AGRICULTURE
RESEARCH,
CONSULTING,
TECHNOLOGY AND
EQUIPMENT
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The Australian agribusiness sector is ideally placed to meet increasing worldwide demand for farm products and services.

As global challenges such as population growth, changing consumption patterns, climate change, food security and the need to improve farm productivity become increasingly urgent, Australia offers best practice solutions in agricultural research, consulting, technology and equipment.

Australia is rich in natural resources and has a strong history of primary industry development. Its varied climate has fostered the development of a wide range of agricultural technology and equipment to help farmers make the most of an often harsh environment.

Scientific and technical advances have helped place Australian farmers at the forefront of efficiency and productivity. This success has largely been due to the combined efforts of farmers, public-sector agricultural researchers and extension agencies.

This industry capability statement provides an overview of Australian capability in agribusiness research, consulting, technology and equipment, including examples of some of the many Australian companies with specialist expertise.

Talk to your local Austrade representative for tailored advice and information about connecting and partnering with the Australian agribusiness industry.
Agribusiness holds a significant place in the Australian economy. In 2011-12, the total value of Australian farm and fisheries food production was $42.6 billion. Australian food exports were valued at $30.5 billion in 2011-12, with over 50 per cent of exports going to Asia.¹

Geographic isolation, combined with strict quarantine and monitoring standards, all contribute to Australia’s reputation for high quality products. Australian produce is an important part of global year-round food supply, thanks to proximity to Asia, free trade agreements and counter-seasonal production to the northern hemisphere.

Modern Australian agribusiness is built on over 100 years of agricultural success and innovation. Around the turn of the 20th century, a number of Australian inventions and production methods, such as the stump-jump plough, the combine harvester and disease-resistant wheat varieties, contributed to expansion and increasing sophistication in farming.

Australian agriculture has consistently financed and developed science-based methods. This focus has yielded an average annual agricultural productivity gain of two per cent over the past 50 years.

For example, annual milk production per cow has more than doubled since 1967 – from 2298 litres to 5816 litres.²

These productivity improvements have been achieved through a combination of methods, including innovative farming techniques, scientific developments in areas such as plant and animal breeding, and improvements in management of crops, livestock, land, water and pests.

Supporting these advances, the increased availability and use of sophisticated machinery and information technology allows farmers to work smarter. Australia is a logical supply source for a wide range of agricultural products, food and biofuels. The professional farming community also represents an educated and reliable supply chain partner for international customers.

Australian farm and fish production 2011 – 2012

$42.6b

Source: Australian Food Statistics 2011-12.¹
Research

Australia leads the world in many areas of agricultural research. Research and development is carried out by state and federal government, institutions and private organisations, including numerous cooperative research centres (CRCs) that bring together industry and government resources.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia’s national science agency. Several of its National Research Flagship areas of focus are directly linked to agribusiness: agrifood technologies and collaborations, sustainable agriculture and fisheries management, water management and biosecurity. In addition, the CSIRO collaborates with a number of CRCs and university research centres on specific areas of focus.

Current CSIRO research spans:

**Sustainable agriculture**
- declining areas of native vegetation
- water use efficiency
- dryland salinity
- soil acidity
- applications of precision agriculture technology

**Livestock and fisheries**
- animal health
- livestock production
- fisheries

**Crops**
- crop improvement and management
- cropping systems and economics
- Pacific crops
- horticulture

**Natural resource management**
- land and water resources
- soil management and crop nutrition
- forestry

**Economics and social sciences**
- agribusiness
- agricultural systems management
- agricultural development policy.

Other leading research centres include:

- **Rural Industries Research and Development Corporation (RIRDC)** is a statutory authority established by the Australian Government to work with industry to invest in research and development for a more profitable, sustainable and dynamic rural sector. Its research programs cover numerous aspects of animal and plant industries as well as issues facing rural populations.

- **Fisheries Research and Development Corporation (FRDC)** a co-funded partnership between its two stakeholders, the Australian Government and the fishing industry. It works to plan and invest in fisheries research, development and extension activities in Australia.
New CSIRO soybean a hit in Japan

Case study: research

A new soybean variety is gaining popularity in Japan due to its enhanced suitability as an ingredient in traditional Japanese dishes. Bred by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) from an existing Japanese variety, the Bunya® soybean was selected and released via the National Soybean Breeding Program funded by the Grains Research and Development Corporation.

Bunya produces a suite of proteins that gel quickly and firmly – important characteristics for making a range of soy-based foods like tofu and custard, as well as edamame and some types of miso.

Bunya has become the preferred Australian soybean variety sold in Japan – and the preferred variety used by Australian tofu manufacturers – because it has a traditional Asian flavour and its large seeds produce higher yields of soy milk and custard.

Farmers that grow the Bunya soybean can also see benefits, such as its increased yields of better quality beans when grown in favourable conditions.

Bunya plants are small which means they can be planted more densely than other soybean varieties. Bunya also has a trait from tropical soybean varieties that enables it to extend its juvenile phase, making it more suited to a wider range of growing environments than other soybean varieties.

The CSIRO is now working on another new variety, ‘Hayman’, which is due for release in late 2013 and has similar proteins and fast gelling properties that make Bunya popular.
New variety takes the chill out of rice growing

Case study: research

A research collaboration by government and industry organisations has produced a new variety of rice with enhanced cold tolerance.

‘Sherpa’ is a medium-grain cultivar developed in New South Wales as a shared project of the Rural Industries Research and Development Corporation (RIRDC), Industry and Investment NSW and commercial company SunRice.

A period of cold weather at the time of pollination can reduce crop yields by 40 per cent or more and is one of the challenges facing rice growers in temperate areas of Australia.

Sherpa’s increased cold tolerance has the potential to reduce the need for deep water growing conditions. As well as being able to tolerate temperatures down to 11.5°C, it has greater water use efficiency and matches all other quality aspects of existing mid-season medium grain cultivars.

During the seven year testing period, Sherpa demonstrated a 13 per cent higher average yield than the leading medium-grain variety ‘Amaroo’, which resulted in a higher yield by two to four tonnes per hectare.
CSIRO develops a mighty prawn

Case study: research

After ten years of careful breeding and research, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) scientists have developed an improved Black Tiger prawn which is producing record yields in aquaculture farms and winning awards for its superior quality.

With beautifully textured meat, rich colour, robust size and outstanding flavour, the prawn produced by CSIRO’s industry partner, Gold Coast Marine Aquaculture (GCMA), has won Gold Medals in 2009, 2010, 2011 and 2013 at the Sydney Royal Fine Food Show.

Using DNA technology, a team from CSIRO’s Food Futures Flagship worked with Australian prawn farmers to breed and select improved Black Tiger prawns. The selected stocks are grown in drought-proof saltwater ponds, and have improved growth and survival rates, breaking national and international yield records.

Leader of the CSIRO Food Futures Flagship prawn research project, Dr Nigel Preston, said that the specially bred prawn has the potential to revolutionise the local and international prawn farming industry.

‘The new prawn’s yield has exceeded all our expectations. Average industry productivity for farmed prawns is only five tonnes per hectare, so the average yield of 17.5 tonnes per hectare is a major leap forward,’ Dr Preston said. ‘These huge yields can be replicated year after year, the technology is available to all Australian prawn farms and is being progressively adopted across the industry, which means consistent supply of a reliable and high quality product.’
CONSULTING

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. The following are some of the services they offer.

Farm management
Australian farm management consultancy services work to assist clients in producing the most economic returns from farming. Typical services include:
• whole-farm planning and budgeting
• agronomy advice, such as development of cropping and pasture programs that cover:
  – plant species and varieties
  – fertiliser strategies
  – weed and disease control strategies
  – chemical and fertiliser application programs
  – input requirements and costings
• crop rotation plans
• livestock production and management
• enterprise evaluation
• business planning.

Soil management
As well as identifying soil problems and recommending solutions, Australian consultants assist farmers to develop long-term management plans, with services like:
• laboratory analysis of soil, plant and water samples
• evaluation of soil and plant nutrition problems
• yearly fertiliser and soil management programs
• pre-planting soil amendment programs
• monitoring of sports fields and public reserves
• programs for more efficient water use.

Precision agriculture
Precision farming or satellite farming is a whole-farm management approach that makes use of new technologies like satellite imagery, information technology, and geospatial tools to help improve profitability.

Using precision farming software and hardware, farmers can locate their precise position in a field, collecting information about paddock performance at minimal cost.

With services and solutions like tailored software packages and digital imagery for vegetation mapping and monitoring projects, Australian precision agriculture specialists can help farmers improve field-level management through:
• crop science
• environmental and soil management (e.g. limiting leaching of soil nutrients)
• economics - boosting competitiveness through more efficient practices (e.g. fertiliser usage and other inputs).

Precision agriculture also provides farmers with information to help improve record-keeping and decision-making and produce higher quality products (e.g. wheat with higher protein levels).
As global demand for animal protein continues to grow, Australian consultants are well placed to offer specialist services and advice to help optimise production efficiency, including:

- pastoral nutritional management
- crop and fodder management and conservation
- silage production, storage and management
- feed commodity selection, quality assurance, handling, processing and storage
- nutritional audits
- feeding strategies and practices
- evaluation of feedstuffs
- selection of feed mixing and handling equipment
- feed process engineering and specialist feed processing
- feedlot specifications and setup
- ration formulation and least cost ‘optimum’ formulations
- defining specifications for target animals
- performance evaluation and computer production models.

Backed by strong biotechnology and research sectors, Australian consultants offer a wide range of expertise across many aspects of animal health and productivity, including:

- animal breeding and herd improvement, including genetic and molecular biology technologies such as genetic mapping to identify favourable and unfavourable traits
- disease diagnosis, epidemiology and disease surveillance
- risk assessment and management
- data analysis
- international livestock movement
- biosecurity.
BioAg helps boost crop yields around the world

Case study: soil management

Australian company BioAg’s biological soil and plant nutrition products are being used by farmers throughout Australia, New Zealand, South-East Asia and the UK to improve their soils, crops, pastures and animal health.

Based in western New South Wales, BioAg produces liquid plant-available nutritional products comprising dormant cultures of microbes and their metabolites in nutrient solutions by fermentation, as well as biologically digested reactive phosphate rock products.

The company’s approach is to provide farmers with biologically-active nutrients and programs that help to produce a living, healthy and balanced soil for optimum plant and livestock productivity. Its microbial cultures also assist with effluent management in dairy farms and other enterprises.

Within Australia, BioAg’s soil nutrition programs have been applied to broadacre cropping, pasture, viticulture, tree crops, horticulture and effluent digestion.

In addition to its Australian trial program, BioAg has conducted cropping trials on wheat, maize, rice, soybeans, cotton and sugar cane in India, Sri Lanka, the USA and Pakistan. Horticultural trials have been conducted in Sri Lanka and India on bananas, potatoes and other vegetable crops and dairy effluent trials have been conducted in the UK.
ACIL Tasman creates a plan for success

Case study: consulting

When major Malaysian investment company Kazanah NB was looking to enter the local agribusiness sector, it sought the expertise of Australian economic consultancy ACIL Tasman (now ACIL Allen Consulting).

ACIL Tasman was commissioned to undertake a detailed analysis of Kazanah NB’s agribusiness entry strategy (including retail, manufacturing and supply chain management) into Malaysia.

The completed study had several components, including:

- a thorough analysis of food retail and consumption trends in Malaysia, the region and broad global trends
- supply chain analysis and design, comprising three sections:
  - an overview and analysis of global supply chain research
  - methods of supply chain coordination through contracts
  - an outline of key success factors
- the development of a series of case studies detailing how relevant successful (and not so successful) supply chains have been designed and implemented by other companies
- a supply chain design for a selected product
- an overview of cooperative structure alternatives
- an overview of the development of agricultural capital markets.

The final stage of this project was the preparation by ACIL Tasman of a comprehensive business plan for Khazanah NB to establish an agribusiness investment. This business plan had to cover several specific criteria; the investment had to make a commercially acceptable rate of return and effect change in Malaysian agriculture and fresh produce supply chains.

Khazanah NB has now fully implemented all of the main elements of the business plan.
Australian agricultural biotechnology companies and research and development organisations create and market technologies that help improve production efficiency and sustainability across all aspects of agriculture.

**Biotechnology and gene technology**

Australian biotechnology and gene technology specialists span a diverse range of areas, such as animal health, improved grain yields and quality, environmental stress tolerance, pest control, herbicide tolerance, disease resistance, lipid enhancements (increased oil, improved fatty-acid composition), protein enhancements (improved amino-acid content), carbohydrate enhancements, and bioactive compounds.

Crop based agricultural biotechnology products offer production-enhancing traits that complement or replace traditional agricultural chemical inputs, such as strains with herbicide tolerance or increased resistance to pests, viruses and fungi.

Biotechnology is also used to improve agronomic characteristics of crops, including crops that use nitrogen more efficiently, or are developed to better tolerate stress, such as drought, alkaline soils, or frost.²

Animal health applications apply advances in genetics and molecular biology to discover and create new and more powerful therapeutic products (proteins, antibodies, enzymes, genetic therapies), diagnostic tools (such as gene or protein markers of disease conditions), and preventive measures such as vaccines.

Biotechnology also provides powerful new tools for improving farm animal breeding programs, including genetic mapping methods to identify both disease-resistant animals and certain specific genes related to health weaknesses and defects.

In livestock production, biotechnology is used to develop animals that have better growth and muscle mass and improved disease resistance.³

Aquaculture biotechnology applications aim to produce larger fish with less feed, improve spawning, and reduce the time for fish to gain market weight.³
Aquaculture
Australian aquaculture capabilities are developing steadily as the industry grows. In 2010-11 the gross value of aquaculture production was A$948 million.4 Over forty aquaculture species are commercially produced in Australia. The top five groups by production value are:

- salmonids
- tuna
- pearl oysters
- prawns
- edible oysters.

National programs for research, quarantine, aquatic animal health, food safety and environmental management are further enhancing the Australian aquaculture industry.

The CSIRO’s selective breeding programs for Australia’s major aquaculture species – Atlantic salmon, black tiger prawns, abalone and Pacific oysters – are gaining international recognition by producing elite aquaculture genotypes with commercial advantages including improved growth rates, product quality, disease resistance and production efficiency. Novel feeds are another area of focus.

IT services
A number of Australian firms produce and supply software tools and packages for farming applications, such as paddock management, farm mapping, management of yield and other GPS based data, as well as applications such as financial management systems tailored for farming enterprises.
University of Sydney robots are at home on the farm

Case study: technology

Researchers at the Faculty of Engineering and Information Technologies at the University of Sydney are working on robotic systems that could increase efficiency and yields of agricultural enterprises.

Professor Salah Sukkarieh leads a team that is developing robotic devices with the ability to autonomously sense, analyse and respond to their own surroundings. He says the technology has the potential to help Australia meet growing demand for fresh produce. ‘We can use automation to increase efficiency and yield, by having many of the manual tasks of farming performed by specially designed agricultural robotic devices.’

The researchers are trialling robots and drones which can perform tasks such as assessing fruit ripeness and soil requirements.

‘Traditionally it has been necessary for someone to actually walk through the orchard, taking and analysing soil and other samples and making decisions on the health and yield quality of the plants.’

‘The devices we’ve developed can collect, analyse and present this information autonomously, so a major part of the farmer’s job can be done automatically.’

The second stage of the project involves applying this technology to standard farm tractors, so that as well as being able to perceive their environment and identify any operations required, the robots will also be able to perform many of these operations themselves, such as applying fertilisers and pesticides, watering, sweeping and mowing.

The third and most complex stage will be enabling the devices to carry out harvesting.
EQUIPMENT

Specialised machinery
Australian capacities span the manufacture, supply and service of a range of specialised agricultural equipment, such as:

- disc ploughs and harrows
- rippers
- graders
- renovators
- zero or no till, minimum till, direct drill and no till air drill solutions
- seeding lines
- air seeders and cultivators
- soil mixers
- semi-automatic and automatic field transplanters
- selective tea harvesters
- sprayers
- washing/sorting/packing systems.

Many firms produce customised equipment for overseas markets, such as high clearance cane sprayers and cane harvesters used in Japan and Thailand, air seeders and cultivators for the USA, Canada and Africa.

Fertilisers
Australian firms produce solid and liquid fertilisers, soil conditioners, seed dressings, fertiliser coatings, crystalline solubles, custom blend formulations and organic blends.
Envirogrower keeps the benefits flowing

Case study: technology and equipment

An Australian company has pioneered a range of nanotechnology-based irrigation technologies that can deliver significant reductions in water use as well as ecological benefits.

Envirogrower specialises in low water use irrigation applied via sub-surface slow release systems which apply moisture directly to plant roots.

Products and technologies like Watergrower gel compound, Moistube and Micro Reservoir allow landscaping plants or food crops to be grown with less water, while potentially improving growth and output. They offer substantial potential for regions facing water scarcity issues and areas that are seeking to boost agricultural production and promote food sustainability.

Moistube and Micro Reservoir use nanotechnology in the form of a semi-permeable membrane that supplies continuous moisture directly to a plant’s feeding roots.

Each product suits a different application, such as irrigation networks and watering of individual shrubs and trees. Due to the low operating pressure required, even very large networks can be gravity fed, removing any requirement for power at a site.

Watergrower is a purified water and cellulose fibre-based compound that releases water directly to roots by reacting with naturally occurring soil microbes.

Producers and plant growers in Asia, Africa and the Middle East are now making use of Envirogrower technologies. Recent projects include a large agricultural irrigation project in the Western Region of Abu Dhabi and an official launch in Botswana following a series of successful vegetable growing trials.
Grizzly breaks new ground

Case study: equipment

A focus on innovation to solve farming problems has helped Australian company Grizzly Engineering become Australia’s largest manufacturer and exporter of disc ploughs.

In 1983, shortly after the company was established, it patented and released a unique three-gang tandem-offset disc design. The innovative disc harrow provided complete ploughing out (no unworked ridges), less working draught, elimination of side draught and longer disc life.

Since then, Grizzly has expanded its product range to include disc ploughs, disc harrows, curved tine rippers, straight shank rippers, heavy duty grader blade and banker channellers.

2009 saw the release of the Wheel Track Renovator, designed to fill wheel tracks caused from semi and full controlled traffic farming and tramline farming. The Wheel Track Renovator went on to win the Australian Machine of the Year award. Grizzly has now won three Machine of the Year awards.

Farmers overseas have been quick to recognise the value of Grizzly products, and the company began exports in the late 1980s to Papua New Guinea, Zimbabwe, Martinique and Zambia.

In recent years, Grizzly has also enjoyed export success in Russia and New Zealand.
The following organisations are some of the government and industry bodies involved in the Australian agribusiness sector.

Contact your local Austrade representative about connecting and partnering with the Australian agribusiness sector.

austrade.gov.au

Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia’s national science agency and one of the largest and most diverse research agencies in the world. Its Food and Agriculture section works to deliver increased and sustainable food production. csiro.au/Outcomes/Food-and-Agriculture.aspx

Rural Industries Research and Development Corporation (RIRDC) is a statutory authority established by the Australian Government to work with industry to invest in research and development for a more profitable, sustainable and dynamic rural sector. rirdc.gov.au

Department of Agriculture, Fisheries and Forestry (DAFF) is responsible for developing and implementing policies and programs that ensure Australia’s agricultural, fisheries, food and forestry industries remain competitive, profitable and sustainable. daff.gov.au

Australian Centre for International Agricultural Research (ACIAR) is a statutory authority that operates as part of the Australian Government’s development cooperation programs. The Centre encourages Australia’s agricultural scientists to use their skills for the benefit of developing countries and Australia. aciar.gov.au

Agribusiness Association of Australia aims to facilitate communication across the agri-food chain and to promote the contribution made by agribusiness to the Australian economy and community. agribusiness.asn.au

Wine Industry Suppliers Association represents the Australian wine industry supply-sector, working collaboratively with the broader industry to bring about benefits and best outcomes for members. wisao.org.au

Fisheries Research & Development Corporation (FRDC) plans and invests in fisheries research, development and extension (RD&E) activities in Australia. This includes providing leadership and coordination of the monitoring, evaluating and reporting on RD&E activities, facilitating dissemination, extension and commercialisation. frdc.com.au/Pages/home.aspx

Tractor and Machinery Association of Australia is a member-based industry organisation established over 40 years ago to represent the interests and development of importers, manufacturers and sellers of agricultural tractors and machinery in Australia. tma.asn.au

Animal Health Australia works to protect and improve animal health within Australia through partnerships with industries and governments which help keep Australia disease free, build the sustainability of our livestock industries and promote the humane use of animals for food, companionship, recreation and sport. animalhealthaustralia.com.au

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