



Department of Primary Industries Victoria

10

RESEARCH AND DEVELOPMENT

The Commonwealth Scientific and Industrial Research Organisation, the cooperative research centres, Australia's seven veterinary schools and industry-based research and development corporations participate in an active research program in livestock health.

This chapter summarises Australian research in livestock health during 2010. Individual research projects are listed in Appendix 4.

The Productivity Commission has evaluated the current operations of the research and development corporations in funding and supporting the research needs of Australia's primary industries. Its extensive recommendations focused on reducing funding from the Australian Government over the next five years, centralising the approach to administration and forming a new research and development (R&D) corporation, the Rural Research Australia body.

10.1 CSIRO Livestock Industries — Australian Animal Health Laboratory

Research at the Australian Animal Health Laboratory (AAHL)⁹⁰ of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) includes terrestrial and aquatic animal health, and diseases that affect both humans and animals. The research is conducted to better manage the risks of exotic, emerging and new diseases. As well as underpinning CSIRO-AAHL's diagnostic activities, the research informs decision makers on the most effective ways to manage the biosecurity risks facing Australia, including both preventive activities and responses to incursions. Results from CSIRO-AAHL's research activities are disseminated in published scientific papers and through CSIRO-AAHL's participation in biosecurity technical committees.

90 www.csiro.au/places/aahl.html

Projects are mainly directed towards:

- evaluating new diagnostic technologies, including developing and validating new diagnostic tests
- studying the pathogenesis of new and emerging diseases that affect animals and humans
- identifying novel markers of infection and critical control points for reducing disease transmission
- developing novel strategies for disease control, including animals with innate resistance to infectious diseases
- developing a predictive framework for infectious disease threats
- studying vector-borne disease, including arbovirus and vector characterisation, insect innate immunity, vaccines and epistemics.

Research activity is funded by CSIRO, the Australian Government Department of Agriculture, Fisheries and Forestry, and external funding bodies. A small selection of projects undertaken during 2010 is presented in Table A4.1.

The Productivity Commission's report has been circulated for comment, and CSIRO will be making a detailed submission in due course. CSIRO-AAHL's view is that biosecurity is currently poorly supported, and it is not clear whether the new Rural Research Australia body will provide support to this area.

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10.2 Cooperative research centres

10.2.1 Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease

The Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease (AB-CRC) officially began in November 2003, and its funding ended in June 2010. The AB-CRC aimed to improve biosecurity measures for the protection of public, animal and wildlife health and associated industries. It focused on developing advanced early warning systems for priority emerging infectious diseases — this requires rapid detection of disease, and nationally and regionally coordinated surveillance networks and systems.

The AB-CRC was split into three programs: Research, Education & Training, and Application & Linkage. The research area was further split into three programs: Technologies to Enhance Detection, Ecology of Emerging Infectious Diseases and Advanced Surveillance Systems.

The Education & Training Program significantly contributed to collaboration among AB-CRC partners, by taking advantage of the synergy between the human health and animal health dimensions. As for other cooperative research centres (CRCs), the AB-CRC's focus on applied research and adoption of research outcomes was fundamental to its success. The Application & Linkage Program provided a strong supporting structure for adoption of the AB-CRC's research.

Improving national biosecurity required a number of changes to the way R&D was conducted, including reducing fragmentation across the R&D sector and using multidisciplinary research capacity to solve complex problems. The principal benefit of the AB-CRC was to provide a catalyst for coordinating and focusing national R&D effort.

Significant outcomes were:

- an improved test for influenza that contributed to the eradication of equine influenza
- an improved understanding of Hendra virus
- improved disease detection
- identification of new arboviruses
- a suite of new epidemiological tools and models
- improved surveillance systems.

Along with many leading animal and public health authorities worldwide, the AB-CRC partnership also supported the 'One Health' view that protecting and promoting the wellbeing of all species is essential for managing new and emerging diseases globally.

The AB-CRC website⁹¹ will remain accessible until 30 June 2015.

10.2.2 Cooperative Research Centre for an Internationally Competitive Pork Industry

The overall objective of the health program of the Cooperative Research Centre for an Internationally Competitive Pork Industry (Pork CRC)⁹² is to reduce the impact of disease on the efficiency of pork production. It aims to achieve this by improving pig survival and growth performance to reduce reliance on antibiotics, and to reduce medication and veterinary costs.

The Australian pork industry does not suffer from the more devastating diseases — such as porcine reproductive and respiratory syndrome, and postweaning multisystemic wasting syndrome — that affect Asia, North and South America, and most of Europe.

91 www.abcrc.org.au

92 www.porkcrc.com.au

Despite this, disease is a major factor constraining the productivity and profitability of the Australian pork industry.

The Pork CRC has invested in projects across Australia to develop cost-effective diagnostics and control strategies for the major diseases affecting the Australian pork industry. These include swine dysentery, Glasser's disease (*Haemophilus parasuis*), ileitis, *Actinobacillus pleuropneumoniae* and *Escherichia coli*-related diarrhoea.

In 2010, Pork CRC researchers developed an enzyme-linked immunosorbent assay (ELISA) test for swine dysentery and a low-dose protected form of zinc oxide for controlling *E. coli* diarrhoea. One of the CRC's PhD students demonstrated that the diet offered to pigs immediately before and after weaning can have long-term effects on animal health and survival. Of particular significance was the finding that including spray-dried plasma protein in the diet one week before and one week after weaning increased the survival of the piglets and better prepared their digestive tract for the nutritional and disease challenges faced after weaning. The project also demonstrated that including nucleotides in the piglets' diet for only one week after weaning (at 28 days) significantly improved the animal's immune status at 68 days of age. Researchers continue to investigate novel means of controlling both preweaning and postweaning *E. coli*-related diseases (which remain major problems in the industry). Other researchers are developing a rapid on-farm diagnostic test for ileitis.

Research projects are listed in Table A4.2. Research summaries⁹³ and full research reports⁹⁴ are available on the Pork CRC's website.

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10.2.3 Poultry Cooperative Research Centre

The Poultry CRC's key challenge is to achieve sustainable, ethical poultry production using fewer resources and reducing environmental impacts. In late 2009, the Poultry CRC secured an extension of funding from the Australian Government to 2017, giving it resources totalling nearly \$87 million.

The new Poultry CRC, a joint venture between seven essential participants, has its headquarters at the University of New England in Armidale, New South Wales. The CRC has an extensive collaborative network of

researchers, educators and support staff from more than 30 participating organisations.

Three integrated programs (Health & Welfare, Nutrition & Environment, Safe & Quality Food Production) address the challenges of meeting increasing demand for 'clean and green' poultry products and maintaining food security in the face of climate change and population growth.

This requires innovative approaches to:

- maintain poultry health and improve bird welfare
- improve the use of resources and reduce the environmental impacts of poultry production
- control food safety issues associated with poultry products and improve egg quality for consumers.

Sixteen research projects began in the second half of 2010, involving nine participating organisations in New South Wales, Queensland, Victoria, South Australia, and Ohio in the United States.

In the first half of the year, the CRC laid a solid foundation for its work over the next seven years by establishing a robust governance and management structure, and developing scientifically sound and practically relevant projects in a highly collaborative and transparent setting.

The Poultry CRC retains its 'four pillars' approach for its education program: the higher education sector, vocational education and training, schools, and public education. At least 35 postgraduates will be integrated within the research projects of the three programs, and will interact directly with end users. The CRC expects several of these students to find employment with industry, some through its internship program.

The CRC's award-winning poultry information centre, Poultry Hub,⁹⁵ continued to grow, attracting more than 1000 visitors each day.

The CRC's website⁹⁶ and the eChook newsletter provide details of the CRC's progress.

Research projects are listed in Table A4.3.

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93 www.porkcrc.com.au/html/research.html

94 www.porkcrc.com.au/html/research_reports.html

95 www.poultryhub.org

96 www.poultrycrc.com.au

10.2.4 Cooperative Research Centre for Beef Genetic Technologies

The Cooperative Research Centre for beef Genetic Technologies (Beef CRC)⁹⁷ is Australia's largest beef research initiative. It is a third-term CRC that began in July 2005, involving industry and research partners from Australia, New Zealand, the United States, Canada and the Republic of Korea. The CRC's research focuses on beef quality, feed efficiency, adaptation, cattle welfare and reproductive performance. It uses world-class genetics and genomics research to improve the profitability, productivity, animal welfare and responsible resource use of Australian beef businesses.

The Beef CRC's animal health research includes investigating resistance of cattle to ectoparasites and endoparasites (ticks, buffalo flies and worms), developing a vaccine to control cattle ticks, objectively measuring cattle welfare, improving female reproductive rates, and developing technologies to reduce methane emissions and improve feed use in cattle.

In 2010, Beef CRC researchers continued to collaborate with researchers from the United States and Canada to evaluate results from a genome-wide association study, using Illumina's single nucleotide polymorphism (SNP) panel of 50 000 DNA (deoxyribonucleic acid) markers to identify associations with economically important productive and adaptive traits. The researchers discovered thousands of DNA markers associated with traits of interest. However, each marker accounts for such a small amount of genetic variation that they will need to be used collectively in prediction equations to add value to beef industry enterprises. In late 2010, the Beef CRC accessed a new high-density marker panel (approximately 850 000 SNPs). This is now being used to increase the accuracy of prediction equations, so that they are reliable across *Bos taurus* and tropically adapted breeds (rather than only within breeds).

The value of DNA markers to cattle breeders will be maximised if they are used in conjunction with systems such as BREEDPLAN's estimated breeding values and Meat Standards Australia. Work to integrate DNA markers into breeding systems is continuing with the international collaborators, to ensure that cattle breeders in Australia and North America are using consistent approaches and to promote the exchange of elite germplasm between countries.

Current projects are listed in Table A4.4.

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97 www.beefcrc.org.au

10.2.5 Cooperative Research Centre for Sheep Industry Innovation

The parasite project of the Cooperative Research Centre for Sheep Industry Innovation (Sheep CRC) aims to develop and communicate efficient and sustainable management recommendations for internal and external parasites.

In a series of trials in northern New South Wales, where *Haemonchus contortus* is the major nematode of concern, University of New England researchers have developed an integrated parasite management program based on pasture preparation to minimise intake of worm larvae by sheep, and a 'drench decision aid' to indicate whether some flocks may be left untreated. This program will enter an extension phase in early 2011. Investigations by the Department of Agriculture and Food Western Australia and the South Australian Research and Development Institute have centred on the 'targeted treatment' concept, in which some animals in a flock are not drenched, thereby reducing both treatment costs and the development of anthelmintic resistance. Field-scale demonstrations in 2010–11 will help develop locally appropriate recommendations.

Other research in the Sheep CRC investigates genetic solutions to parasite management. This includes genetic correlations with resistance to worm infection, and breeding values for breech wrinkle and cover, using the CRC's Information Nucleus⁹⁸ flocks. These flocks comprise ewes of several sheep breeds that are placed in a range of environments in five states and mated to particular sires. Data from the progeny provide genetic and environment comparisons for a large number of traits, which can be used to develop new and improved breeding stock.

The Sheep CRC has a strong focus on communication for parasite management, largely through the WormBoss⁹⁹ and FlyBoss¹⁰⁰ websites. These provide rapid access to nationally accepted and frequently updated technical information on management of sheep worms and blowflies, as well as regional control recommendations. In addition, 'Managing Flystrike' workshops for sheep producers are being conducted in all states, and a series on 'Managing Sheep Worms' will commence in 2011.

A number of CRC-funded postgraduate students are attached to various research activities in the parasite project.

98 www.sheepcrc.org.au/industry-tools-and-information/information-nucleus.php

99 www.wormboss.com.au

100 www.flyboss.org.au

Current projects are listed in Table A4.5.

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10.2.6 Dairy Futures Cooperative Research Centre

The Dairy Futures CRC¹⁰¹ is an extension of existing investments in pasture and animal-based biotechnology applications. It aims to develop opportunities from the past 7–10 years of investment to provide beneficial impacts for the dairy industry. Three programs of work are proposed:

- Program 1 (Designer forages) aims to
 - deliver a range of plant breeding technologies
 - using both genetically modified and conventionally bred plants — for ryegrass and white clover, to improve nutritive quality, disease resistance, drought tolerance and the use of novel endophytes
 - construct commercial models of cultivar development that can smoothly integrate the new technology
 - expand the range of target plants to include species that are capable of thriving in warmer and drier conditions; ryegrass technology will be extended into fescue and warm-season grasses, and white clover technology will be extended into lucerne
 - use core breeding technology to address new traits of interest, including bloat safety and mitigation of methane emissions from livestock.
- Program 2 (Animal improvement) aims to
 - complete commercialisation of the use of genomic selection in animal breeding; initially, this is expected to significantly improve the selection of young sires, although the technique has not yet been proven under Australian conditions
 - construct an ambitious and collaborative program of work to increase the reliability of genomic products, for both elite sires and commercial cows
 - use genomic selection to achieve progress with difficult traits such as fertility and longevity and to assess new traits such as feed conversion efficiency
 - expand the value of animal breeding using sex-selected semen; a range of new approaches will be considered, including stem cell technology.
- Program 3 (Capturing the farm, factory and community benefits) aims to address the complexity

of introducing large innovations into modern dairy farming systems. A well-positioned entrance of these large innovations (such as high-energy ryegrass) increases the adoption rate of the innovation, better positions its use, prevents its inappropriate use, and seeks to capture value from such an opportunity across the whole supply chain.

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10.3 University research programs

10.3.1 The University of Sydney

The Faculty of Veterinary Science, University of Sydney,¹⁰² has an international research profile and continues to have outstanding success in attracting competitive research grants. It has strong links with veterinary and animal health professional bodies, public health authorities, prestigious national CRCs and industry-based R&D corporations. The faculty's research¹⁰³ strengths are concentrated in the following areas:

- animal production systems
- infectious diseases
- veterinary public health and epidemiology
- veterinary pathology
- comparative genomics
- reproduction and genetics
- companion animal health and behaviour
- wildlife health and conservation biology
- equine medicine and performance sciences.

Table A4.6 lists the faculty's animal health research projects that were active in 2010.

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10.3.2 The University of Melbourne

The Faculty of Veterinary Science¹⁰⁴ at the University of Melbourne has research strengths in the diagnosis, prevention and control of infectious disease; morphology and cell biology; animal biotechnology; animal production systems and reproduction; and clinical studies. The faculty has particular interests in:

- developing new vaccines, approaches to control and diagnostic methods for infectious diseases

101 www.dairyfuturescrc.com.au

102 www.sydney.edu.au/vetscience

103 www.sydney.edu.au/vetscience/research

104 www.vet.unimelb.edu.au

- understanding the genomics and genetics of prokaryotes and parasitic worms
- understanding the roles of the extracellular matrix in bone and joint pathology, and the role of protease-activated receptors in musculoskeletal development and inflammatory disease
- developing new approaches to DNA vaccination
- developing animal models of asthma
- understanding the effects of biomaterials on wound healing and how biomaterials are affected by the body
- improving sheep farm profitability and reducing production risk
- improving synchrony treatments in dairy cattle to improve conception rates and treatment of anovulatory anoestrus
- understanding the epidemiology of mastitis in sheep and cattle
- the pharmacology of vasoactive agents and the pathophysiology of laminitis
- conducting wildlife disease surveillance.

Table A4.7 lists the faculty's research projects relating to animal health.

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10.3.3 Charles Sturt University

Charles Sturt University (CSU) has an ongoing commitment to supporting rural Australia's livestock industries. The first classes of students in the new veterinary degree and animal science programs graduated in 2010.

To support these programs, the School of Animal and Veterinary Sciences¹⁰⁵ has attracted academic staff — many of them early career researchers — with research interests in animal health across a range of species and disciplines. The school offers research training with a focus on large animal production research, especially within sustainable production systems. The school is developing novel approaches to curriculum delivery to ensure that graduates benefit from leading-edge teaching that is informed by research. There is a deliberate international focus, with collaborators in many countries, including Pakistan, India and China. These linkages allow CSU to offer exciting PhD training opportunities to international students from diverse countries. The major

105 www.csu.edu.au/faculty/science/savs

research areas are animal physiology, reproduction and genetics; parasitology, infectious diseases and animal health; animal welfare, nutrition and production; clinical sciences; and research in teaching.

Table A4.8 lists the animal health research projects at CSU.

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10.3.4 Murdoch University

The School of Veterinary and Biomedical Sciences¹⁰⁶ at Murdoch University gives research a high priority to complement its programs in veterinary, biomedical and animal sciences. Research in the school involves more than 160 postgraduate and honours students.

Research areas of particular strength include:

- animal production and animal health
- animal biosecurity and public health
- biomolecular control of disease
- aquatic animal health
- wildlife and conservation medicine
- companion animal health.

Researchers are active in projects to improve production, health and welfare in the sheep, cattle, pig and poultry industries. Areas of high activity include meat quality, efficiency of production, biomolecular approaches to disease control, practical approaches to developing indicators for animal welfare, and the live export industry (see Table A4.9).

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10.3.5 The University of Queensland

In 2010, most of the University of Queensland's research into animal health was conducted in the School of Veterinary Science and the School of Animal Science. From 2011, the School of Veterinary Science¹⁰⁷ will be merged into an expanded Faculty of Science. The School of Animal Science will become part of a reconstructed School of Agriculture, which will also be within the Faculty of Science.

The university recently established the Queensland Alliance for Agriculture and Food Innovation, bringing

106 www.murdoch.edu.au/School-of-Veterinary-and-Biomedical-Sciences

107 www.uq.edu.au/vetschool/

together leading scientists from the university and the Queensland Government. The alliance, which will hold institute status within the university, will allow university scientists and former government scientists from the Department of Employment, Economic Development and Innovation to work within three research streams – one of these streams is a centre for animal science. These changes open many new avenues for research collaboration.

Current research support is derived from Australian competitive grant programs, industry R&D organisations, CRCs, endowments and bequests, state government and Australian Government departments, and national and multinational companies. The largest individual sponsors of animal health research are currently the Australian Centre for International Agricultural Research, Meat & Livestock Australia and the Australian Research Council.

The new \$100-million veterinary science complex at the Gatton campus is now fully operational, with most staff and students based at Gatton. The facilities include the Veterinary Medical Centre, a Clinical Training and Small Animal Centre, a multistorey research building and state-of-the-art teaching spaces. The new facilities were partly funded by the Australian Government from the Higher Education Endowment Fund/Education Investment Fund (\$47.3 million). These facilities, combined with the \$33-million Centre for Advanced Animal Science (a joint venture with the Department of Employment, Economic Development and Innovation), mean that the University of Queensland's Gatton campus now provides world-class facilities to support research in the areas of animal growth, adaptation, welfare, health and vaccines (Table A4.10).

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10.3.6 James Cook University

The School of Veterinary and Biomedical Sciences¹⁰⁸ at James Cook University has a long and proud history of active research and international project management, first as a graduate veterinary school and, in the past 10 years, as an undergraduate biomedical and veterinary science teaching facility.

As the number of academic staff grows, the research profile of the school is evolving. It includes both human and animal health, as well as a keen focus on zoonotic disease and biosecurity.

The school's research strengths are currently concentrated in tropical animal diseases, tropical cattle production, tropical infectious disease and immunopathogenesis, aquatic pathobiology, environmental and public health microbiology, reproductive physiology, comparative cardiorespiratory physiology, neurophysiology, and emerging infectious diseases of wildlife.

The close association between the School of Veterinary and Biomedical Sciences; the School of Medicine and Dentistry; and the School of Public Health, Tropical Medicine and Rehabilitation Sciences facilitates a 'one health' approach to research activities.

Table A4.11 lists the livestock and wildlife health research projects of the School of Veterinary and Biomedical Sciences.

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10.3.7 University of Adelaide

The School of Animal and Veterinary Sciences¹⁰⁹ at the University of Adelaide began taking veterinary students in early 2008. The school provides an outstanding environment for research, with high-quality infrastructure and access to a variety of industry and research facilities. In addition, staff members are internationally recognised for their contributions to scientific and veterinary research.

The school is involved in various cooperative research centres and also has well-established links with many partner organisations that add considerably to the research opportunities available. These organisations include the South Australian Research and Development Institute, the Department of Primary Industries and Resources South Australia, the Pig and Poultry Production Institute, and Martindale Holdings. In addition, the school is building partnerships with ZooSA, Gribbles Veterinary Pathology, Equine at Morphettville, TAFE SA and the Institute of Medical and Veterinary Science.

The research interests of the school include areas of animal production and genetics, nutrition, wildlife ecology, laboratory animal science, animal welfare, musculoskeletal biology, epidemiology, physiology and anatomy. In addition, the research profile will expand over the next two years with appointments in veterinary microbiology, virology, parasitology, toxicology,

108 www.jcu.edu.au/vbms

109 www.adelaide.edu.au/vetsci

immunology and pharmacology, as well as the clinical disciplines.

Table A4.12 lists the research projects of the School of Animal and Veterinary Sciences.

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10.4 Research and development corporations

10.4.1 Meat & Livestock Australia

Meat & Livestock Australia (MLA) invests in animal health research to improve the profitability and sustainability of the beef cattle, sheep and goat industries in Australia.

MLA has invested in research into:

- Johne's disease (ovine and bovine)
- gastrointestinal nematodes in sheep
- respiratory disease in feedlot cattle
- infectious causes of reproductive wastage in cattle
- bovine ephemeral fever
- toxic plants
- internal and external parasites in cattle
- miscellaneous problems, such as acorn calf disease
- feral pig and rabbit control
- control of scouring in sheep and young calves.

In addition, MLA invests in research that will improve disease surveillance to help demonstrate freedom from disease and improve biosecurity, such as better tools for screw-worm fly diagnosis.

Table A4.13 lists MLA's livestock health research projects. More information can be found on the MLA website.¹¹⁰

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10.4.2 Rural Industries Research and Development Corporation

The Rural Industries Research and Development Corporation (RIRDC) works with industry and government to deliver their R&D priorities — to make Australia's rural industries more profitable, dynamic and sustainable. The RIRDC conducts R&D into:

- established rural industries, such as chicken meat,

rice, honey bees, horses, fodder crops and pasture seeds

- new and emerging industries, including new animal products, olives, Asian foods, truffles, organics and tea tree oil
- national rural issues, such as global challenges, dynamic rural communities and farm health and safety.

Most projects relating to animal health fall within the RIRDC's Established Rural Industries portfolio and the New Animal Products program in the New and Emerging Industries portfolio.

In 2010, a substantial number of reports from completed projects relating to animal health were published. These, and detailed reports of projects in progress in the animal health area, can be accessed on the RIRDC's website.¹¹¹

RIRDC animal health-related projects in 2010 are listed in Table A4.14.

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10.4.3 Dairy Australia

Dairy Australia is the dairy industry's service company, and is committed to supporting high standards of animal health and welfare on Australian dairy farms.

Animal health and welfare are essential for the efficient and productive operations of dairy farms, and good outcomes help to maintain the excellent reputation of the Australian dairy industry and its products. Investment by industry in research, development and extension has focused on projects for prevention and control of cattle diseases, genetic improvement, enhanced nutrition, and improved animal handling and husbandry practices. Priorities for the dairy industry are integrating biosecurity measures into whole farm management, and improving calf management.

Research projects provide information for dairy farmers and their advisers to prevent diseases, achieve good animal welfare outcomes and establish appropriate animal management systems and practices. The industry conducts several national projects addressing animal health topics, as well as a large number of small, regionally based projects. For example, Countdown Downunder is Australia's national extension program for preventing, diagnosing and treating mastitis. The InCalf project focuses on improving reproductive performance,

110 www.mla.com.au

111 www.rirdc.gov.au

and BJD Aware promotes strategies to manage and control bovine Johne's disease. CowTime, which focuses on milk harvesting, delivers extension on reducing stress for cows at milking, including principles of stock handling, dairy design and cow behaviour.

Building on the successful control of enzootic bovine leucosis (EBL) in dairy cattle, the Australian Dairy Industry Council and animal health authorities implemented a national program to eradicate EBL from the Australian dairy herd. Provisional freedom was achieved in December 2009, and the first annual monitoring was completed in 2010, with negative results.

To improve the skills of dairy farmers and their employees, Dairy Australia has established the National Centre of Dairy Education Australia to develop and deliver vocational education and training for the dairy industry. The animal health and welfare content is regularly revised and updated.

The Dairy Futures CRC was established in January 2010 through a government and industry partnership to deliver major improvements to plant and animal breeding.

Dairy industry research projects are listed in Table A4.15. More information can be found on the Dairy Australia website.¹¹²

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10.4.4 Fisheries Research and Development Corporation – Aquatic Animal Health Subprogram

The Fisheries Research and Development Corporation (FRDC) invests in areas of R&D that aim to benefit all sectors of Australian fisheries – the commercial sector (wild-catch, aquaculture and post-harvest), the recreational sector and the Indigenous sector. The FRDC's Aquatic Animal Health Subprogram (AAHS) was established specifically to develop, support and manage a portfolio of aquatic animal health research projects, in consultation with the fisheries and aquaculture industry. The focus of the AAHS is on infectious diseases of finfish, crustaceans and molluscs.

Australian aquaculture continues to grow and currently contributes more than one-third (\$868 million) of Australian fisheries' gross value of production (\$2187 million¹¹³). Although aquaculture is an important

industry sector, R&D for aquatic animal health is required for all aquatic animal sectors, including the wild-catch, recreational and ornamental sectors. The requirement for expert health services and advice, and therefore R&D activities, continues to increase. These are essential for the profitability, productivity and sustainability of Australia's aquatic animal industries, and to protect Australia's natural resources.

The AAHS R&D plan, which was reviewed in 2009, has six key research areas:

- nature of disease and host–pathogen interaction
- aquatic animal health management
- endemic and exotic aquatic animal disease diagnostics
- surveillance and monitoring
- aquatic animal disease therapy and prophylaxis
- training and capacity building.

More information can be found on the subprogram website.¹¹⁴ The revised AAHS R&D plan can be obtained by contacting the Subprogram Leader.

Table A4.16 lists current research projects.

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10.4.5 Australian Wool Innovation

The mission of Australian Wool Innovation Limited (AWI)¹¹⁵ is to invest in research, development, marketing and promotion to:

- enhance the profitability, international competitiveness and sustainability of the Australian wool industry
- increase demand and market access for Australian wool.

AWI's vision is to be a significant contributor to a vibrant, stable and profitable wool industry, providing the world with the best natural fibre.

The 2010 calendar year covered two operational plans (2009–10 and 2010–11). The plan for 2010–11 focuses on:

- fostering sustainable, profitable and ethical animal care and wool production
 - reducing impacts of illness, infestation and predation on productivity and/or welfare

112 www.dairyaustralia.com.au

113 Australian Bureau of Agricultural and Resource Economics (2009). *Australian Fisheries Statistics 2008*, Canberra.

114 www.frdc.com.au/research/Animal-Health

115 www.wool.com/default.htm

- gaining productivity through improved sheep resilience, reproduction and/or fleece production
- supporting provenance and welfare credentials to protect market access and increase demand for wool
- improving the industry’s reputation for ethical, sustainable and responsible animal care
- creating labour and production efficiencies in clip harvesting and preparation
- reducing the incidence and impacts of clip contamination
- enhancing the industry reputation for wool clip quality
- fostering sustainable, profitable and ethical land and resource management
 - gaining productivity through optimal land and resource management
 - increasing resilience and adaptability to climate change
 - gaining productivity through advances in carbon sequestration and global greenhouse gas mitigation
- supporting provenance and eco credentials to protect market access, support participation in carbon trading markets and increase demand for wool
- improving the industry’s reputation for ethical, responsible and sustainable land and resource management
- fostering industry resilience, confidence and growth
 - participation, use, adoption and retention rates
 - increasing wool grower resilience, pride and confidence
 - developing integrated communication strategies with stakeholders and marketplace
 - improving industry reputation for productivity, profitability and responsible custodianship of land and animals.

Table A4.17 lists current research projects.

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