AGRIBUSINESS AND FOOD EDUCATION AND RESEARCH
AUSTRALIAN EXPERTISE IMPROVING PRODUCTIVITY AROUND THE WORLD

Australia is recognised internationally for the productivity of its agriculture sector and the high quality and integrity of the food it exports.

As countries all over the world are seeking to modernise their food production and build the sustainability of their use of land, water and other resources, they are turning to Australia’s research, skills development and training capacity to ensure their investments in infrastructure, equipment and inputs are put to good use.

INDUSTRY OVERVIEW

In addition to its food production capabilities, Australia has earned a global reputation for the quality of its international delivery of education and research. Australia is also internationally recognised for its integrated approach that links teaching and learning, research and development (R&D), and practical industry needs.

These strengths, combined with a tradition of innovative problem-solving in agriculture and food production, have helped Australia become a regional leader in education, research and skilling in these industries.
KEY CAPABILITIES

Australia is a global leader in the provision of education services. Today, education is Australia’s largest services export and its third largest export industry overall. Education and R&D in agricultural and food sciences spans an extensive network of over 600 organisations and government and industry affiliations, providing education and training across the agriculture, agribusiness and food sectors.

The sector finances and develops scientific and technology-based improvements to farming techniques. Consistent year-on-year productivity gains have been achieved over the past 50 years, across a diverse range of production systems and environments that are similar to many of Australia’s key trading partners. These span arid, temperate, tropical and sub-tropical climates and marine environments. While many areas of the country are highly productive and fertile, Australia has also achieved success where there are challenging resource limitations including low rainfall, high salinity, poor quality soils, and limited infrastructure.

Australia’s reputation for leadership and innovation in agricultural production has been built on pioneering research in agriculture and food production. Research spans food security and sustainability, adaptive farming techniques, disease resistant and higher yield crops, IVF and embryo transfer technologies, genomics, precision agriculture technologies and soil, water and other sustainable resource management.

EDUCATION AND TRAINING

Australia has a long record of utilising competency and assessment-based education and training to improve the skills pool of its labour force. This approach has been adopted by many countries across all aspects of agriculture and food security at many levels:

- skills development via vocational training
- knowledge transfer of environmentally friendly and more efficient farm management techniques via higher education degrees
- world-leading R&D in areas of global importance, including sustainable food production and food safety, disease prevention, increased yields in crops, and genetic technologies.
UNIVERSITIES

Australian university programmes in agriculture, agribusiness and food sciences offer professional qualifications, industry accreditation and memberships that are internationally recognised, driving a global knowledge base.

In addition to dedicated programmes of study, Australian universities conduct and contribute to R&D in the agriculture and food sectors through co-located research institutes, centres of excellence and industry-funded research. These collaborations contribute significantly to degree programme offerings at undergraduate and postgraduate level.

Commercialisation of new research is assisted through business development and commercial entities attached to universities. These facilitate early business incubation, attract investment and funding and generate new income streams through extension and application of research outcomes. Cooperation across teaching and research is further strengthened through the Council of Agricultural Deans, which serves as a forum for university agriculture in Australia.

All Australian universities with a strong agriculture and food sciences focus are ranked in the world’s top 1000 universities, with 6 in the top 100 and 15 in the top 200. In R&D, Australian universities are ranked at above and well above world standards.2

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<thead>
<tr>
<th>City</th>
<th>Melbourne</th>
<th>Sydney</th>
<th>Canberra</th>
<th>Brisbane</th>
<th>Adelaide</th>
<th>Perth</th>
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<tr>
<td>World rank</td>
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<td>4</td>
<td>21</td>
<td>23</td>
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In addition to academic excellence, Australia is a popular location for international students. In 2014, six Australian cities were listed in the top 50 Best Student Cities in the World (QS), ranked by international students and researchers in Australia.5

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**COMPARATIVE RANKINGS**

<table>
<thead>
<tr>
<th>Australia’s rank 2014</th>
<th>University</th>
<th>World ranking Top 100</th>
<th>Agriculture, fisheries &amp; food sector Top 100</th>
<th>Agriculture &amp; forestry sector Top 100</th>
<th>Life &amp; agricultural sciences sector Top 200</th>
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<tbody>
<tr>
<td>1</td>
<td>Australian National University (ANU)</td>
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<td>2</td>
<td>University of Melbourne</td>
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<td>University of Queensland</td>
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<td>5</td>
<td>University of New South Wales (UNSW)</td>
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</table>

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**VOCATIONAL EDUCATION AND TRAINING (VET)**

Vocational education and training (VET) in Australia focuses on the training and development of the national workforce and is a major export. There are over 4400 registered training organisations (RTO) in Australia, with 1300 public state and territory technical and further education (TAFE) institutions and approximately 3100 private RTO providers.

VET delivers the majority of practical vocational training and skilling in agriculture and food processing in Australia, with many programmes tailored to suit individual client requirements. Particular strengths of the VET sector recognised by the OECD, UNESCO and the ILO include:

- meeting industry needs
- providing high-quality training and connecting skills with job outcomes
- delivering nationally agreed and internationally transferrable curriculum models
- strong leadership and engagement with industry and skills councils.

The competency-based training methodology is flexible, which allows portability of nationally recognised qualifications in an international context and encourages recognition of prior learning regardless of where it is undertaken.

Australia’s industry-led VET system is used as a benchmark in an international comparison of quality assurance and a model of best practice.

More than 230,000 international students are enrolled in the VET sector. Australian TAFE is active in over 50 countries around the world, transferring experience and know-how from the Australian system and enhancing communities and economies through in-country (transnational) delivery of specialised training and skills development.

**CASE STUDY: AUSTRALIAN VETERINARY ACADEMICS SHARE THEIR KNOWLEDGE IN VIETNAM**

Chamberlain Veterinary Services Pty Ltd and the University of Queensland (UQ) are helping train the next generation of animal health professionals in Vietnam through an advanced veterinary program delivered with Nong Lam University (NLU) in Ho Chi Minh City.

With a growing population and increasing middle-class economy, Vietnam is responding to the challenges of growing a sustainable animal industry through domestic production and increased importation of livestock.

The programme is a part of the Vietnamese Ministry of Education and Training’s (MOET) strategy to develop domestic industry capacity around animal production and disease management, quality assurance, animal health and welfare and to build international trade.

Entering its fifth year, and supported by an MoU between the School of Veterinary Sciences (SVS) UQ and NLU, the programme uses the University of Queensland’s curriculum as the basis for developing an internationally recognised tertiary training programme in Vietnam.

The programme currently has up to 60 students per year, with all classes taught and assessed in English. To date, more than 28 UQ SVS academics have visited NLU to deliver face-to-face lectures as well as holding teaching methodology workshops, and more than 20 NLU academics have undertaken academic exchange at UQ to learn about the curriculum.
RESEARCH DEVELOPMENT AND EXTENSION (RD&E)

Australian RD&E has assisted many countries to improve production yields, safety and quality, enhancing the efficiency of supply chains for the benefit of local and international communities and brokering partnerships between researchers and industry, governments and the international community.

Australia’s focus on RD&E in the agriculture and food sectors is a major contributor to improving global productivity, addressing challenges in climate change and improving food sustainability and long-term food security. Australia has worked with many countries in land and farm management, animal production, crop and pasture production, fisheries science, forestry science, horticultural production, veterinary sciences and other agricultural sciences.

More than 100 research institutes and centres are currently operating across education, industry and government in agriculture and food sciences, collaborating with local and international partners in best-practice application and commercialisation solutions.

Australia’s Rural Research and Development Corporations (RDCs) are a unique partnership between the Australian Government and the Agriculture, Forestry and Fisheries industries to co-invest in research and development. There are currently 15 RDCs, spanning major crop and animal industries.

The RDCs commission and manage targeted research and foster uptake and adoption based on the identified needs and priorities of both industry and the Australian Government. Their focus is on expanding Australia’s rural R&D effort, improving industry effectiveness and efficiency by investing in high priority areas and encouraging uptake of research results to improve international competitiveness and sustainability.

CASE STUDY: TAFE QLD TAKES MEAT INDUSTRY SKILLS TO NEW MARKETS

Specialised training programmes for meat industry workers developed by TAFE Queensland South West (TQSW) are now being delivered to the meat industries in Indonesia, Malaysia and Vietnam.

The training programmes focus on animal welfare, meat hygiene and safe meat processing practices.

With a focus on staff employed in the animal processing industries, the training curriculum is based on Australian Standards (AS4696:2007) for the hygienic production and transportation of meat and meat products for human consumption. The programmes are tailored to suit the requirements for each country and delivered through government and industry partnerships. In Malaysia this is through the Department of Veterinary Services (DVS) for Abattoir Management and Development Section and Biosecurity and SPS Division - Veterinary Inspection Section. In Vietnam this is through the Ministry of Agriculture and Rural Development (MARD) and the Department of Animal Health (DAH), and in Indonesia through the Indonesian Ministry of Agriculture.

The training is part of an overall skills development programme, with theory and practical activities delivered in Australia over six weeks. Assessment is carried out in-country by TQSW staff to monitor and assess ‘on-the-job’ demonstrations. On return to country, the participants are encouraged to act as mentors and drive improvements within the meat industry, becoming champions of change when introducing the new procedures learnt in Australia into their existing facilities.

TQSW staff continue to be mentors to the participants to assist with implementation and progression of best-practice methods.

Image courtesy of TAFE Qld

Image courtesy of TAFE Qld
CONSULTANCY

Australian agribusiness consultants work across all aspects of the sector, helping producers and landholders apply the latest research, practices and technology to their farms and businesses through services that include:

Farm management – assisting clients to maximise economic returns from farming through whole-farm planning and budgeting, agronomy advice on crops, plant species and varieties, weed and disease control, chemical application, crop rotation, livestock production and enterprise evaluation.

Soil management – helping identify long-term solutions for existing soil problems through laboratory analysis of soil, plant and water samples, soil nutrition, fertiliser and soil management solutions, pre-planting soil and efficient water use.

Precision agriculture – assisting in assessing feasibility and implementation of precision or satellite farming as a whole-of-farm management approach, incorporating technologies such as satellite imagery, information technology and geospatial tools to improve profitability. Precision farming allows farmers to collect detailed information about paddock performance or specific animal activity to understand how to improve field-level management more effectively.

CASE STUDY:
LADYBIRD LEADS THE WAY IN PRECISION AGRICULTURE

Agricultural robots developed by the Australian Centre for Field Robotics (ACFR) are a new way for farmers to incorporate precision agriculture techniques into their operations. Based in Australia at the University of Sydney’s School of Aerospace, Mechanical and Mechatronic Engineering, the ACFR has been instrumental in developing breakthrough technologies and conducting world-leading R&D in the field of agricultural robotics. The centre is dedicated to the research, development, application and dissemination of autonomous and intelligent robots and systems for outdoor operation.

To date the ACFR’s best-known device is a solar-powered, electric-driven robotic device ‘The Ladybird’, named for its distinctive red and black appearance. The Ladybird carries a variety of different sensors, all with precision agriculture applications for the vegetable industry. It can help farmers collect intelligence on nutritional information, autonomous farm surveillance, mapping, classification and detection of pests and, eventually, autonomous weeding and harvesting. The Ladybird has been successfully trialled in Cowra, New South Wales on onions, beetroots and spinach crops.

As well as the Ladybird, the ACFR is currently developing two new low-cost robotics technologies to assist agriculturalists in taking their farms into the future, as well as providing an education tool for the next generation of growers. These two new variants will capture a wide range of agriculture applications, from livestock to tree crops and vegetable rows.

The centre has partnered with major national and international agencies in academia, government and industry and has also established a number of leading research centres funded by the Australian Research Council, mining, security and defence, and environmental agencies.
FOOD PRODUCTION, SAFETY, TRACEABILITY AND QUALITY ACCREDITATION

Australia’s food and beverage sector is a major industry domestically and exports to over 200 international markets. Australia has a rigorous regulatory environment, supported by an extensive government and industry framework, that ensures the quality, safety and consistency of Australian products and underpins Australia’s clean and safe reputation. Many countries around the world have incorporated Australian systems and processes into their regulatory frameworks.

Australia’s food and beverage production sector is highly developed, thanks in part to Australia’s multicultural population, which has driven capacity across many categories of food and beverages. Australia draws on the advantages of European, Asian and Middle Eastern influences across a diverse range of foods, including specific categories such as kosher, halal and organic, each of which is covered by food certification systems and standards. The industry is highly dynamic, driven by the demands of globally connected consumers who seek diversity, quality and value.

An extensive network of R&D facilities assists in the innovation and extension process by facilitating development of new and differentiated products, new food processing, separation and packaging technologies and innovation and a reliable supply of high quality raw materials. This is supported by a strong food safety system through Food Standards Australia New Zealand (FSANZ), and an environment that encourages creativity, innovation and collaboration.

International companies such as Nestle, Unilever, Associated British Foods, DSM, Danisco, Parmalat, Mars, McCains, Simplot, and Hakubaku have invested in Australian operations. They have recognised the advantages of local production and business expertise, access to quality produce and food safety, internationally accredited and highly trained staff and Australia’s international reputation for excellence in agricultural and food products.

CASE STUDY: AUSTRALIAN ORGANIC BUILDS CERTIFICATION SKILLS INTERNATIONALLY

With global consumer demand for organic produce continuing to grow at an unprecedented rate, the Australian Organic (AO) group, through its subsidiary Australian Certified Organic (ACO), is helping to address the challenge of implementing organic verification and certification systems in several countries.

ACO provides certification services to operators from all sectors of the organic industry. Certification ensures compliance with national production standards and allows traceback of all products to their origin. Through its certification division, the company has developed a training and certification package based on existing international certification guidelines.

The training programmes equip new and existing certification bodies and their auditing staff with organic certification skillsets, and are currently running in China, Vanuatu, Thailand and Australia.

Training is carried out over a five-day programme, finishing with written and practical examinations. The content includes the various organisational certification requirements and organic standards for the United States Department of Agriculture (USDA), European Union (EU) certification, COSMetics Organic and Natural Standards (COSMOS), Korean Organic Standards and Japanese Agricultural Standards (JAS). Training reviews and auditor refreshers programmes are planned annually.
INDUSTRY AND RESEARCH ORGANISATIONS

The following are some of the organisations involved in education and R&D in the Australian agriculture and food sector; contact your local Austrade representative about connecting and partnering with organisations in this sector.

EDUCATION AND TRAINING

The Australian Council of Deans of Agriculture (ACDA) is a peak body representing issues of common interest that affects agricultural activities in Australian universities. csu.edu.au/special/acda

Universities Australia represents Australian universities in the public interest, both nationally and internationally. universitiesaustralia.edu.au

Australia’s vocational education and training (VET) sector includes technical and further education (TAFE) institutes, community education providers, agricultural colleges and private providers across eight states and territories.

Queensland tafeqld.edu.au
New South Wales tafensw.edu.au
Victoria education.vic.gov.au/ victorianskillsgateway
Tasmania tastafe.tas.edu.au
South Australia tafesa.edu.au
Western Australian eti.wa.edu.au

AgriFood Skills Australia leads the development of training packages in agrifood, animal care, rural, seafood, meat and food processing www.agrifoodskills.net.au

Australian Council for Private Education and Training (ACPET) is the national industry association for independent providers of post-compulsory education and training for Australian and international students acp.et.edu.au

Rural Skills Australia works to improve rural involvement in education and training, enhancing the skills and capabilities of those in agriculture. ruralskills.com.au
RESEARCH

National Centre for Vocational Education Research (NCVER) is a Commonwealth, state and territory owned not-for-profit company that aims to inform and influence vocational education and training in Australia. ncver.edu.au

Horticulture Innovation Australia (HIA) is a not-for-profit, grower-owned research and development corporation (RDC) for Australia’s $9 billion horticulture industry. horticulture.com.au

CSIRO, the Commonwealth Scientific and Industrial Research Organisation, is Australia’s national science agency. csiro.au

Australian Centre for International Agricultural Research (ACIAR) is part of the Australian Aid Program and encourages Australia’s agricultural scientists to use their skills for the benefit of developing countries as well as Australia. aciar.gov.au

The Grains Research and Development Corporation (GRDC) is a grains research organisation responsible for planning, investing in and overseeing RD&E to deliver improvements in production, sustainability and profitability across the Australian grains industry. grdc.com.au

The Fisheries Research and Development Corporation (FRDC) is a co-funded partnership between the Australian government and the fishing industry to plan and invest in fisheries research, development and extension (RD&E) activities in Australia. frdc.com.au

The Cooperative Research Centres Association (CRCA) was established to improve the effectiveness of Australia’s research effort by bringing together researchers in the public and private sectors with end-users and through a focus on research applications. crca.asn.au

Dairy Futures Research Centre creates a positive future for dairy farmers and companies that provide products and services to the dairy industry through transformational innovations. dairyfuturescrc.com.au

Australian Wine Research Institute (AWRI) supports the Australian grape and wine industry through world-class research, practical solutions and knowledge transfer. awri.com.au

The Crawford Fund is a non-profit non-government organisation that raises awareness of the benefits to Australia and developing countries from international agricultural research, commissions studies on research policy and practice, and arranges specialist training activities for developing country scientists. crawfordfund.org
REFERENCES


GOVERNMENT DEPARTMENTS AND INDUSTRY ASSOCIATIONS

Food Standards Australia New Zealand (FSANZ) is a bi-national government agency that develops and administers the food standards code and the requirements for foods, additives, food safety, labelling and GM foods. foodstandards.gov.au

Department of Agriculture aims to enhance the sustainability, profitability and competitiveness of Australia’s agriculture, food, fisheries and forestry industries. agriculture.gov.au

Dairy Australia is the national services body for dairy farmers and the dairy industry. dairyaustralia.com.au

Meat & Livestock Australia Limited (MLA) is the national industry body responsible for delivering marketing and R&D services for Australia’s cattle, sheep and goat producers. mla.com.au

The National Seafood Industry Alliance brings together the Commonwealth, national, state and territory peak industry bodies in the commercial and wild-catch fishing and aquaculture industries to provide national representation to the Australian government. seafoodforaustralia.com.au

National Farmers Federation (NFF) is the peak national body representing farmers and, more broadly, agriculture across Australia. nff.org.au

Australian Organic owns and supports the nation’s largest organic certifying group Australian Certified Organic. austorganic.com / aco.net.au

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