owners of the codes are required to conduct online training in the elements of LPA (including on-farm biosecurity and welfare) and pay a small triennial fee (see Section 2.2.8). The newly incorporated welfare module draws heavily on the *Australian animal welfare standards and guidelines* for cattle and sheep being made law. Therefore states and territories yet to incorporate these standards into their legislation or regulations are being urged to do so.

In an exciting development for the livestock sector, MLA's Donor Company Board has endorsed the assessment and contracting of projects within a strategic partnership for animal welfare. A commitment of up to $7 million per year for five years has been given by partner organisations, which comprise the Commonwealth Scientific and Industrial Research Organisation (Armidale), Animal Welfare Science Centre (University of Melbourne and South Australian Research and Development Institute), Agriculture Victoria, Queensland Alliance for Food and Agricultural Innovation, Charles Sturt University, University of Western Australia, University of Sydney, University of Adelaide and New South Wales Department of Primary Industries.

11.2.11 Equestrian Australia Limited

Equestrian Australia (EA) is the peak governing body for equestrian sports in Australia, encompassing eight disciplines, in each state, from introductory to Olympic and Paralympic-level riding.

Horse welfare is paramount, and 'For the Love of the Horse' is the primary driver, central to the organisation's responsible management and care of horses. EA's vision and six key priorities in the

Equestrian Australia Strategic Plan 2017–2020 are each connected to this core value.

As well as adhering to the Fédération Equestre Internationale *Code of conduct for the welfare of the horse*, EA aspires to enable the welfare of every horse, and has implemented several initiatives over the past year, including:

- the Making Eventing Safer program; a $250 000 investment in research and development to reduce the risk of injury to riders and horses
- a National Safety Officer to review existing safety and risk-management practices and policies, and recommend and implement safety initiatives to improve horse welfare and standards
- roll-out of frangible devices for cross-country courses at all EA events
- a 'think tank' for Australia's top course designers, to help ensure cross-country courses meet world safety standards for prevention of horse falls.
- implementation of policies and procedures that can be accessed on the horse welfare section of the EA website.

11.2.12 Goat Industry Council of Australia

The Goat Industry Council of Australia (GICA) works with government and industry bodies, producers and other peak industry councils to develop collective goat industry policy for all breeds.

Welfare of livestock is important during all stages of goat production from birth to slaughter, and affects productivity, profitability and sustainability of the goat and broader livestock industries. Good animal welfare practices are an integral part of a property management plan.

GICA and AHA have developed the *Australian industry welfare standards and guidelines for goats*. The industry standards and guidelines apply to all goat farming enterprises in Australia, from extensive rangelands to intensively managed systems and individually owned goats. The industry standards and guidelines are a voluntary tool that facilitates industry uptake of best-practice animal welfare, improves production and maintains market access.

In addition, GICA oversees the investment of industry levies in animal welfare research conducted by MLA, to provide tools and knowledge to producers to help them improve the wellbeing of their goats and address issues of community concern.

11.2.13 Harness Racing Australia

Harness Racing Australia (HRA) is the peak body for the regulation of harness racing in Australia as well as being the keeper of the Standardbred Studbook (the registry for breed information).

In January 2017, HRA recruited an Equine Welfare Manager to develop several critical reports with strategies and recommendations which will further the strong welfare focus of the harness racing industry. The following key projects were undertaken in 2017:

- The whip has long been contentious in racing and HRA has been focused on reforming requirements for the use of whips. Further rule changes are being finalised in 2017 which will restrict whip use to a flicking motion only, with a long-term aim of completely phasing out the use of whips as a performance enhancing tool (but retaining their use for safety).
- An official deregistration procedure and accompanying rules were enacted, and an 'information drive' was conducted to gain a better understanding of horse numbers and reasons for leaving the racing industry. There was very strong response rate from industry, and HRA updated details of more than 21 000 horses and produced a detailed Deregistration Statistics, Analysis and Recommendations report. Report highlights included the fact that almost 80% of all retired standardbreds have a life after racing.
- Microchipping became compulsory for all standardbreds born on or after 1 September 2017, to allow increased biosecurity, traceability and data integrity functions. This brings the industry in line with a number of other peak equestrian bodies.
- A new welfare-focused website[163] was launched to better educate the public about the harness racing industry and the measures in place to

163 www.thereisnofinishline.com.au

ensure best-practice equine welfare. It includes transparent, accurate statistics on drug use and testing, racing incidents and injuries, life after racing, and breeding statistics.

11.2.14 Racing Australia

Racing Australia has continued to expand and flourish, with an increased focus on key objectives such as integrity, jockey safety and animal welfare.

The harmonisation of medication policies and strategies, the administration of the Australian Rules of Racing and the Australian Stud Book Rules, jockey safety, horse welfare and retirement, whole-of-life traceability of a thoroughbred, and the contractual relationship between trainers and owners have all been successfully managed and implemented in the past year.

Foal Ownership Declarations, particularly, continue to strengthen ownership transparency and traceability, as well as further improving integrity and animal welfare across the thoroughbred industry. The introduction of data collection on the retirement of racehorses revealed that 92% found homes: 68% entered equestrian programs and 20% were transferred to the breeding industry.

In May 2017, the Australian Government agreed to match the breeding industry's proposed contribution to a new industry research and development levy. Along with contributions from Racing Australia, this will provide up to $2.4 million over the next four years for research and development into the key areas of disease control, horse welfare, reproduction and fertility improvements, and injury prevention.

The levy commenced on 1 September 2017 and the research will be undertaken by AgriFutures Australia (previously known as the Rural Industries Research & Development Corporation), who will be directed in their research by a thoroughbred research and development advisory panel.

Racing Australia continues to allocate funds for research and development directly associated with thoroughbreds. The Research and Development Grant Assessment Panel reviews submissions and recommends projects to the Racing Australia Board, with criteria requiring research to be innovative, have clear hypotheses and methodology, and produce tangible outcomes for the health, welfare and performance of the thoroughbred in Australia.

The following projects have been approved by the Racing Australia Board:

- detection of gene doping in thoroughbred racehorses
- tools for reducing injury and breakdown in training and racing
- detection of anabolic steroids in equine hair
- exercise-induced pulmonary haemorrhage
- exertional heat illness.

11.2.15 Sheep Producers Australia

In 2017, Sheepmeat Council of Australia was rebranded as Sheep Producers Australia. Sheep Producers Australia saw an increase in activity to meet the goals of the Sheep Industry Strategic Plan (SISP) 2015–2020. The SISP has several themes, the first of which is 'the wellbeing of the animals within our care'. Focus has increased on reducing losses in the national flock and methods to increase marking rates while reducing ewe mortality.

Sheep Producers Australia has funded and helped deliver workshops that assist producers in meeting the new LPA requirements, which now include bio-security and animal welfare modules. The objective is to encourage producers to examine their current methods to mitigate pest and disease risk, and examine if this can be improved, along with ensuring that producers and their staff are aware of the animal health issues and requirements.

The LPA modules complement industry efforts to continue the testing of industry readiness for an emergency disease outbreak, with improved traceability allowing Australia's international trading partners to have confidence in the integrity of the supply chain for lamb and sheepmeat. Other benefits from integrating industry information is in helping producers gain improved feedback from the National Sheep Health Monitoring Program (in place with abattoirs), with the advent of the Livestock Data Link.

Sheep Producers Australia continues to represent the industry on numerous health and welfare working groups. These range from overseeing monitoring programs to helping research groups investigating the effectiveness of vaccines or pain relief products. The industry is continually updating best-practice guides to ensure producers are aware

of scientific and industry case studies that show improved health and welfare outcomes, which can boost on-farm productivity.

The annual industry investment of $7.6 million into Sheep Producers Australia is estimated to deliver a net increase in industry income of $148 million by 2020 ($760 million by 2030). The SISP shows the 11 key themes the industry is focused on to achieve a return on investment of over 4:1 by 2020 and over 9:1 by 2030.

11.2.16 WoolProducers Australia

WoolProducers Australia is the national peak industry body representing and promoting the needs of Australia's wool growers. Membership covers the industry's commercial, superfine and stud breeding sectors.

Animal health and welfare are key components of the work done on behalf of growers, including ongoing improvement while supporting productivity and profitability. WoolProducers is the wool-growing member of AHA, and carries a significant responsibility for decision making on behalf of the industry, including the oversight of the wool industry health and welfare levy collected and administered by AHA.

Key initiatives undertaken by WoolProducers in 2016–17 include:

- funding of the Sheep Cooperative Research Centre wellness program for development and delivery of wellness parameters for on-farm use that will enable growers to improve flock health and welfare
- support for the National Wild Dog Action Plan via the stakeholder consultative group
- a workshop to identify potential welfare issues and risk-mitigation strategies for the industry
- development of a combined sheep industry emergency animal disease (EAD) response plan to replace the individual sheep meat and wool response plans that prescribed two separate 'emergency roundtables' for the sheep and wool industries; these new combined roundtables should be more effective for solving access problems between the sheep meat and wool industries in an EAD, welfare or market
- continuation of the WoolProducers' board Health and Welfare Advisory Committee with representation from the Australian Wool Growers Association, Australian Association of Stud Merino Breeders, Australian Superfine Wool Growers Association, Livestock Contractors Association and Australian Veterinary Association to ensure representation and input across the entire wool industry in the expenditure of the health and welfare levy collected and administered by AHA
- continuation of support for the Sheep Health Project, enabling growers to improve on-farm management of biosecurity, health and welfare and improve preparedness for an EAD
- support for the roll-out of the Livestock Data Link to provide feedback from the National Sheep Health Monitoring Project directly to growers
- development of a biosecurity strategy to benefit sheep producers and wool growers
- representation of the Australian perspective in the International Wool Textile Organisation welfare specifications
- representation of Australian growers in the International Wool Textile Organisation on the Biosecurity Working Group, Sustainable Practices Working Group and the Grower Forum (WoolProducers provides the chair and secretariat to the Growers Forum)
- raising awareness on key health, welfare and biosecurity issues through increased media presence.

In Australia, the sheep blowfly (*Lucilia cuprina*) presents a unique set of challenges to wool growers. On behalf of wool growers, the industry research and development 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.

11.2.17 Zoo and Aquarium Association

The Zoo and Aquarium Association (ZAA) is the region's peak body for zoos and aquaria, encompassing facilities in Australia, New Zealand and Papua New Guinea. ZAA's animal welfare ethos is articulated in its Animal Welfare Position Statement and is aligned with the Australian Animal

Welfare Strategy.[164] The Association manages an accreditation program to validate and promote 'positive welfare' in its 90-plus members. All ZAA member organisations need to achieve and maintain accreditation as a requirement of their membership, and this must be updated every three years.

The accreditation program employs a contemporary understanding of animal welfare, using the 'five-domains model'[165] for welfare assessment, which incorporates an assessment tool that identifies the conditions an animal lives with. Key to the program is a self-assessment component requiring 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 a common 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 in which negative welfare is merely minimised.

The ZAA accreditation program has been presented at international forums, and interest in the program has been received from other regional associations and animal care facilities. This interest is a strong indicator of the robustness and standing of the program.

In 2017, ZAA reviewed and refined the accreditation program to enable integration of knowledge gained from the last accreditation cycle of 90 facilities, in which 744 individual animals of 2441 different species were assessed for positive welfare. The auditing framework has been strengthened through improved articulation, expanded briefing materials and refined practical application and assessment. With a view to supporting its members' commitment to continuous improvement, the updated program applies an iterative process to enable advances in animal welfare science and understanding to be incorporated into the program. A pilot study of the improved program, Accreditation 2020, has been implemented, with a targeted roll out in 2018.

164 www.zooaquarium.org.au/index.php/position-statements

165 Mellor DJ, NJ Beausoleil. Extending the 'Five Domains' model for animal welfare assessment to incorporate positive welfare states. *Animal Welfare* 2015; 24.3: 241-253.

11.3 Australian animal welfare standards and guidelines

Australian animal welfare standards and guidelines for several different animal industries are being developed, under the supervision of the AWTG (see section 1.1.1). The standards are minimum standards, which state and territory governments can adopt in their animal welfare legislation to create consistent enforceable standards across jurisdictions. The standards are accompanied by guidelines, which set out consistent expectations and additional guidance for people working in animal industries. The guidelines can also be used by industry bodies to create QA or verification schemes. The standards and guidelines update and replace existing model codes for the welfare of particular species.

In 2017, the AWTG continued to oversee the development and implementation of *Australian animal welfare standards and guidelines* for exhibited animals, poultry, livestock at processing establishments and livestock at saleyards and depots.[166]

11.3.1 Australian animal welfare standards and guidelines for exhibited animals

The proposed *Australian animal welfare standards and guidelines for exhibited animals* will create improved, 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 in 2017. The final draft standards and guidelines are ready to be considered by governments for endorsement.

166 www.animalwelfarestandards.net.au

11.3.2 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. The standards and guidelines manage animal welfare risks such as 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.

11.3.3 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 are intended to update and replace existing model codes of practice for the welfare of poultry, including slaughter. The proposed standards and guidelines cover all aspects of the welfare of poultry reared or bred in captivity, including layer chickens, broilers, ducks, turkeys, geese, pheasants, guinea fowl, ostriches, emus, partridge, quail and pigeons.

The New South Wales Government continued to coordinate the project in 2017. The draft standards and guidelines continued to be developed in consultation with stakeholders from industry, animal welfare organisations and agriculture regulators.

Relevant stakeholders and the wider community were given the opportunity to comment on the draft standards and guidelines documents in a public consultation period commencing in November 2017.

11.3.4 Australian animal welfare standards and guidelines for livestock at processing establishments

The proposed *Australian animal welfare standards and guidelines for livestock at processing establishments* have been drafted to create improved, nationally consistent rules for Australian establishments that undertake commercial processing of livestock. They will complement Part 7 of the current Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption (AS 4696: 2007).

The New South Wales Government continued to coordinate the project. The draft standards and

Image credit: iStock

guidelines continue to be developed in consultation with stakeholders from industry, animal welfare organisations, and regulators from food safety and agriculture sectors.

11.4 International animal welfare

11.4.1 World Organisation for Animal Health

Since May 2005, the World Assembly of the OIE, representing the 181 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.

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).

The OIE Collaborating Centre is not currently undertaking any joint projects, but continues to meet regularly to discuss projects of common interest, particularly in the Asian region.

11.4.2 Regional Animal Welfare Strategy: Asia, the Far East and Oceania

The OIE Regional Animal Welfare Strategy (RAWS) Advisory Group met via teleconference three times during 2017. 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. Australia is represented in this group.

Key issues the Advisory Group dealt with in 2017 included:

- review and update, as necessary, of the group's terms of reference and modus operandi
- ongoing review of the RAWS Action Plan
- a package of materials and resources to better support new OIE National Focal Points for Animal Welfare in the region
- review and stocktake of animal welfare training resources available in the region.

Image credit: Nick Harris

12

REGIONAL ANIMAL HEALTH INITIATIVES

This chapter summarises Australia's main areas of international engagement in terrestrial animal health in the Asia–Pacific and African regions. Information on aquatic animal health initiatives is provided in Chapter 7.

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 early warning of and preparedness for important animal pests and diseases, including zoonoses. Aid and research activities are primarily resourced through the Australian Government Department of Foreign Affairs and Trade (DFAT)[167] and the Australian Centre for International Agricultural Research (ACIAR)[168] and aim to improve livelihoods in partner countries.

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

167 dfat.gov.au/aid

168 aciar.gov.au

overarching international and regional strategies ensures that projects address animal health issues and requirements that are important for collaborating countries, Australia and the region.

12.1 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.

Dr Schipp, along with other Australian experts, participated in the 30th conference of the Regional Commission for Asia, the Far East and Oceania which was held in Putrajaya, Malaysia, on 20–24 November 2017. Progress on the Regional Workplan Framework 2016–2020 was reported. The framework, adopted in 2015, aligns with the OIE 6th Strategic Plan and focuses on key activities for the region.

12.2 Pre-border surveillance and capacity building

12.2.1 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).

In 2017, joint animal health surveys took place in the:

- North Fly District, Western Province, PNG
- East and West New Britain Provinces, PNG and
- Baucau Municipality, 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 Department of Agriculture and Water Resources also funded the following activities through the **Agricultural Competiveness White Paper**:

- an animal health survey of south coast villages of the South Fly District, Western Province, PNG
- desk-top exercises to test rabies-response plans in PNG and Timor-Leste
- establishment of a sentinel cattle herd in Timor-Leste and continuation of the PNG herd to provide early warning for significant animal diseases
- support for the PNG response to the detection of pigs with antibodies to Aujeszky's disease
- training for data kit use in PNG and Timor-Leste to improve data collection and quality from surveillance activities
- core biosecurity and surveillance knowledge training for animal health staff in PNG and Timor-Leste
- animal health surveys delivered by PNG NAQIA and Timor-Leste MAF
- animal sample testing at the Timor-Leste Veterinary Diagnostic Laboratory.

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.

12.3 Overseas aid

The Indo-Pacific region includes recognised hotspots for emerging infectious diseases, 75% of which originate in animals. Many countries also have weak human and animal health systems, rendering the region vulnerable to rapidly spreading

and dangerous emerging infectious diseases. A major disease outbreak would have severe health and economic implications for Australia, our neighbours and trading partners, potentially costing lives and disrupting regional trade, tourism and development.

In June 2016, the Australian Government made a pre-election policy commitment to invest in regional health security. DFAT's Indo-Pacific Centre for Health Security in Australia is delivering on this commitment under the $300 million Indo-Pacific Health Security Initiative (the Initiative) announced by the Foreign Minister on 8 October 2017.

The Initiative aims to safeguard Australian and regional interests by decreasing health security risks and contributing to strengthened human and animal health systems. This is to prevent and contain outbreaks of existing and emerging infectious diseases which have epidemic potential, and drug resistant strains of these diseases.

This approach builds on Australia's Health for Development Strategy 2015–2020, which emphasises the role of strong health systems, innovative research and regional collaboration and linkages in improving health security. The Initiative will address 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. It also fits well with Australia's Aid Policy (promoting prosperity, reducing poverty and enhancing stability) in building an aid program that effectively promotes economic growth, reduces poverty and protects Australia's interests in the Indo-Pacific region. DFAT's diplomatic, trade and aid functions and overseas aid investments will be used to achieve these strategic goals.

Australia participates in several international forums with active agendas relating to antimicrobial resistance (AMR). AMR is a key international health security priority for human and animal health, for the G20 group, WHO and the OIE. Australia is also engaged in the United States-initiated Global Health Security Agenda as a contributing country to the action package on AMR. See Chapter 9 for a description of Australia's status for and approach to AMR.

Australia is continuing to make 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 – a 'one health' approach.

12.3.1 Stop Transboundary Animal Diseases and Zoonoses initiative

The Australian Government-funded Stop Transboundary Animal Diseases and Zoonoses (STANDZ) initiative in southeast Asia concluded in December 2017. It was a six-year program

Image credit: Nick Harris

implemented by the OIE to reduce the impact of emerging infectious diseases (EIDs), transboundary animal diseases and zoonoses on food security, human health and livelihoods. STANDZ supported 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.

STANDZ funding supported the following activities in 2017:

- post-vaccination monitoring of cattle vaccinated against FMD in campaign regions in central Myanmar and northern Lao People's Democratic Republic (PDR)
- studies on the incursion of exotic FMD virus strains into the southeast Asian region, the socio-economic impacts (including gender issues) of FMD vaccination in northern and central Lao PDR and cost–benefit analysis of maintaining FMD freedom in Indonesia
- technical support for countries in the region to revise their FMD-control plans to align with the South East Asia and China Foot and Mouth Disease (SEACFMD) Roadmap 2016–20
- support for mass dog vaccination campaigns against rabies in Cambodia, Myanmar and the Philippines, and development of national strategic plans for rabies elimination in Myanmar and the Philippines
- monitoring and evaluation missions in Cambodia, Lao PDR, Myanmar, Vietnam and the Philippines to gather evidence on the impact of the STANDZ program.

Sustainability and resource mobilisation outcomes were also reported, including increased funding contributions to the SEACFMD campaign (from China), investments in FMD control in Lao PDR and Myanmar (from New Zealand) and improved veterinary service capacity in the region. STANDZ will further document end-of-program achievements in final reporting, expected end March 2018.

In 2017, the STANDZ investment was also recognised in Australia's Office of Development Effectiveness (ODE) evaluation.[169] Key findings include:

- A key regional disease control model (SEACFMD campaign) was established for FMD in southeast Asia, reporting and sharing FMD surveillance data and raising the profile of veterinary services, as well as providing a potential foundation for control of other zoonotic diseases.
- The regional FMD approach of strengthening veterinary systems and outbreak investigations was adapted as a basis for animal disease-control strategies, such as for avian influenza and rabies, for the Association of Southeast Asian Nations.
- STANDZ was highlighted by the ODE as a good practice example on how to address gender issues. The initiative's gender analysis, research and organisational policy were highlighted, although linking improved conceptual understanding with gender outcomes remains a work in progress.

12.3.2 Community-based emerging infectious disease risk-reduction in the Mekong

Australia, through a partnership with the United States Agency for International Development, 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

169 Office of Development Effectiveness. Evaluating a decade of Australia's efforts to combat pandemics and emerging infectious diseases in Asia and the Pacific 2006–2015: are health systems stronger? Canberra: Department of Foreign Affairs and Trade, 2017.

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 funding supported the following activities in 2017:

- Target country risk-management strategies since early 2017, to inform national country activity plans, were reviewed. Supporting stakeholders are to target risk-based surveillance activities at country and cross-border levels, including identification of critical virus transmission points and risk mitigation measures.
- LAMP activities were officially launched (in June) at a regional workshop attended by diverse stakeholders, including industry experts, departments of livestock, development partners and private sector and civil society representatives including women's groups.
- Country activity work plans were finalised for implementation in Cambodia, Lao PDR, Myanmar and Vietnam, in-country 'kick-off' workshops held throughout the second half of 2017, supported by implementation agreements with key government partners and stakeholders.
- Regional Field Epidemiology Training Program for Veterinarians workshops were held on value chain analysis for animal disease risk management (in September, expert consultations were held; in November, pilot testing of training materials and field exercises was conducted).

LAMP interventions will further contribute to regional coordination, particularly when disease situations are no longer manageable or when outbreaks involve more than one country.

12.3.3 Australia–Indonesia Partnership for Emerging Infectious Diseases

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 funded by DFAT and implemented by the Australian Government Department of Agriculture and Water Resources in partnership with the Indonesian Ministry of Agriculture.

The AIP-EID Phase 1 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 contributor to economic development.

The AIP-EID Phase 2 is a smaller program than Phase 1 and is scheduled to close on 30 June 2018. 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 systems
- improvements to Indonesia's 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 AIP-EID Phase 2 in the past 12 months has completed the following activities:

- facilitated the establishment of an Emergency Management Working Group to oversee coordination activities between Indonesian government agencies and other stakeholders for preparing for emergency disease incidents
- provided technical input into a range of animal disease policy documents, operational procedure documents and guideline documentation
- distributed the Indonesian Emergency Management Manual for animal diseases and facilitated its uptake by the Government of Indonesia at federal, provincial and district levels
- led a review into emergency funding arrangements for supporting emergency disease incidents

- supported incident command system training to agencies responsible for managing emergency disease events, to improve cross-agency coordination and align systems
- provided technical input and training as part of preparations for the National Pandemic Influenza Simulation Exercise in September 2017, for testing and identifying gaps in the Indonesia's current emergency management systems
- assisted in the extension of iSIKHNAS by developing new training modules for improving the effectiveness of Indonesian extension officers
- supported a range of technical, functionality and infrastructure enhancements to iSIKHNAS
- developed reporting templates and a new web-based application within iSIKHNAS to be used in animal health and production monitoring
- led detailed epidemiological analysis of iSIKHNAS data and subsequent development of communication materials for the Indonesian Ministry of Agriculture, to support policy making and strategic planning for disease surveillance and control programs
- commenced the development of a new information management system for veterinary laboratories that is integrated with iSIKHNAS
- delivered the Indonesian Veterinary Leadership (IVL) course to three separate cohorts of Indonesian government animal health officers, including a cohort of officers responsible for iSIKHNAS coordination at the provincial and regional level
- supported the delivery of an IVL 'train the trainer' course to a new cohort of master trainers
- supported the delivery of separate training packages to program managers and vaccinator teams working in the rabies control and eradication program in Bali
- supported a review into anthrax and brucellosis control programs in South Sulawesi.

The ODE's independent evaluation of Australia's past support for combating pandemics and emerging infectious diseases at a regional level in Asia and the Pacific noted that the best result from efforts to strengthen animal health surveillance was in Indonesia. The ODE report found the surveillance model, developed through the AIP-EID animal health program 'iSIKHNAS' had achieved impressive engagement with farmers and strong ownership by all levels of the veterinary service in the pilot areas.

12.3.4 Government Partnerships for Development Program

The DFAT-funded Government Partnerships for Development program funded the Timor-Leste Village Poultry Health and Biosecurity Program, which finished in August 2017. This was 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 aimed 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. The project also assisted in cold-chain management and activities to strengthen current biosecurity arrangements in Timor-Leste, with a focus on poultry disease risks.

Achievements included:

- delivery of seven Newcastle disease vaccination campaigns in each pilot village, and technical support for the delivery of poultry vaccination campaigns 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, risk analysis and operational training, which has led to development of a training program for the National Directorate for Quarantine and Biosecurity of MAF.

12.4 International animal health research

Australia funds international animal health research through several agencies, including ACIAR and DFAT. Since 1982, ACIAR has supported research for development in animal health and production systems through partnerships with many countries in the Asia–Pacific and Africa regions. Research projects of varying lengths of time are funded to meet the priorities of partner countries and Australia in order to have the widest possible impact. ACIAR's livestock projects research questions relevant to the various livestock production systems and services in partner countries, with findings scaled out through broader development programs. These programs are implemented by partners including DFAT, the Australian Government Department of Agriculture and Water Resources and other international organisations such as the FAO and OIE.

12.4.1 ACIAR livestock systems program

ACIAR's livestock systems program supports research organisations in Australia and partner countries to use multi-disciplinary approaches to solve problems in animal production and health in the Asia–Pacific and African regions. Progress and final reports of projects are published on the ACIAR website[170] and via social media and other platforms.

12.4.2 Indonesia and Timor-Leste

Important animal diseases in Indonesia include anthrax, HPAI, brucellosis, classical swine fever and rabies. Research is currently being undertaken to support livestock production systems to manage animal disease through several projects including:

- improved livelihoods of smallholder beef producers in Indonesia and Timor-Leste
- disease control in smallholder pig systems in Timor-Leste.

12.4.3 Mekong region and the Philippines

Diseases of livestock have a major impact on household income in the Mekong region, and trade in cattle and pigs is increasingly important. Current ACIAR projects involve research on:

- best-practice husbandry and village-level biosecurity of cattle and buffalo in Lao PDR and Cambodia
- improving livelihoods by developing pig-based enterprises in upland Vietnam
- improved food safety along smallholder pork value chains in Vietnam
- improved pig health and husbandry in the Philippines .

New cattle and small ruminant projects are being developed to follow on from a recently completed project that enhanced the management, nutrition and health of small ruminants, cattle and village poultry in Myanmar's Central Dry Zone. The project will explore the technical constraints and opportunities for smallholder cattle and small ruminant producers in the Central Dry Zone to adapt improved animal health and production practices.

12.4.4 Papua New Guinea and Pacific island countries

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. Projects focused on small ruminants are also being undertaken in Fiji and Samoa, and a new bee biosecurity project will start in 2018, with a focus on PNG, Fiji and the Solomon Islands.

12.4.5 Eastern and southern Africa

A project in Tanzania and Zambia 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.

In South Africa, a new project aims to enhance the competitiveness of smallholder cattle producers. It will examine the various constraints on smallholder livestock producers, and explore how livestock-related marketing systems can be improved.

170 www.aciar.gov.au

Image credit: CSIRO

13

RESEARCH AND DEVELOPMENT

The Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Cooperative Research Centres (CRCs), Australia's veterinary schools, and industry-based research and development corporations have active research programs in animal health and welfare.

13.1 National Animal Biosecurity Research, Development and Extension Strategy

Good biosecurity practices are essential to protect Australia's livestock sector to maintain good animal health and welfare, minimise risks to human health and to safeguard market access. 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. Biosecurity research, development and extension (RD&E) play an important role in underpinning productivity, growth, competitiveness and sustainability of Australia's livestock industries and their access to markets.

The National Primary Industries RD&E Framework aims to promote greater collaboration and continuous improvement in investment spread on primary industries' RD&E resources nationally. The Framework is being implemented through 14 sectoral and seven cross-sectoral strategies, with one of the cross-sectoral strategies addressing animal biosecurity.

The first version of the National Animal Biosecurity RD&E Strategy was published by Animal Health Australia (AHA) in 2014. Although originally intended to be a five-year strategic plan, changes in the operating environment led to a review of the strategy in 2017, resulting in the development of a new five-year strategy (2017–2022).

The revised Strategy reflects significant stakeholder consultation, as well as the published RD&E priorities of the National Biosecurity Committee, the Australian Government's Science and Research Priorities (2015), the **Agricultural Competitiveness White Paper** (2015), the review of the Intergovernmental Agreement on Biosecurity and the strategic plans of the livestock industries.

The Strategy vision is 'World-leading cross-sectoral biosecurity RD&E through collaboration and efficient use of resources, further improving Australia's high animal health status, productivity and ongoing market access'.

The short to medium-term goals of the Strategy are:

- greater cooperation, collaboration and co-investment
- greater coordination and reduced duplication
- informed RD&E decisions and investments.

The long-term, end-of-program goals of the Strategy are:

- national biosecurity RD&E priorities addressed
- efficient use of RD&E resources and capabilities.

The Strategy will continue to be managed by AHA on behalf of its stakeholders, who include the Australian, state and territory governments; CSIRO; rural research and development corporations; industry; and the university sector. The Strategy establishes the future direction for improving the focus, efficiency and effectiveness of RD&E in supporting biosecurity in Australia's livestock industries over the next five years.

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13.2 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 the strategy and cross-sectoral research projects. The steering committee comprises 19 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:

- *Livestock animal welfare RD&E: capability and gaps analysis*: a capability and gaps analysis of primary industries animal welfare RD&E in Australia
- *Novel markers of pain in animals*: a comprehensive literature review focusing on advances in the measurement of pain in animals and humans.

On 23 November 2017, the 7th National Animal Welfare RD&E Strategy Forum was held at the University of Melbourne. 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 especially to discuss

established and emerging practical techniques to assess animal welfare across the supply chain.

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13.3 CSIRO Australian Animal Health Laboratory and CSIRO Health and Biosecurity

The CSIRO Australian Animal Health Laboratory (AAHL) facility is a vital part of Australia's biosecurity infrastructure, helping to protect multi-billion dollar livestock and aquaculture industries, and the general public from emerging infectious disease threats and to ensure the competitiveness of our agriculture and trade. AAHL works closely with veterinary and human health agencies globally. CSIRO's expertise extends across the disease and science spectrum, from pathogenesis and epidemiology to virus characterisation and test development.

As a national facility operating to benefit the nation, 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.

As a World Organisation for Animal Health (OIE)-designated reference laboratory for several aquatic and terrestrial diseases, AAHL is called on to provide confirmatory and follow-up testing on diagnoses from southeast Asia and beyond. In 2017, AAHL has worked with Nepal, Myanmar, Laos and the Philippines on avian influenza and with Honduras, Vietnam, New Zealand and various countries of the Pacific Community on a range of viral and bacterial diseases affecting finfish and crustaceans.

Scientists based at AAHL this year published significant research results about host immune responses to African swine fever (ASF) virus in pigs, in the journal *Nature: Scientific Reports*. The study identified a set of common genetic responses to ASF virus in pigs, providing insight into how the immune system responds to infection and how it influences the replication of the virus in the host. Next steps are to target these common genetic responses as the basis for vaccine development and additional diagnostic tests, ensuring we are prepared in the event of emergency animal disease outbreaks.

In 2016, a project 'Improved surveillance, preparedness and return to trade for emergency animal disease incursions using FMD as a model' commenced. Several stakeholder meetings with jurisdictions and industry have been held to encourage their involvement and ensure the project outputs will be relevant. The project is governed by a committee with partners from CSIRO, Meat & Livestock Australia (MLA), DAWR, AHA and Charles Sturt University (see Section 6.5.1).

Other work conducted at AAHL includes research into trade-sensitive animal diseases such as bluetongue disease and diagnosis of diseases of aquatic animals (finfish, molluscs and crustaceans) with an emphasis on exotic and newly emerging diseases.

In late November 2016, white spot syndrome virus was confirmed on a commercial prawn farm in Queensland. Until this time, Australia was one of the few countries in the world with a prawn farming industry that had remained free of the disease. During December 2016, AAHL received an all-time monthly high of over 1000 submissions and 21 000 samples for testing. The AAHL team showed their ability to respond quickly and maintain their capacity for testing for this outbreak and all the other diagnostic submissions received in the same period. AAHL continued to receive suspected white spot disease sample submissions, conducting a further 22 700 tests in support of ongoing surveillance activities. AAHL also provided policy and technical advice throughout the outbreak, and the test results suggest that the disease-control activities have been effective in containing the virus and preventing further spread.

CSIRO scientists at AAHL received endorsement as an OIE Collaborating Centre for Diagnostic Test Validation Science in the Asia–Pacific Region, along with partners from the University of Melbourne and Massey University in New Zealand. AAHL continues to maintain its status as both a Collaborating Centre for Laboratory Capacity Building and for New and Emerging Diseases.

AAHL receives funding from CSIRO, the Australian Government Department of Agriculture and Water Resources, National Research Infrastructure for Australia and external funding bodies.

The Animal Behaviour and Welfare Team within CSIRO Agriculture and Food is also part of a trans-Tasman OIE Collaborating Centre for Animal Welfare Science and Bioethical Analysis. Our agriculture and food scientists have expertise in assessment of animal welfare, parasite burdens of livestock, and resilience and immune competence of livestock, and they are researching the development of a blowfly vaccine.

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13.4 Elizabeth Macarthur Agricultural Institute

The Virology Laboratory at the Elizabeth Macarthur Agricultural Institute (EMAI) is undertaking a range of research projects to develop improved diagnostic tests. This includes the development and evaluation of real-time polymerase chain reaction (PCR) assays to detect caprine arthritis–encephalitis virus in milk and blood of goats, and enzyme-linked immunosorbent assays for the detection of antibodies in milk. Multiplex real-time PCR assays are also being developed to allow the direct detection of bluetongue virus serotypes in the blood of infected animals without the need for culture. Research is being conducted to develop a new vaccine to protect rabbits from infection with recently discovered strains of rabbit haemorrhagic disease virus, and defined genetic lines of Pacific oysters are being screened in an experimental challenge model to determine resistance to infection with oyster herpesvirus 1. This will support the selection of oyster breeding stock that is resistant to disease caused by ostreid herpes virus 1 microvariant. In 2015, there was an outbreak of disease in an endangered population of freshwater snapping turtles. A high mortality rate has reduced the population to below viable levels for long-term survival in the wild. Transmission studies are being undertaken to assess the susceptibility of other freshwater turtle species to the novel virus that was detected during the outbreak, and epidemiological studies are being conducted in adjacent river systems to establish the distribution of the virus.

Research projects undertaken in the EMAI Microbiology and Parasitology section have been developed using partnerships aligning expertise to improve our understanding of diseases that continue to affect production or pose a biosecurity threat. In the area of pig health, these projects include swine erysipelas, diagnostics, epidemiology and control strategies for enteric and respiratory diseases, antimicrobial resistance and alternatives to antibiotics for the control of enteric disease. Another project underway is molecular typing of emerging pathogens such as *Klebsiella pneumoniae*. Current bovine health projects are focused on bovine respiratory disease, Johne's disease, venereal campylobacteriosis and genomic epidemiology and transmission routes of bovine theileriosis. Researchers are also currently investigating chlamydial arthritis, ovine brucellosis, fly strike, lice and molecular diagnostics for diagnosis of footrot in sheep.

EMAI is also involved in projects with a One Health component, including Q fever caused by *Coxiella burnetti*, and an investigation of the prevalence of equine abortion caused by *Chlamydia psittaci*. Both pathogens are zoonotic and pose a significant risk to field veterinarians and farm workers. The research team is also involved in several projects relevant to aquatic animal health, including developing prediction tools for oyster disease outbreaks, developing new diagnostic tools for *Perkinsus* spp. and examining the role of the microbiome in yellowtail kingfish health.

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Image credit: Emily Onizawa

13.5 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. CEBRA invests considerable effort in projects for animal biosecurity, three of which are described below.

Decision support tools for vector (insect)-spread animal diseases

A key component of managing emergency animal disease (EAD) incursions, and minimising their economic impact, is timely and effective decision making in the face of uncertainty. Arboviral diseases such as bluetongue pose significant challenges due to the involvement of insect vectors that are free-ranging and strongly influenced by weather and landscape factors. Bluetongue is an economically important, trade sensitive disease of ruminants. Using bluetongue as a case study, this project will modify an existing foot-and-mouth disease (FMD) simulation model to enable it to be used to study the spread and control of vector-borne diseases. The project will also provide some initial analyses of spatial spread and management approaches for controlling clinical bluetongue disease outbreaks. Having a good understanding of the rate and extent of spread of vector-borne diseases, as well as the capacity to test control strategies, will help the Department of Agriculture and Water Resources improve planning, policy development and response for these diseases.

Post-outbreak management to support trade

After an outbreak of FMD, surveillance will be required to demonstrate that infection has been eradicated from the population and enable any remaining movement restrictions to be lifted within the country. Proof of freedom will also be needed to satisfy trading partners and regain access to international markets.

Vaccination is increasingly recognised as an important tool to assist in containing and eradicating FMD outbreaks, but its use makes achieving disease-free status more difficult. There is also currently no agreed approach to post-outbreak management of vaccinated animals in the Australian Veterinary Emergency Plan (AUSVETPLAN). This project will consider the use of vaccination in achieving recognition of FMD-free status. It will bring together epidemiological and economic expertise from the Department of Agriculture and Water Resources, the Australian National University, and CEBRA to formally explore

and establish a science-based, cost-effective approach to regaining FMD-free status after an FMD outbreak as quickly as possible. The project will expand the Department of Agriculture and Water Resources' modelling capability as well as providing insights into post-outbreak FMD management and contribute to Australia's FMD preparedness.

Optimisation of national resources for animal disease surveillance

There is growing recognition by Australia's national and jurisdictional governments and agricultural industries that Australia needs to strengthen its surveillance arrangements to be able to mitigate biosecurity threats while continuing to facilitate and enhance trade. Resources for surveillance are finite and therefore need to be allocated optimally. The Intergovernmental Agreement on Biosecurity promotes a risk-based approach to biosecurity, that is, prioritising the allocation of resources to the areas of greatest return. This project aims to provide a mechanism that enables a rational, consistent, optimal allocation of national resources for terrestrial animal disease surveillance.

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13.6 Cooperative Research Centres

13.6.1 Cooperative Research Centre for High Integrity Australian Pork

The Cooperative Research Centre 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 *Streptococcus 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 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*, *B. hyodysenteriae* and *Strep. suis*. Alternative strategies and technologies for reducing the impact of disease on animal health and performance have also been developed. These include anti-inflammatories, genuine alternatives to antibiotics for weaner pigs and a range of dietary strategies and technologies. More recently, investment has been in understanding the impact of antibiotics and alternative strategies on the gut microbiome and antimicrobial resistance.

Pork CRC also invests in animal welfare research through Program 1 (Reduced Confinement of Sows and Piglets). Research has included improving the welfare and performance of sows housed in groups in gestation and innovations in farrowing and lactation systems.

Pork CRC research projects funded between 2011 and 2017 are detailed on the Pork CRC website.

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13.6.2 Poultry Hub Australia

Poultry Hub Australia is the successor body to the Poultry CRC, which finished up on 30 June 2017. Poultry Hub Australia has been established at the University of New England and will ensure that the effective collaborative network, information-rich

website, and other legacies of the Poultry CRC can continue to benefit the entire poultry industry.

Poultry Hub Australia's main goal is to focus on current challenges identified by the Industry. These will be addressed through the following three objectives;

- sharing knowledge: generate new ideas and knowledge, through investing in research, that will be disseminated to industry; targeted workshops and training will also facilitate knowledge sharing
- building capacity: support industry internships and promote the poultry industry in schools and universities to build industry capacity for the future
- creating connections: provide opportunities for industry and researchers to connect through the annual Ideas Exchange conference, PoultryGrad and facilitated workshops, to develop ideas for future projects.

Poultry Hub Australia is a not-for-profit organisation that strives to serve all poultry species in both the meat and egg industries. Information about Poultry Hub Australia's progress is available from the Poultry Hub website and by subscribing to the eChook newsletter.

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13.6.3 Sheep Cooperative Research Centre

The major challenge of the Sheep CRC is to continue the transformation of the Australian sheep industry through the use of cutting edge research, to enhance sheep wellbeing, introduce value-based trading of sheep meat and deliver affordable technologies for DNA-based genetic improvement.

Effective management of major risks to the wellbeing of sheep and the inputs for profitable production relies on anticipating future events and accounting for the interconnected nature of different aspects of the grazing system. The challenges of accurate forecasting and taking into account the interacting components of the grazing system can be greatly assisted by computer analysis.

Endemic diseases including neonatal mortality, internal parasites, dystocia, weaner ill-thrift and mortality, and flystrike, cost the Australian sheep industry more than $1.5 billion a year as a result of production loss, costs of prevention and costs of treatment. Effective management of these health challenges relies on prediction and early detection in order to implement preventative actions and timely treatment.

The Sheep CRC's Research Program 1 (Enhanced sheep wellbeing and productivity) uses technology and information to improve wellbeing and production. The program has two components; new technologies for monitoring wellbeing and the development of a predictive modelling tool.

In 2017, the Sheep CRC focused on the development of ASKBILL, a web-based app that uses a predictive analytical technology tool to assist with the proactive management of animals. ASKBILL has the capacity to collect and collate a wide range of information, including farm data, weather and industry knowledge. The app draws on information generated by biophysical models and includes a daily download of climate data to provide long-range (90-day) forecasts to inform:

- the amount and quality of pasture across a whole farm or for specific areas of interest
- live weight and body condition score for each stock class within the sheep flock
- the level of risk from worms and sheep blowfly
- the risk from extreme cold and heat.

The models have also been designed to provide estimates of:

- stocking rates to manage pasture targets
- supplementary feeding rates to reach live weight and body condition score targets
- changes in the risk of worm infection and fly strike following treatments.

The app will enable producers to set management plans based on forecasts of pasture availability, animal performance and disease risks as well as being able to proactively manage risks before flock wellbeing and productivity is compromised. ASKBILL has been developed by the Sheep CRC and its participants in collaboration with the Data to Decisions CRC, with major contributions from the Bureau of Meteorology and the University of New

England. The app is scheduled for release in early 2018.

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13.7 University research programs

13.7.1 Charles Sturt University

Charles Sturt University (CSU) 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, for example, in Pakistan, India, Indonesia, Papua New Guinea, Fiji and China. These linkages allow the School to offer a breadth of exciting PhD training opportunities to Australian and international students.

The Graham Centre for Agricultural Innovation is one of CSU's four research centres and is an alliance between CSU and the New South Wales Department of Primary Industries, established in 2005 to strengthen the capacity of these organisations to undertake industry-relevant research and development. The Centre is focused on delivering solutions for crop and livestock systems, across value chains.

Academic staff at the School of Animal and Veterinary Sciences have research interests in animal health in a range of species and disciplines, and many are active members of the Graham Centre. Research within the School focuses on five research clusters:

- epidemiology, public health and biosecurity
- animal health and disease diagnosis
- farming systems
- translational and clinical sciences
- 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 on the CSU 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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13.7.2 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: veterinary tropical diseases and food biosecurity, animal production, fertility in adverse environments, tropical rangeland ecosystems and aquatic animal health and disease. The Discipline of Veterinary Science is actively involved in high-quality research in these areas and is rated above world standard by the Australian Research Council (ARC) with a consistent Excellence in Research for Australia (ERA) rating of 4 out of 5.

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 and in nearby tropical regions. Current work involves established infectious diseases (e.g. Johne's disease and leptospirosis), emerging infectious diseases (e.g. Hendra virus, flaviviruses, chytridiomycosis and bovine ureaplasmosis), wildlife health surveillance and small mammal population declines. Other relevant areas of investigation, with an emphasis on the tropics, include:

- targeted syndromic animal health surveillance
- 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
- health, welfare and behaviour of companion animals
- legumes to enhance livestock production within tropical pasture-based grazing systems.

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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13.7.3 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.

The College of Veterinary Medicine oversees a laboratory dedicated to research in the animal and human health theme. This includes mechanisms, diagnosis and treatment of shock, coagulation disorders, sepsis and acute kidney injury in canine experimental and clinical models, and cardiopulmonary diseases of horses. Through collaboration with Royal Perth Hospital, there is extensive and ongoing research into mechanisms and treatment of orthopaedic diseases. This theme generates outputs relevant to both animal and human health.

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

13.7.4 University of Adelaide

Researchers in the School of Animal and Veterinary Sciences at the University of Adelaide undertake a diverse range of research in animal production and health, in addition to the allied One Health arena. The School provides an outstanding environment for research, with high-quality laboratory and animal housing infrastructure. Our goal is to produce industry-relevant outcomes that also address state government priorities relating to the livestock industries.

The School maintains close industry ties and has a range of campus co-location partners with whom research collaboration is commonplace. Partner organisations include the South Australian Research and Development Institute, Primary Industries and Regions SA, and the Pig and Poultry Production Institute. In the non-livestock area, the School is continuing to build partnerships with Zoos South Australia and Technical and Further Education (TAFE) South Australia.

Since 2012, the School has been a collaborative partner of the Animal Welfare Science Centre. This association has seen a growth in the School's involvement in welfare science, animal behaviour and animal–human interactions research across the full range of domestic species. A new centre, the Australian Centre for Antimicrobial Resistance Ecology, bolsters research in the newly emerging area of antibiotic resistance in animals, and will continue to monitor trends in development of 'superbugs' in both humans and animals. The School, alongside the other six Australian veterinary schools, is also part of an ARC-funded venture (VetCompass) to collate veterinary medical records in companion animals. This service will provide researchers the opportunity to reliably and cost-effectively source and analyse data on a range of diseases affecting companion animals.

In 2017, the research interests of the School were embedded in five departments, highlighting 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.

Within the animal and veterinary bioscience theme, there are research programs on animal behaviour, human–animal interactions and development of novel welfare assessment tools. Animal physiology research focuses on the gastrointestinal and reproductive systems. Nutrition themes also feature strongly. Infectious disease and public health research includes aquatic animal health and husbandry, virology of avian diseases, wildlife health, livestock parasitology and management of zoonotic diseases. Within the production animal health research theme, there is a strong emphasis on analysis of genetic and epigenetic factors that contribute to trait selection in livestock. Pig and poultry production research is also a strength in this theme, aligning with state priorities for research focus in these species. A range of clinical conditions and novel treatment strategies are investigated by the companion animal health and equine medicine research teams.

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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13.7.5 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 University 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
- new vaccines and approaches to control and diagnostic methods for infectious diseases
- genomics and genetics of viruses, prokaryotes, protists and parasitic worms

- the roles of the extracellular matrix in bone and joint pathology, and the role of protease-activated receptors in musculoskeletal development and inflammatory disease
- risk factors for, and mitigation against, catastrophic bone injury in horses
- understanding and manipulation of the plant, animal and soil microbiome
- new approaches to vaccination and assessing novel adjuvants
- 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
- epidemiology of mastitis in sheep and cattle
- pharmacology of vasoactive agents and the pathophysiology of laminitis
- wildlife disease surveillance.

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13.7.6 University of New England

The University of New England (UNE) is located in a region with strong sheep and beef grazing and feedlot production systems as well as poultry and horses. UNE does not have a Veterinary School but the Animal Science discipline is strong, with a long history of animal health-related research and teaching, primarily within a systems perspective. The university has a current ERA ranking of 5 (the maximum) in the Agricultural and Veterinary Sciences. The Animal Science discipline is located within the School of Environmental and Rural Science and has approximately 50 staff, with major research strengths in the areas of livestock genetics, ruminant and monogastric nutrition, abating carbon emissions from ruminants, international livestock development, animal product science and animal health and welfare. The group has nearby access to an extensive range of excellent facilities for intensive and grazing animal research. Interaction with industry and agencies such as the nearby CSIRO FD McMaster Laboratory is a hallmark, and the group has hosted multiple Collaborative Research Centres in the Beef, Sheep and Poultry industries.

Animal health and welfare are recognised as key components of integrated animal production systems and issues that constrain production and limit efficiency and sustainability of livestock production. UNE has increased investment in this area recently, with the appointment of several post-doctoral fellows and new staff. Key current areas of research include:

- disease modelling (epidemiology, economics, decision support)
- genetics of disease resistance and interactions with environment
- economics of disease and disease control
- managing gastrointestinal nematode infections in ruminants
- managing gastrointestinal disease in intensive and free-range poultry
- managing viral disease in poultry
- animal behaviour and welfare in a range of livestock production systems.

A strong integrating approach in our research is the use of intensive measurement and data in experimentation and management of agricultural systems. This provides better understanding and decision support for the improvement of productivity, animal health and environmental outcomes.

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13.7.7 University of Queensland

Animal health research at the University of Queensland (UQ) is conducted by staff in the School of Veterinary Science and in the Queensland Alliance for Agriculture and Food Innovation (QAAFI). The research includes projects on health and welfare of livestock, companion animals and wildlife species. The research also benefits human

health and wellbeing through projects on One Health and comparative medicine. 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.

Particular research interests and strengths of UQ staff include:

- antimicrobial and anti-parasitic drug resistance
- northern beef reproductive losses
- comparative oncology
- stem cell research
- health and production of livestock species in developing countries
- wildlife health, including diseases of koalas and sea turtles
- heat stress in broiler chickens
- equine upper respiratory dysfunction
- small animal and equine endocrinology
- animal welfare, including research in animal shelters and humane transport
- veterinary education
- bacterial diseases in the intensive livestock industries
- cattle tick vaccine.

The School is located at the Gatton campus, and QAAFI staff in the Centre for Animal Science are located at several sites across Queensland, including the UQ St Lucia campus. Excellent laboratory facilities and equipment are available at the UQ campuses and there is access to university dairy, piggery, poultry, equine and beef cattle facilities at the Gatton campus. The Queensland Animal Science Precinct is situated on the same campus and provides physical containment level 2 animal housing for research in small and large animals.

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13.7.8 University of Sydney

Research interests of the Sydney School of Veterinary Science, University of Sydney, span animal health, livestock production science, One Health and zoonoses, and wildlife research. The Faculty's partnerships include those with rural industry organisations, CSIRO and national and international government agriculture departments. These partnerships advance the reproduction, nutrition, genetics and health of Australia's livestock, and Australia's competitive trading status. Joint projects include those in areas such as aquaculture, wildlife health and conservation, poultry nutrition, semen sexing, Johne's disease 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 school 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
- antimicrobial resistance and stewardship
- biosecurity surveillance
- clinical pharmacology
- comparative oncology
- equine research
- farm animal health and welfare
- inherited disorders
- molecular and diagnostic parasitology and microbiology
- pathobiology
- small animal clinical research (strong expertise in infectious diseases and oncology)
- 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 production
- livestock genetics and genomics
- poultry production

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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13.8 Research and development corporations

The R&D corporations listed in this section invest in research by various service providers – CSIRO, universities, commercial research organisations, government departments and CRCs, but mostly do not undertake research themselves.

13.8.1 Australian Eggs Limited

Australian Eggs Limited is a public, unlisted company limited by guarantee and established under the *Egg Industry Service Provision Act 2002 (Cwlth)*. Australian Eggs integrates on-farm, through-chain and market service provision for the benefit of all stakeholders. Australian Eggs 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 losses 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 the industry's understanding of disease characteristics and developing vaccines that are readily available.

Australian Eggs invests directly with research institutions in projects and activities that affect the health of the laying flock, including:

- ensuring effective levels of on-farm biosecurity by understanding the barriers to effective engagement of medium sized producers and through the provision of biosecurity manuals and posters
- developing vaccines for the emerging disease, spotty liver
- continuing to supply up-to-date RD&E of food safety messaging on *Salmonella* management across the supply chain
- managing and enhancing rapid diagnosis of hen health problems and best management of hen production through evaluating dietary strategies and feed additives

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13.8.2 Australian Pork Limited

The pork industry assists in maintaining high welfare standards through the implementation of research recommendations that address the needs of the animals and are in keeping with the expectations of the community. Australian Pork Limited (APL) has invested over $2.2 million in welfare research alone to be at the forefront of innovative welfare science.

Key projects in APL's welfare R&D program include:

Welfare methodology

Being able to measure animal welfare allows assessment of the impacts of various production husbandry procedures. APL has commissioned several research projects to ensure that methods used to measure welfare are robust and scientifically based.

Welfare interventions

A new early intervention project is investigating whether there is a genetic component to tail biting in pigs. If a heritable component of being a victim of tail biting exists, this information would be useful in breeding programs to identify genetic

selection criteria that may result in a reduction in the incidence of tail biting.

Under the National Primary Industries Animal Welfare RD&E Framework (see Section 13.2), a review of novel pain biomarkers to measure pain in animals was conducted, and resulted in the identification of an extensive list of biomarkers. Development of multiple biomarkers to measure pain in pigs is a research priority for the Australian pork industry.

CO_2 stunning is the most common method of stunning for pigs in Australia. Outcomes of a national research project that investigated CO_2 stunning procedures are currently under review, with the aim of developing minimum operating procedures that safeguard animal welfare outcomes.

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, a computer-based training program that uses a cognitive–behavioural technique to change the attitudes of stock-people towards animals was developed in conjunction with industry. 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. ProHand Pigs and ProHand Pork Abattoir have also been released to industry.

Other areas in which APL funds a considerable amount of research is seasonal infertility and heat stress. In Australia, summer can be one of the most challenging times of the year for care of pigs, as the combination of heat and increased day-length create environmental conditions that can cause seasonal infertility, which results in higher rates of reproductive failure. Research into seasonal infertility in different genetic lines and in different housing situations (e.g. indoor versus outdoor housing) have been the focus of recent APL-funded research.

Any thermal stress that a pregnant animal suffers can negatively affect her offspring in utero and can have consequences throughout their life. Research into heat stress in utero and heat stress suffered by growing and finishing pigs, and research into ways to identify, prevent and alleviate heat stress in these animals is also currently being explored.

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13.8.3 Australian Wool Innovation Limited

The mission of Australian Wool Innovation Limited (AWI) is to invest in R&D, marketing and promotion to enhance the profitability, international competitiveness and sustainability of the Australian wool industry, and to increase the demand and market access for Australian wool.

Improvement of sheep health and welfare is a part of the current AWI Strategic Plan 2016–17 to 2018–19.

In 2017, AWI investments in research and development included:

- replacement and refinement of mulesing and other surgical husbandry procedures, including provision of pain relief
- internal and external parasite management in sheep, including genetics of blowfly parasitism, development of fly genome clustered regularly interspaced short palindromic repeats (CRISPR) technology, development of new chemicals for sheep blowfly control, a new method for conducting faecal egg counts, best-practice management of blowflies, worms and lice (ParaBoss)
- EAD preparedness, including review and revision of the AUSVETPLAN documents relating to wool, development of an EAD-preparedness training program and tools for the wool industry, completion of a prototype wool bale decontamination unit for use in an EAD outbreak
- improving fetal, lamb, weaner and ewe survival through feed supplementation, lambing paddock environment and development of remote sensors
- rabbit bio-control with rabbit haemorrhagic disease virus and remote imaging and recognition of predators for alerts to land managers.

In 2017, the National Wool Industry Emergency Animal Disease Preparedness RD&E Strategy 2016–17 to 2018–19 was finalised. It addresses the shorn wool pipeline from farm to market and aligns with the AWI Strategic Plan 2016–17, the National Wool RD&E Strategy 2016–20 and the National Animal Biosecurity RD&E Strategy.

The five-year AWI Breech Flystrike Strategy was updated for 2017–18 to 2021–22. It has five key pillars for AWI investment, including breeding and selection, breech modification alternatives, improved management practices, wool industry training and engagement and supply chain engagement.

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13.8.4 Dairy Australia Limited

Dairy Australia is the dairy industry's service company, and is committed to supporting improvements in animal health on Australian dairy farms. Healthy animals have better welfare and are essential for the profitability of dairy farms. Good health outcomes also help maintain the reputation of the industry and promote markets for our dairy products.

Dairy Australia invests in selected RD&E projects to provide information and training for dairy farmers and their advisers that address national animal health and welfare priorities identified by the dairy industry organisations and wider consultative forums. In 2017, Dairy Australia focused on several key animal health issues. DairyBio is applying genetic technologies and data analysis to improve the selection of animals that have superior production and fitness under Australian conditions. Guidelines for practical control of mycoplasma infections and bovine viral diarrhoea virus within dairy herd systems have been developed.

A second edition of the popular Rearing Healthy Calves manual was published, promoting recent advances in calf health management, preventive strategies for common health risks and responsible use of antibiotics. 'Cups on Cups off' courses held in all dairy regions have provided accredited training to over 600 farmers in milking practices aimed at preventing mastitis, the most important production disease of dairy cattle. A dairy farm biosecurity planning template has been developed, which will underpin a new online tool to be developed by Dairy Australia, in conjunction with Agriculture Victoria, in 2018.

Bobby calf welfare is a top priority, and the industry is working on developing alternative markets for male dairy calves. Along with MLA, the New South Wales Department of Primary Industries and Agriculture Victoria, Dairy Australia has recently supported Australian experts to engage with United States dairy beef supply chain advisers, producers and processors. Their insights will help inform the development of a larger scale Australian dairy beef supply chain and build local advisory expertise.

Dairy Australia is also investing in research through the University of Sydney on the remote sensing of lameness. This project aims to provide novel technology to accurately and autonomously detect dairy cow lameness in real time, using non-invasive, 3-D video images of locomotion and machine learning. A prototype system will be developed and validated on large numbers of cows within the Australian dairy industry's genetic information commercial herds.

The Healthy Hooves prevention manual, and field guide were developed, and the website launched to provide farmers with detailed advice on the prevention, detection, diagnosis and treatment of lameness in dairy herds.[171] An upgrade of the Cool Cows extension project is currently underway to provide farmers and their advisers with up-to-date resources to support heat stress mitigation strategies.

Accredited Euthanasia of Livestock courses were delivered in all dairy regions. Building farmer awareness and adoption of the *Australian animal welfare standards and guidelines for cattle* has been another high priority. Farmer-engagement activities have involved milk processors and Dairy Australia's Regional Development Programs, with communications delivered via media articles, webinars, discussion groups and workshops.

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171 healthyhooves.dairyaustralia.com.au

13.8.5 Live Export Program Research Development and Extension

Key priority project areas for the Livestock Export Program (LEP) RD&E program for 2016–17 were:

- identification of animal welfare indicators through the supply chain, and commencement of the pilot study of the respective indicators through the supply chain
- development of the 'Don't Forget BRD Preventative Practices When Preparing Cattle for Live Export' program, a bovine respiratory disease (BRD) roadmap
- development of the National Livestock Identification System (NLIS) standard operating procedures and work instructions for livestock exporters and approved live export quarantine premises operators
- the Australian livestock export industry competitiveness report.

The 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 in 2017 continued to be delivery of animal health and welfare improvements (76%), which represents a 5% increase in contribution compared to previous years. Supply chain efficiency and regulatory performance received 17% of the funding and the remaining 7% was allocated to market access research.

Development and assessment of livestock welfare indicators for the livestock industry

The aim of this project is to identify internationally accepted and currently used indicators of animal welfare for sheep, cattle and goats and to develop key animal welfare indicators relevant to each point along the livestock export supply chain. A pilot project has been approved for commencement in July 2017.

This project will pilot and record animal welfare indicators through the supply chain, and develop an industry dashboard for collecting data that will contribute towards benchmarking the industry. The welfare indicators to be used include measures based on resources, animals and management which have been identified from previous research as both important and practical.

Importantly, some new qualitative measures of welfare, based on observing animals' behaviour to determine how animals are coping at points in the export chain, will be captured, as well as physical measures of health and fitness. This project shows the industry's commitment to animal welfare and provides them with a platform to report and benchmark themselves, supporting their charter for continual improvement and increased transparency.

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13.8.6 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:

- 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)
- exploiting innate immunity and resilience to disease
- reproductive diseases of cattle and sheep
- sheep footrot (diagnosis and vaccination)
- 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 6.5.1), and transmissible spongiform encephalopathy freedom assurance.

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13.8.7 AgriFutures Australia

AgriFutures Australia, previously known as the Rural Industries Research and Development Corporation, works with industry and government to grow the long-term prosperity of Australian rural industries. There are four areas of AgriFutures Australia's research investment:

- people and leadership
- national challenges and opportunities
- growing profitability
- emerging industries.

Most projects relating to animal health fall within the following AgriFutures Australia programs of RD&E:

- chicken meat
- honey bee and pollination
- thoroughbred horses (including Hendra virus)
- emerging industries.

In 2017, a substantial number of reports from completed projects relating to animal health were published. These can be accessed on the AgriFutures Australia website.

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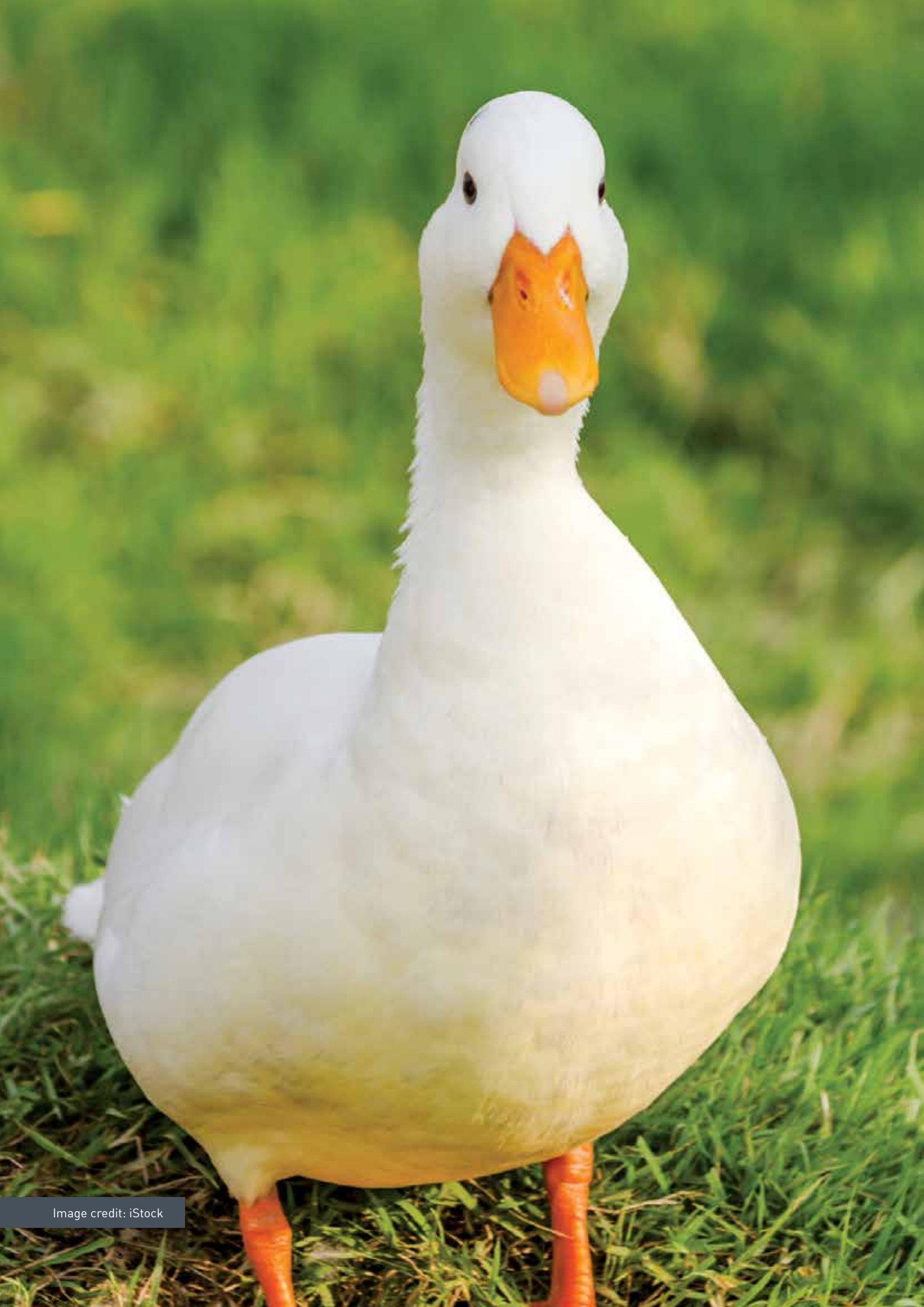


Image credit: iStock

APPENDICES

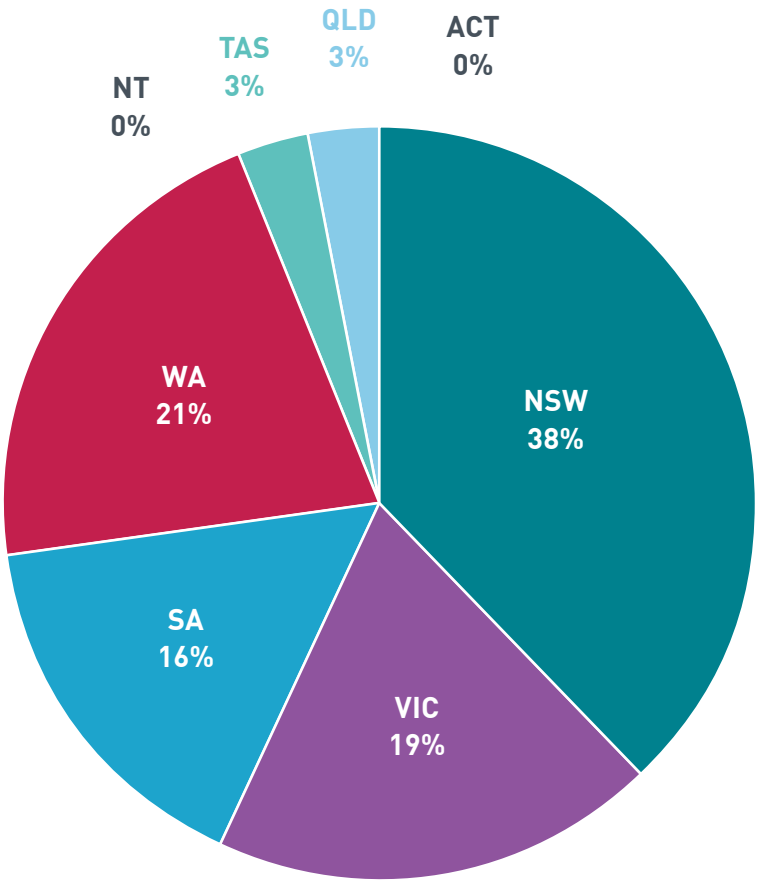
APPENDIX A
LIVESTOCK INDUSTRIES IN AUSTRALIA*

Table A1 Sheep and cattle numbers by state, 2015–16

	Unit	Qld	NSW	Vic	SA	WA	Tas	NT	ACT	National
Sheep	'000 head	1815	25 968	13 065	10 744	13 862	2044	-	45	67 543
Beef cattle	'000 head	10 390	4675	1819	914	1878	386	2238	6	22 306
Dairy cattle	'000 head	155	323	1665	135	125	263	-	-	2665

Source: Australian Bureau of Statistics.

Figure A1 Sheep flock by state, 2016–17



* All figures provided in the tables in this appendix are based on Australian financial years, which run from 1 July to 30 June.

Figure A2 Beef cattle herd by state, 2016–17

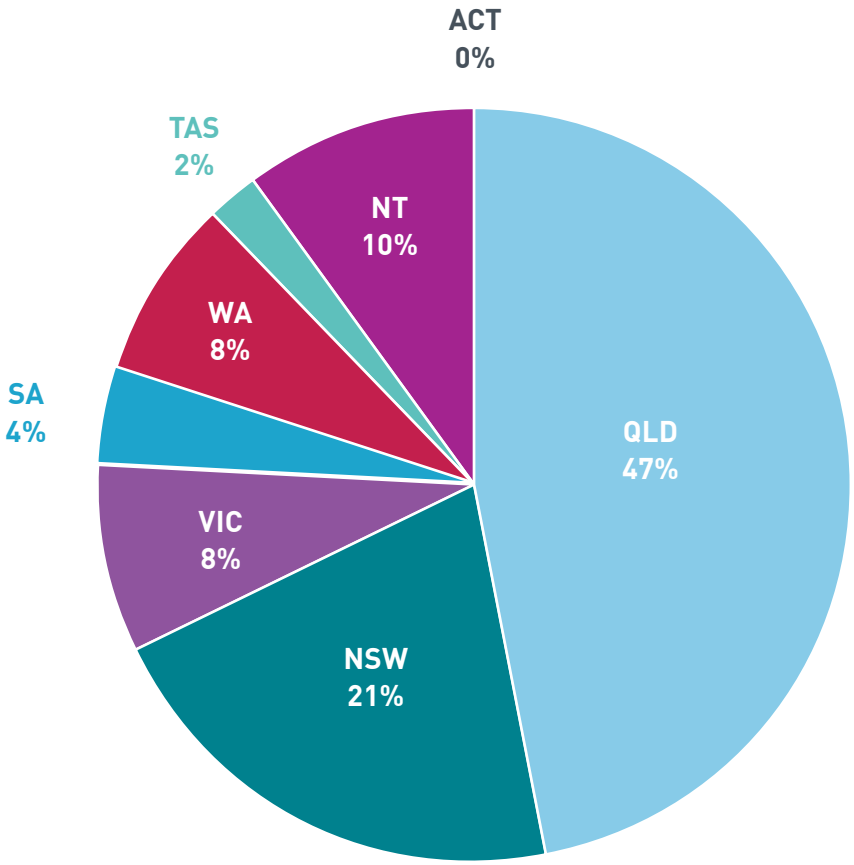


Figure A3 Dairy cattle herd by state, 2016–17

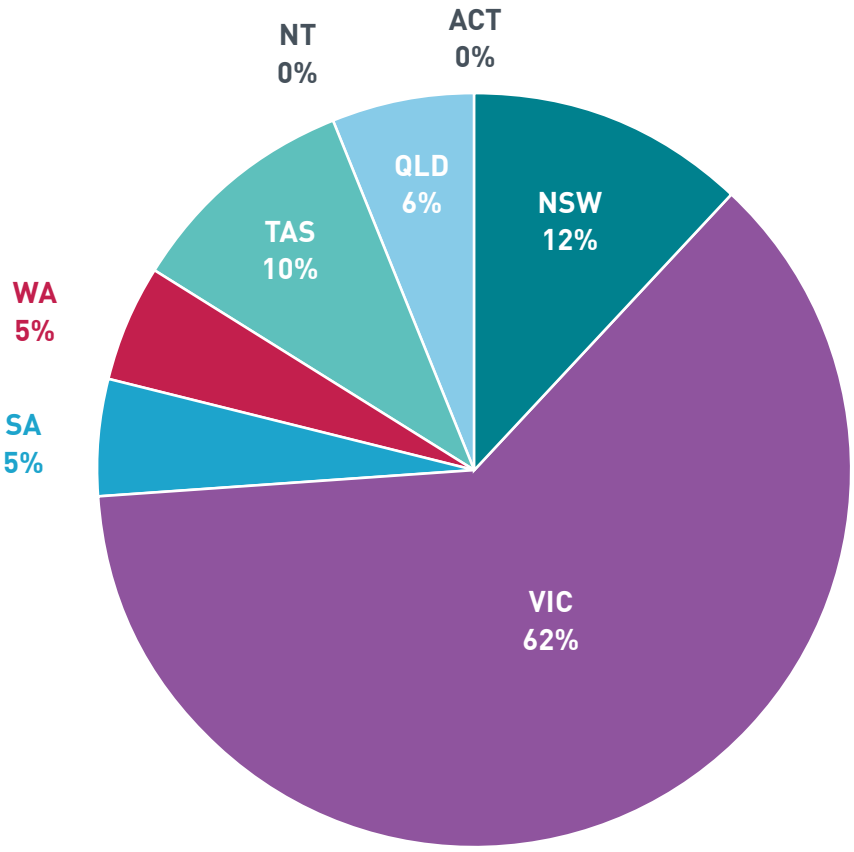


Table A2 Australian livestock statistics

	Unit	2014–15	2015–16	2016–17[s]
Livestock numbers				
Sheep	'000 head	70 910	67 543	70 156
Beef cattle	'000 head	24 602	22 306	23 312
Dairy cattle	'000 head	2811	2665	2600
Total cattle	'000 head	27 413	24 971	25 912
Pigs	'000 head	2272	2294	2381
Livestock slaughterings				
Sheep	'000 head	9 022	8127	6553
Lamb	'000 head	22 867	23 131	22 344
Cattle and calves	'000 head	10 103	8796	7423
Pigs	'000 head	4924	5000	5160
Chickens	million	591	623	653
Goats	'000 head	2116	2158	2087
Meat produced[a]				
Mutton	kt (cw*)	214	196	163
Lamb	kt (cw)	507	516	506
Beef and veal	kt (cw)	2662	2344	2069
Pork	kt (cw)	371	378	397
Poultry	kt (cw)	1116	1191	1230
Goat meat	kt (cw)	32	33	33
Livestock products				
Wool[b]	kt (gr. eq.**)	427	404	414
Milk[c]	mL	9732	9679	9015
Eggs	million dozen	318	329	335
Meat exports				
Mutton	kt (sw***)	180	156	135
Lamb	kt (sw)	254	261	255
Beef and veal	kt (sw)	1376	1,196	991
Pig meat	kt (sw)	29	28	31
Chicken meat	kt (sw)	36	27	35
Goat meat	kt (sw)	36	30	29
Kangaroo meat	kt (sw)	4	3	3
Camel meat	kt (sw)	1	1	1

cont.

	Unit	2014–15	2015–16	2016–17[s]
Live animal exports				
Sheep[d]	'000 head	2180	1859	1851
Feeder/slaughter cattle[e]	'000 head	1295	1114	817
Breeder cattle[f]	'000 head	83	144	99
Goats	'000 head	91	81	30
Camels	head	704	273	584
Buffalo	head	3699	1838	3672
Gross value of livestock production				
Sheep[g]	$m	650	535	678
Lamb[g]	$m	2401	2477	2998
Cattle and calves[h]	$m	10 175	11 536	10 783
Pigs[g]	$m	1149	1353	1355
Poultry	$m	2610	2748	2857
Goats	$m	120	167	203
Cattle exported live[i]	$m	1356	1551	1199
Sheep exported live[d]	$m	245	228	233
Goats exported live	$m	10	10	5
Wool[b]	$m	2676	2965	3397
Milk[j]	$m	4722	4282	3687
Eggs	$m	729	783	808

*cw = carcase weight

**gr. eq. = greasy equivalent

***sw = shipped weight

a Includes canned meats.

b Includes shorn wool (includes crutching), dead and fellmongered wool, and wool exported on skins.

c Includes the whole milk equivalent of farm cream intake.

d Includes breeding stock.

e Includes buffalo.

f Includes dairy cattle and buffalo.

g Excludes skin and hide values.

h Includes dairy cattle slaughtered.

i Includes all bovine for feeder/slaughter, breeding and dairy purposes.

j Milk intake by factories and valued at the farm gate.

s ABARES estimate.

Source: Australian Bureau of Statistics.

Table A3 Australian fisheries production

	Unit	2013–14	2014–15	2015–16
Volume of fisheries production				
Tuna	kt	11	12	14
Salmonids[a]	kt	42	49	56
Other fish	kt	102	102	123
Prawns	kt	25	25	25
Rock lobster	kt	11	10	10
Crab	kt	5	5	5
Other crustaceans	kt	1	1	1
Abalone	kt	5	5	4
Scallop	kt	4	4	5
Oyster	kt	12	13	11
Squid	kt	1	2	2
Other molluscs	kt	5	5	5
Other nei	kt	2	6	5
Total	**kt**	**223**	**239**	**266**
Value of fisheries production				
Tuna	$m	147	161	171
Salmonids[a]	$m	543	631	718
Other fish	$m	405	435	523
Prawns	$m	339	365	388
Rock lobster	$m	588	668	695
Crab	$m	55	55	53
Other crustaceans	$m	9	10	11
Abalone	$m	164	164	160
Scallop	$m	11	11	14
Oyster	$m	91	93	97
Squid	$m	9	12	13
Other molluscs	$m	85	97	107
Other nei*	$m	27	68	77
Total	**$m**	**2473**	**2769**	**3026**
Exports of fisheries production				
Edible – volume[b]	kt	39	43	62
Edible – value[b]	$m	1138	1293	1418
Non-edible – value	$m	166	147	123

a Includes salmon and trout production.

b Excludes live tonnage but includes live value.

*not elsewhere included

Sources: ABARES; Australian Fisheries Management Authority; Australian Bureau of Statistics; Department of Fisheries, Western Australia; Department of Primary Industries, New South Wales; Department of Primary Industries, Parks, Water and Environment, Tasmania; Fisheries Queensland, Department of Agriculture, Fisheries and Forestry; Fisheries Victoria, Department of Environment and Primary Industries; Northern Territory Department of Primary Industry and Fisheries; Primary Industries and Regions, South Australia; South Australian Research and Development Institute.

Image credit: Animal Health Australia

Table A4 Australian aquaculture production, by volume[a]

	Unit	2013–14	2014–15	2015–16
Volume				
Fish				
Salmonids[b]	kt	42	49	56
Tuna	kt	8	8	9
Silver perch	kt	0	0	0
Barramundi	kt	3	4	4
Other[c]	kt	1	2	3
Total	**kt**	**54**	**63**	**72**
Crustaceans				
Prawns	t	3774	5282	4628
Yabby	t	34	34	20
Marron	t	60	64	56
Redclaw	t	36	45	51
Total	**t**	**3903**	**5426**	**4755**
Molluscs				
Edible oyster	kt	12	11	11
Abalone	kt	1	1	1
Blue mussel	kt	3	4	4
Total	**kt**	**16**	**15**	**16**
Other nei[d]*	**kt**	**1**	**6**	**5**
Total (all categories)	**kt**	**75**	**89**	**97**

a Excludes hatchery production, crocodiles, microalgae and aquarium worms.

b Includes salmon and trout production.

c Includes eel, other native fish and aquarium fish.

d Includes aquaculture production not elsewhere specified because of confidentiality restrictions. In Victoria, this includes warmwater finfish, ornamental fish, other shellfish, shrimps and aquatic worms.

*not elsewhere included

Sources: ABARES; Australian Fisheries Management Authority; Department of Fisheries, Western Australia; Department of Primary Industries, New South Wales; Department of Primary Industries, Parks, Water and Environment, Tasmania; Fisheries Queensland, Department of Agriculture, Fisheries and Forestry; Fisheries Victoria, Department of Environment and Primary Industries; Northern Territory Department of Primary Industry and Fisheries; Primary Industries and Regions, South Australia; South Australian Research and Development Institute

Table A5 Australian aquaculture production, by value[a]

	Unit	2013–14	2014–15	2015–16
Value				
Fish				
Salmonids[b]	$m	543	631	718
Tuna	$m	122	131	127
Silver perch	$m	4	4	5
Barramundi	$m	34	37	35
Other[c]	$m	14	26	41
Total	**$m**	**717**	**829**	**925**
Crustaceans				
Prawns	$m	64	86	86
Yabby	$m	1	1	1
Marron	$m	2	2	2
Redclaw	$m	1	1	1
Total	**$m**	**67**	**90**	**90**
Molluscs				
Edible oyster	$m	91	93	97
Pearl oyster	$m	61	68	78
Abalone	$m	26	29	29
Blue mussel	$m	10	12	11
Total	**$m**	**187**	**201**	**215**
Other nei[d]*	**$m**	**26**	**66**	**76**
Total (all categories)	**$m**	**997**	**1187**	**1307**

a Excludes hatchery production, crocodiles, microalgae and aquarium worms.

b Includes salmon and trout production.

c Includes eel, other native fish and aquarium fish

d Includes aquaculture production not elsewhere specified because of confidentiality restrictions. In Victoria, this includes warmwater finfish, ornamental fish, other shellfish, shrimps and aquatic worms.

*not elsewhere included

Sources: ABARES; Australian Fisheries Management Authority; Department of Fisheries, Western Australia; Department of Primary Industries, New South Wales; Department of Primary Industries, Parks, Water and Environment, Tasmania; Fisheries Queensland, Department of Agriculture, Fisheries and Forestry; Fisheries Victoria, Department of Environment and Primary Industries; Northern Territory Department of Primary Industry and Fisheries; Primary Industries and Regions, South Australia; South Australian Research and Development Institute

APPENDIX B
KEY AUSTRALIAN ANIMAL HEALTH WEBSITES

Accreditation Program for Australian Veterinarians	www.animalhealthaustralia.com.au/training-centre/accreditation-program-for-australian-veterinarians-apav
AgriFutures Australia	www.agrifutures.com.au
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-border-force-abf
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 Eggs Limited	www.australianeggs.org.au
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)	www.dfat.gov.au/aid
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 Meat Processor Corporation	www.ampc.com.au

Australian National Quality Assurance Program	www.anqap.com
Australian Pork Limited	www.australianpork.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
College of Public Health, Medical and Veterinary Sciences, James Cook University	https://www.jcu.edu.au/college-of-public-health-medical-and-veterinary-sciences
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 Economic Development, Jobs, Transport and Resources, Agriculture Victoria	www.agriculture.vic.gov.au
Department of Primary Industries, New South Wales	www.dpi.nsw.gov.au
Department of Primary Industries and Regional Development, Western Australia	www.dpird.wa.gov.au
Department of Primary Industries and Regions, South Australia	www.pir.sa.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
Farm Biosecurity	www.farmbiosecurity.com.au
Fisheries Research and Development Corporation	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 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 pests & disease outbreaks	www.outbreak.gov.au
National Transmissible Spongiform Encephalopathies Surveillance Project	www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/tse-freedom-assurance-program/surveillance-of-tses
Poultry Hub	www.poultryhub.org
Racing Australia	www.racingaustralia.horse
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
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
School of Veterinary Science, University of Sydney	www.sydney.edu.au/vetscience
Sheep Producers Australia	www.sheepproducers.com.au
Wildlife Health Australia	www.wildlifehealthaustralia.com.au
WoolProducers Australia	www.woolproducers.com.au
Zoo and Aquarium Association	www.zooaquarium.org.au

Image credit: Taryn Mokotupu

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 2017 of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases are recorded in the National Animal Health Information System (Section 3.2) and are reported in Table C1. Note that a single investigation may involve more than one animal. For additional information on some disease investigations see: anthrax (Section 6.6.1), avian influenza (Section 6.5.2), Hendra virus (Section 6.6.2), and transmissible spongiform encephalopathies (Section 4.4.2). Wildlife health surveillance activities are reported in Section 4.3.5.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
African swine fever	Pig	**National Total**	**14**	**0**	**14**
		NSW	2	0	2
		NT	1	0	1
		SA	4	0	4
		Vic.	2	0	2
		WA	5	0	5
Anaplasmosis in tick-free areas	Cattle	**National total**	**7**	**0**	**7**
		NSW	1	0	1
		WA	6	0	6
Anthrax	Alpaca	**National total**	**3**	**0**	**3**
		Vic.	1	0	1
		WA	2	0	2
	Camel	**National total**	**1**	**0**	**1**
		Vic.	1	0	1
	Cattle	**National total**	**193**	**1**	**192**
		NSW	110	0	110
		Qld	15	1	14
		SA	2	0	2
		Tas.	1	0	1
		Vic.	52	0	52
		WA	13	0	13

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Anthrax	Goat	**National total**	**5**	**0**	**5**
		NSW	2	0	2
		Qld	1	0	1
		Vic.	2	0	2
	Horse	**National total**	**4**	**0**	**4**
		NSW	1	0	1
		Qld	1	0	1
		Vic.	2	0	2
	Pig	**National total**	**4**	**0**	**4**
		NSW	1	0	1
		Qld	1	0	1
		WA	2	0	2
	Sheep	**National total**	**115**	**18**	**97**
		NSW	49	1	48
		Qld	1	0	1
		SA	1	0	1
		Tas.	2	0	2
		Vic.	53	17	36
		WA	9	0	9
Australian bat lyssavirus	Camel	**National total**	**1**	**0**	**1**
		WA	1	0	1
	Cat	**National total**	**2**	**0**	**2**
		NSW	1	0	1
		Qld	1	0	1
	Cattle	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Deer	**National total**	**1**	**0**	**1**
		NSW	1	0	1
	Dog	**National total**	**7**	**0**	**7**
		NSW	1	0	1
		Qld	5	0	5
		Vic.	1	0	1
	Horse	**National total**	**26**	**0**	**26**
		Qld	24	0	24
		SA	1	0	1
		Tas.	1	0	1

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Avian influenza	Bird	**National total**	**465**	**1**	**464**
		NSW	168	0	168
		NT	25	0	25
		Qld	45	0	45
		SA	36	0	36
		Tas.	30	0	30
		Vic.	84	0	84
		WA	77	1[a]	76
Babesiosis in tick-free areas	Cattle	**National total**	**16**	**0**	**16**
		NSW	1	0	1
		WA	15	0	15
Bluetongue (clinical disease)[b]	Camel	**National total**	**1**	**0**	**1**
		WA	1	0	1
	Cattle	**National total**	**14**	**0**	**14**
		NSW	2	0	2
		Qld	2	0	2
		SA	3	0	3
		Tas.	1	0	1
		Vic.	2	0	2
		WA	4	0	4
	Goat	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Sheep	**National total**	**67**	**0**	**67**
		NSW	10	0	10
		Qld	7	0	7
		SA	20	0	20
		Tas.	2	0	2
		Vic.	16	0	16
		WA	12	0	12
Bovine virus diarrhoea Type 2	Cattle	**National total**	**11**	**0**	**11**
		WA	11	0	11
	Sheep	**National total**	**1**	**0**	**1**
		WA	1	0	1

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Brucella abortus[c]	Cat	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Camelid	**National total**	**4**	**0**	**4**
		Vic.	4	0	4
	Cattle	**National total**	**610**	**0**	**610**
		NSW	17	0	17
		Qld	123	0	123
		SA	38	0	38
		Tas.	24	0	24
		Vic.	63	0	63
		WA	345	0	345
	Goat	**National total**	**2**	**0**	**2**
		Vic.	2	0	2
	Horse	**National total**	**9**	**0**	**9**
		Vic.	8	0	8
		WA	1	0	1
	Pig	**National total**	**1**	**0**	**1**
		Vic.	1	0	1
	Sheep	**National total**	**75**	**0**	**75**
		Vic.	71	0	71
		WA	4	0	4
Brucella canis	Cat	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Dog	**National total**	**2**	**0**	**2**
		Qld	1	0	1
		WA	1	0	1
Brucella melitensis[c]	Cat	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Goat	**National total**	**1**	**0**	**1**
		SA	1	0	1
	Sheep	**National total**	**1**	**0**	**1**
		WA	1	0	1

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Brucella suis[c]	Cat	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Dog	**National total**	**416**	**64**	**352**
		ACT	1	0	1
		NSW	325	48	277
		NT	1	0	1
		Qld	83	16	67
		SA	2	0	2
		Vic.	4	0	4
	Pig	**National total**	**8**	**0**	**8**
		NSW	3	0	3
		NT	1	0	1
		Qld	3	0	3
		WA	1	0	1
	Sheep	**National total**	**1**	**0**	**1**
		Qld	1	0	1
Contagious agalactia	Sheep	**National total**	**4**	**0**	**4**
		WA	4	0	4
Contagious equine metritis	Horse	**National total**	**1**	**0**	**1**
		NSW	1	0	1
Enzootic bovine leucosis	Cattle	**National total**	**2**	**0**	**2**
		NSW	1	0	1
		SA	1	0	1
Equine encephalomyelitis (Eastern, Western and Venezuelan)	Horse	**National total**	**16**	**0**	**16**
		Qld	1	0	1
		SA	2	0	2
		Tas.	1	0	1
		WA	12	0	12
Equine infectious anaemia	Horse	**National total**	**66**	**2**	**64**
		NSW	2	0	2
		Qld	54	2	52
		Vic.	6	0	6
		WA	4	0	4

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Equine influenza	Horse	**National total**	**7**	**0**	**7**
		NSW	1	0	1
		Qld	2	0	2
		Vic.	3	0	3
		WA	1	0	1
Equine piroplasmosis (*Babesia equi*, *Babesia caballi* and *Theileria equi*)	Horse	**National total**	**2**	**0**	**2**
		NSW	1	0	1
		Vic.	1	0	1
Foot-and-mouth disease	Buffalo	**National total**	**1**	**0**	**1**
		NT	1	0	1
	Cattle	**National total**	**68**	**0**	**68**
		NSW	25	0	25
		NT	5	0	5
		Qld	1	0	1
		SA	1	0	1
		Tas.	1	0	1
		Vic.	21	0	21
		WA	14	0	14
	Pig	**National total**	**5**	**0**	**5**
		NSW	1	0	1
		Qld	1	0	1
		SA	1	0	1
		WA	2	0	2
	Sheep	**National total**	**26**	**0**	**26**
		NSW	2	0	2
		Qld	1	0	1
		SA	9	0	9
		Vic.	10	0	10
		WA	4	0	4
Haemorrhagic septicaemia	Cattle	**National total**	**1**	**0**	**1**
		NT	1	0	1
	Sheep	**National total**	**1**	**0**	**1**
		WA	1	0	1

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Infection of bees with *Paenibacillus larvae* (American foulbrood)	Bees	**National total**	**520**	**201**	**319**
		ACT	7	7	0
		NSW	54	20	34
		Qld	211	127	84
		SA	248	47	201
Infection of bees with *Melissococcus plutonius* (European foulbrood)	Bees	**National total**	**245**	**50**	**195**
		NSW	1	1	0
		Qld	211	32	179
		SA	33	17	16
Infection with African horse sickness virus	Horse	**National total**	**1**	**0**	**1**
		WA	1	0	1
Infection with Aujeszky's disease virus	Pig	**National total**	**2**	**0**	**2**
		Qld	1	0	1
		WA	1	0	1
Infection with Borna disease virus	Sheep	**National total**	**1**	**0**	**1**
		WA	1	0	1
Infection with Bungowannah virus (porcine myocarditis)	Pig	**National total**	**1**	**0**	**1**
		WA	1	0	1
Infection with *Chlamydophila abortus* (enzootic abortion of ewes, ovine chlamydiosis)	Sheep	**National total**	**8**	**0**	**8**
		WA	8	0	8
Infection with classical swine fever virus	Pig	**National total**	**37**	**0**	**37**
		NSW	2	0	2
		NT	1	0	1
		SA	5	0	5
		Vic.	2	0	2
		WA	27	0	27
Infection with duck herpesvirus 1 (duck viral enteritis/duck plague)	Bird	**National total**	**1**	**0**	**1**
		Qld	1	0	1

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Infection with equid herpesvirus-1 (EHV-1) (abortigenic and neurological strains)	Horse	**National total**	**263**	**23**	**240**
		NSW	149	8	141
		Qld	62	0	62
		SA	8	4	4
		Tas.	1	0	1
		Vic.	34	11	23
		WA	9	0	9
Infection with equine arteritis virus	Horse	**National total**	**15**	**0**	**15**
		NSW	7	0	7
		Vic.	5	0	5
		WA	3	0	3
Infection with Hendra virus	Dog	**National total**	**6**	**0**	**6**
		NSW	6	0	6
	Horse	**National total**	**1035**	**4**	**1031**
		NSW	274	3	271
		NT	8	0	8
		Qld	631	1	630
		SA	9	0	9
		Tas.	3	0	3
		Vic.	98	0	98
		WA	12	0	12
	Pig	**National total**	**1**	**0**	**1**
		Qld	1	0	1
Infection with influenza A viruses in swine	Pig	**National total**	**24**	**3**	**21**
		NSW	1	0	1
		Qld	1	0	1
		Vic.	4	2[d,e]	2
		WA	18	1[d]	17
Infection with Menangle virus	Pig	**National total**	**1**	**0**	**1**
		NSW	1	0	1

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Infection with *Mycobacterium avium* (avian tuberculosis)	Bird	**National total**	**1**	**0**	**1**
		WA	1	0	1
	Chicken	**National total**	**1**	**1**	**0**
		Tas.	1	1	0
Infection with *Mycoplasma mycoides* subsp. *mycoides* SC (contagious bovine pleuropneumonia)	Cattle	**National total**	**9**	**0**	**9**
		NT	2	0	2
		WA	7	0	7
	Goat	**National total**	**1**	**0**	**1**
		Qld	1	0	1
Infection with *Neorickettsia risticii* (Potomac fever)	Horse	**National total**	**1**	**0**	**1**
		WA	1	0	1
Infection with Newcastle disease virus (virulent)	Bird	**National total**	**462**	**0**	**462**
		NSW	162	0	162
		NT	25	0	25
		Qld	44	0	44
		SA	54	0	54
		Tas.	17	0	17
		Vic.	92	0	92
		WA	68	0	68
Infection with peste des petits ruminants virus	Sheep	**National total**	**4**	**0**	**4**
		Vic.	1	0	1
		WA	3	0	3
Infection with porcine epidemic diarrhoea virus	Pig	**National total**	**8**	**0**	**8**
		NSW	2	0	2
		Qld	2	0	2
		WA	4	0	4
Infection with rabies virus	Camel	**National total**	**1**	**0**	**1**
		WA	1	0	1
	Horse	**National total**	**3**	**0**	**3**
		SA	1	0	1
		Tas.	1	0	1
		WA	1	0	1
Infection with Rift Valley fever virus	Cattle	**National total**	**2**	**0**	**2**
		WA	2	0	2

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Infection with *Salmonella abortus-equi*	Horse	**National total**	**1**	**0**	**1**
		WA	1	0	1
Infection with *Salmonella Enteritidis* in poultry	Bird	**National total**	**2**	**0**	**2**
		WA	2	0	2
Infection with swine vesicular disease virus	Pig	**National total**	**2**	**0**	**2**
		Qld	1	0	1
		WA	1	0	1
Infection with *Taenia saginata* (*cysticercus bovis*)	Cattle	**National total**	**3**	**1**	**2**
		SA	1	0	1
		Vic.	2	1	1
Infection with *Theileria parva* (East Coast fever) or *T. annulata* (Mediterranean theileriosis)	Cattle	**National total**	**11**	**0**	**11**
		NSW	2	0	2
		WA	9	0	9
Infection with vesicular stomatitis virus	Cattle	**National total**	**58**	**0**	**58**
		NSW	25	0	25
		NT	3	0	3
		Qld	1	0	1
		SA	1	0	1
		Tas.	1	0	1
		Vic.	21	0	21
		WA	6	0	6
	Horse	**National total**	**2**	**0**	**2**
		SA	2	0	2
	Pig	**National total**	**4**	**0**	**4**
		NSW	1	0	1
		Qld	1	0	1
		SA	1	0	1
		WA	1	0	1
	Sheep	**National total**	**25**	**0**	**25**
		NSW	2	0	2
		Qld	1	0	1
		SA	9	0	9
		Vic.	10	0	10
		WA	3	0	3

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Infestation of bees with *Acarapis woodi* (acariasis tracheal mite)	Bees	**National total**	**76**	**0**	**76**
		Qld	76	0	76
Infestation of bees with *Tropilaelaps clareae* or *T. mercedesae* (tropilaelaps mite)	Bees	**National total**	**76**	**0**	**76**
		Qld	76	0	76
Infestation of bees with *Varroa destructor* or *V. jacobsoni* (varroosis)	Bees	**National total**	**80**	**0**	**80**
		Qld	76	0	76
		Vic.	4	0	4
Japanese encephalitis	Sheep	**National total**	**1**	**0**	**1**
		WA	1	0	1
Leishmaniosis of any species	Dog	**National total**	**3**	**0**	**3**
		Qld	2	0	2
		Tas.	1	0	1
Louping ill	Sheep	**National total**	**2**	**0**	**2**
		WA	2	0	2
Lumpy skin disease	Cattle	**National total**	**3**	**0**	**3**
		NSW	1	0	1
		SA	1	0	1
		Vic.	1	0	1
Maedi-visna	Barbary Sheep	**National total**	**1**	**0**	**1**
		SA	1	0	1
	Sheep	**National total**	**1**	**0**	**1**
		Vic.	1	0	1
Malignant catarrhal fever – wildebeest-associated	Cattle	**National total**	**3**	**0**	**3**
		NSW	2	0	2
		WA	1	0	1
Nipah virus infection	Pig	**National total**	**1**	**0**	**1**
		Qld	1	0	1

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Paratuberculosis (Johne's disease)	Alpaca	**National total**	**2**	**0**	**2**
		Vic.	2	0	2
	Bison	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Camel	**National total**	**2**	**1**	**1**
		Qld	1	0	1
		Vic.	1	1	0
	Cattle	**National total**	**93**	**23**	**70**
		NSW	27	4	23
		Qld	9	0	9
		Vic.	39	19	20
		WA	18	0	18
	Goat	**National total**	**11**	**2**	**9**
		NSW	1	0	1
		Qld	2	0	2
		Vic.	6	2	4
		WA	2	0	2
	Sheep	**National total**	**48**	**24**	**24**
		NSW	6	2	4
		Qld	1	1	0
		Vic.	16	12	4
		WA	25	9	16
Porcine reproductive and respiratory syndrome	Pig	**National total**	**10**	**0**	**10**
		SA	1	0	1
		Vic.	1	0	1
		WA	8	0	8
Post-weaning multi-systemic wasting syndrome	Pig	**National total**	**1**	**0**	**1**
		WA	1	0	1
Pulmonary adenomatosis - Jaagsiekte	Sheep	**National total**	**1**	**0**	**1**
		NSW	1	0	1
Salmonellosis – *S. abortus-ovis*	Sheep	**National total**	**12**	**0**	**12**
		Vic.	7	0	7
		WA	5	0	5

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Screw-worm fly – New World (*Cochliomyia hominivorax*)	Cat	**National total**	**1**	**0**	**1**
		NT	1	0	1
	Cattle	**National total**	**2**	**0**	**2**
		NT	2	0	2
	Dog	**National total**	**1**	**0**	**1**
		NT	1	0	1
	Goat	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Primate	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Sheep	**National total**	**3**	**0**	**3**
		WA	3	0	3
Screw-worm fly – Old World (*Chrysomya bezziana*)	Bird	**National total**	**1**	**0**	**1**
		NT	1	0	1
	Cat	**National total**	**2**	**0**	**2**
		NT	2	0	2
	Cattle	**National total**	**2**	**0**	**2**
		NT	2	0	2
	Dog	**National total**	**1**	**0**	**1**
		NT	1	0	1
	Goat	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Primate	**National total**	**1**	**0**	**1**
		Qld	1	0	1
	Sheep	**National total**	**3**	**0**	**3**
		WA	3	0	3
Sheep pox and goat pox	Goat	**National total**	**1**	**0**	**1**
		WA	1	0	1
	Sheep	**National total**	**3**	**0**	**3**
		WA	3	0	3
Surra (*Trypanosoma evansi*)	Cattle	**National total**	**2**	**0**	**2**
		NT	2	0	2

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
Transmissible gastroenteritis	Pig	**National total**	**10**	**0**	**10**
		NSW	2	0	2
		Qld	3	0	3
		WA	5	0	5
Transmissible spongiform encephalopathies (bovine spongiform encephalopathy, chronic wasting disease of deer, feline spongiform encephalopathy, scrapie)	Cattle	**National total**	**512**	**0**	**512**
		NSW	193	0	193
		NT	17	0	17
		Qld	157	0	157
		SA	17	0	17
		Tas.	16	0	16
		Vic.	89	0	89
		WA	23	0	23
	Mouse	**National total**	**1**	**0**	**1**
		Vic.	1	0	1
	Sheep	**National total**	**466**	**0**	**466**
		NSW	133	0	133
		Qld	31	0	31
		SA	43	0	43
		Tas.	12	0	12
		Vic.	93	0	93
		WA	154	0	154
Trypanosomosis (tsetse fly-associated)	Cattle	**National total**	**1**	**0**	**1**
		NT	1	0	1
Tuberculosis (*Mycobacterium bovis*)	Alpaca	**National total**	**1**	**0**	**1**
		Tas.	1	0	1
	Cattle	**National total**	**1**	**0**	**1**
		WA	1	0	1
	Pig	**National total**	**2**	**0**	**2**
		SA	2	0	2
Tularaemia	Rabbit	**National total**	**1**	**0**	**1**
		NSW	1	0	1
Turkey rhinotracheitis (avian metapneumovirus)	Turkey	**National total**	**1**	**0**	**1**
		NSW	1	0	1

cont.

Table C1 Investigations of suspect cases of certain emergency animal diseases and nationally notifiable animal diseases, 2017

Disease	Species	Jurisdiction	No. of investigations	Number positive	Number negative
West Nile virus infection (clinical disease)	Bird	**National total**	**14**	**0**	**14**
		SA	14	0	14
	Cattle	**National total**	**2**	**0**	**2**
		WA	2	0	2
	Horse	**National total**	**37**	**0**	**37**
		NSW	11	0	11
		Qld	3	0	3
		SA	7	0	7
		Tas.	1	0	1
		Vic.	3	0	3
		WA	12	0	12
	Pig	**National total**	**2**	**0**	**2**
		Qld	1	0	1
		Vic.	1	0	1

NSW = New South Wales; NT = Northern Territory; Qld = Queensland; SA = South Australia; Tas. = Tasmania; Vic. = Victoria; WA = Western Australia

a One positive low-pathogenic strain of avian influenza (H9N2) was detected in a commercial poultry breeder farm. The owner voluntarily depopulated and disposed of the flock via composting and implemented decontamination procedures to minimise any potential environmental viral persistence.

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 *Brucella abortus*) was eradicated from the Australian cattle herd in 1989 and is presently considered an exotic animal disease in Australia. Neither ovine nor caprine brucellosis (caused by *B. melitensis*) have ever 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 The sequencing from the positive detection in July indicated the presence of seasonal H1N1 virus strain known to currently circulate in both pigs and humans; it was not a novel virus.

e The sequenced virus sample from December was a novel H3N2 influenza A virus in Australian swine, comprising *HA, NA* and *MP* genes derived from old human seasonal H3N2 viruses.

ACRONYMS AND ABBREVIATIONS

AAA	Australian Alpaca Association
AADIS	Australian Animal DISease
AAHL	Australian Animal Health Laboratory
AAPSP	Australian Animal Pathology Standards Program
AAV	Australian Accredited Veterinarians
AAVLD	Australian Association of Veterinary Laboratory Diagnosticians
ABIAB	Animal and Biological Import Assessments Branch
ABLV	Australian bat lyssavirus
ACIAR	Australian Centre for International Agricultural Research
ACMF	Australian Chicken Meat Federation
ACT	Australian Capital Territory
ACVO	Australian Chief Veterinary Officer
ADIC	Australian Dairy Industry Council
ADMA	Australian Duck Meat Association
AEL	Australian Eggs Limited
AGSOC	Agriculture Senior Officials' Committee
AHA	Animal Health Australia
AHBIC	Australian Honey Bee Industry Council
AHC	Animal Health Committee
AI	avian influenza
AJASN	Australasian Joint Agencies Scanning Network
ALFA	Australian Lot Feeders Association
ALOP	appropriate level of protection
AMIC	Australian Meat Industry Council
AMR	antimicrobial resistance
ANQAP	Australian National Quality Assurance Program
ANZSDP	Australian and New Zealand Standard Diagnostic Procedures
APL	Australian Pork Limited
APMV	avian paramyxovirus
APVMA	Australian Pesticides and Veterinary Medicines Authority
ARA	Australian Renderers Association

ASF	African swine fever
ASVP	Australian Society for Veterinary Pathology
ATMAC	Agricultural Trade and Market Access Cooperation
AVBC	Australasian Veterinary Boards Council
AWI	Australian Wool Innovation
AWTG	Animal Welfare Task Group
BBO	Bee Biosecurity Officers
BCG	Biological Consultative Group
BICON	Biosecurity Import Conditions
BIPIM	Biosecurity Incident Public Information Manual
BRD	bovine respiratory disease
BSE	bovine spongiform encephalopathy
BTEC	Brucellosis and Tuberculosis Eradication Campaign
CAE	caprine arthritis–encephalitis
CCA	Cattle Council of Australia
CCEAD	Consultative Committee on Emergency Animal Diseases
CDNA	Communicable Diseases Network Australia
CEBRA	Centre of Excellence for Biosecurity Risk Analysis
CMO	Chief Medical Officer
CRC	Cooperative Research Centre
CRISPR	clustered regularly interspaced short palindromic repeats
CSF	classical swine fever
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSU	Charles Sturt University
CVO	Chief Veterinary Officer
DFAT	Department of Foreign Affairs and Trade
DFTD	devil facial tumour disease
DPIRD	Department of Primary Industries and Regional Development
EA	Equestrian Australia
EAD	emergency animal disease
EADRA	Emergency Animal Disease Response Agreement
EADRP	Emergency Animal Disease Response Plan
EBL	enzootic bovine leucosis
ECA	Egg Corp Assured
EID	emerging infectious disease
ERA	Excellence in Research for Australia
ESA	Egg Standards of Australia
ESCAS	Exporter Supply Chain Assurance System

EuFMD	European Commission for the Control of Foot-and-Mouth Disease
FMD	foot-and-mouth disease
FRDC	Fisheries Research and Development Corporation
FREPA	Free Range Egg and Poultry Australia
FSANZ	Food Standards Australia New Zealand
FSCF	Food Safety Cooperation Forum
FTA	free trade agreement
GICA	Goat Industry Council of Australia
GSF	gestation stall free
HACCP	hazard analysis and critical control points
HeV	Hendra virus
HICC	Horse Industry Consultative Committee
HPAI	highly pathogenic avian influenza
HRA	Harness Racing Australia
IAHER	International Animal Health Emergency Reserve
IGAB	Intergovernmental Agreement on Biosecurity
IGB	Inspector-General of Biosecurity
IVL	Indonesian Veterinary Leadership
JAEPA	Japan–Australia Economic Partnership Agreement
JCU	James Cook University
JD	Johne's disease
JE	Japanese encephalitis
JEV	Japanese encephalitis virus
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
LPA	Livestock Production Assurance
LPAI	low pathogenicity avian influenza
MAF	Ministry of Agriculture and Fisheries
MLA	Meat & Livestock Australia
NABF	Northern Australia Biosecurity Framework
NACA	Network of Aquaculture Centres in Asia–Pacific
NAHIS	National Animal Health Information System
NAHSD	National Animal Health Surveillance and Diagnostics
NAHTSC	National Animal Health Training Steering Committee

NAIWB	National Avian Influenza Wild Bird
NAQIA	National Agriculture Quarantine and Inspection Authority
NAQS	Northern Australian Quarantine Strategy
NATA	National Association of Testing Authorities
NBC	National Biosecurity Committee
NBCEN	National Biosecurity Communication and Engagement Network
NBPSP	National Bee Pest Surveillance Program
NBRT	National Biosecurity Response Team
ND	Newcastle disease
NFAS	National Feedlot Accreditation Scheme
NJDP	National Johne's Disease Project
NLIS	National Livestock Identification System
NLTG	National Laboratory Task Group
NMG	National Management Group
NNDMP	National Newcastle Disease Management Plan
NNDSS	National Notifiable Diseases Surveillance System
NRS	National Residue Survey
NSDIP	National Significant Disease Investigation Program
NSHMP	National Sheep Health Monitoring Project
NSW	New South Wales
NT	Northern Territory
NTSESP	National Transmissible Spongiform Encephalopathies Surveillance Project
NVD	National Vendor Declaration
NWS	New World screw-worm
ODE	Office of Development Effectiveness
OIE	World Organisation for Animal Health
OJD	ovine Johne's disease
OWS	Old World screw-worm
PC	physical containment
PCR	polymerase chain reaction
PHA	Plant Health Australia
PNG	Papua New Guinea
PT	proficiency testing
PVS	performance of veterinary services
QA	quality assurance
QAAFI	Queensland Alliance for Agriculture and Food Innovation
Qld	Queensland
RAWS	Regional Animal Welfare Strategy

RD&E	research, development and extension
RRT	Rapid Response Team
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SA	South Australia
SCAAH	Sub-Committee on Aquatic Animal Health
SCU	standard cattle unit
SE	Salmonella Enteritidis
SEACFMD	South East Asia and China Foot and Mouth Disease
SERP	State Emergency Response Plan
SFMCA	Stock Feed Manufacturers' Council of Australia
SISP	Sheep Industry Strategic Plan
SP	Salmonella Pullorum
SPS	sanitary and phytosanitary
SSBA	security-sensitive biological agents
STANDZ	Stop Transboundary Animal Diseases and Zoonoses
SWF	screw-worm fly
SWFSPP	Screw-Worm Fly Surveillance and Preparedness Program
TAFE	Technical and Further Education
Tas.	Tasmania
TB	tuberculosis
TPA	third-party auditing
TRACE	Tracking Animal Certification for Export
TSE	transmissible spongiform encephalopathies
TSEFAP	Transmissible Spongiform Encephalopathies Freedom Assurance Program
UNE	University of New England
UNGA	United Nations General Assembly
UQ	University of Queensland
Vic.	Victoria
VSAAC	Veterinary Schools Accreditation Advisory Committee
VSB	veterinary statutory body
WA	Western Australia
WHA	Wildlife Health Australia
WHO	World Health Organization
WTO	World Trade Organization
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.
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), caseocalcereous (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.
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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