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Research Report 3

PERFORMANCE REVIEW OF THE RURAL INNOVATION SYSTEM

RESEARCH REPORT 3: KEY INSTITUTIONS IN THE RURAL INNOVATION SYSTEM

18 APRIL 2018

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1 University Rural Research Institutes and Centres

Research institutes and centres are an essential component of the Rural Innovation System. They have a particular focus on applied research and working with industry. The listing below, drawn from Internet entries, provides an overview of the extended rural research activity across university sector.

New South Wales

- *Sydney Institute for Agriculture, The University of Sydney*

The Sydney Institute of Agriculture was established to bring together agricultural research from across the University of Sydney and contribute valuable knowledge to the agriculture and food sector.

With the first chair of agriculture in Australia in 1910, the University of Sydney has been a leading contributor to Australian agricultural knowledge for more than a century. Our contribution to agricultural knowledge remains vital and what we offer is highly valued by our industry stakeholders, making us a leading participant in transforming Australian agriculture.

Agribusiness offers Australia one of the largest opportunities for economic growth in the coming decades. Our research staff are made up of industry leaders influencing policy locally and internationally. They are finding solutions to the biggest challenges our planet faces, from sustainable food production for an increasing population, to environmental management issues.

Food and fibre production, processing, distribution and consumption are under increasing scrutiny. Positive digital technology and innovation will result in a competitive, transparent, resilient and profitable agriculture and food sector. This transformation will require considerable new investment and capacity in agricultural research and development.

https://sydney.edu.au/agriculture/

- *Ag Health Australia – The University of Sydney*

AgHealth Australia, (previously known as the Australian Centre for Agricultural Health and Safety or ACAHS) is based at Dubbo. It is an academic unit of the University of Sydney within the School of Rural Health.

AgHealth is also a member of the Australian Rural Health Research Collaboration (ARHRC) along with the University Departments of Rural Health at Broken Hill and Lismore, plus the Centre for Rural and Remote Mental Health, Orange.

AgHealth has been leading research in relation to injury and deaths on Australian farms for over 20 years. AgHealth is also the operations centre for Farmsafe Australia and through this network we work with a range of partners to ensure the research is turned into practical programs to assist farmers, their workers, families and the rural community.

Translation of the research information has led to the development of programs of work that in conjunction with industry and relevant organisations, has contributed to major reductions in the burden of injury and poor health in rural Australia.

Honorary Associate Professor: Tony Lower; Phone: 02 6882 1486; Email: tony.lower@sydney.edu.au

Honorary Associate Professor: Lyn Fragar AO; Phone: 02 6882 1486; Email: aghealth@health.usyd.edu.au

http://sydney.edu.au/medicine/aghealth/

- *Animal Genetics and Breeding Unit (AGBU) - UNE*

AGBU is a joint venture between the NSW Department of Primary Industries (DPI) and University of New England (UNE). For 40 years AGBU has been researching the genetics of livestock and how to breed better animals and plants and we are regarded as one of the world leaders in R&D of genetic evaluation systems for cattle and sheep.

Using massive datasets on animals and plants worldwide and creating highly complicated algorithms, our team delivers knowledge and tools that help breeders identify the best animals and plants. Through our partners, this information is then made available and useful for breeders and producers in all industries.

http://agbu.une.edu.au/

- *UNE Centre for Agribusiness*

"The Centre for Agribusiness offers bold, creative and sustainable solutions to big questions of food industry performance, global food security and best management practice. It is a platform from which we are able to reimagine data to facilitate innovation in the sector.

By connecting people, research, industries, and government, the Centre will supply the tools and support to imagine, create, share and commercialise a broad range of ideas, supporting leadership to steer agribusiness into a strong future".

https://www.une.edu.au/research/research-centres-institutes/centre-for-agribusiness

- *Cotton Hub at UNE*

The Cotton Hub is the result of discussion between UNE and the Cotton Research and Development Corporation (CRDC).

The Cotton Hub at UNE will deliver cross disciplinary work on the issues affecting production of sustainable cotton now and over the coming decades. It will also facilitate the deployment of required expertise in response to situations that may arise and require immediate attention within the cotton industry.

UNE has expertise that is well regarded by the cotton industry. The Cotton Hub will act as a focus, where this expertise will come together to develop responses to both open and tender-based calls from the CRDC. The outcome will be to improve the cross disciplinary responses to the challenges of cotton production over the coming decades.

https://www.une.edu.au/research/research-centres-institutes/cotton-hub

- *PoultryHub Australia*

An initiative of the Poultry CRC in Australia, PoultryHub was developed to share just about anything to do with commercial poultry production. Students and educators from Australia and around the world are using PoultryHub to learn about poultry and poultry production, stimulating interest in poultry science and hopefully dispelling some of the myths and misconceptions surrounding poultry production at the same time.

The site, initially set up using MediaWiki software, allowed a collaborative resource centre where people could contribute their knowledge and expertise about poultry.

http://www.poultryhub.org/

- *The Australian Centre for Agriculture and Law (AgLaw) - UNE*

The Australian Centre for Agriculture and Law provides innovative scholarship on laws and institutions affecting rural communities, to develop policies and strategies that improve rural sustainability and social justice.

https://www.une.edu.au/research/research-centres-institutes/the-australian-centre-for-agriculture-and-law/about-us

- *The National Centre of Science, Information and Communication Technology, and Mathematics Education for Rural and Regional Australia (SiMERR).*

SiMERR Australia works with rural and regional communities to achieve improved educational outcomes for all students in the areas of Science, ICT and Mathematics so that:

- Parents can send their children to rural and regional schools and know they will experience equal opportunities for a quality education;
- Students can attend rural or regional schools and realise their academic potential in Science, ICT and Mathematics; and
- Teachers can work in rural and regional schools and be professionally connected and supported.

https://simerr.une.edu.au/pages/aboutus_aims.php

- *Institute for Rural Futures, UNE*

The Institute for Rural Futures (IRF) continues a strong tradition at the University of New England in rural socio-economic research and extension carried out by independent non-profit research centres. The first such centre was the Kellogg Rural Adjustment Unit, established in 1976. This became the Australian Rural Adjustment Unit in 1980 and the Rural Development Centre in 1984.

International Development Research

The Institute works closely with international partners to research, develop and implement sustainable farming, marketing and community systems. Sustainable rural and regional development in developing countries requires an understanding of the economic, environmental, social, institutional and physical characteristics and the interactions and relationships which influence a farmer's ability to produce marketable products.

The Institute works closely with national, regional and local governments in developing policies to assist rural development. We work closely with partner universities to both assist in the implementation of appropriate research and develop research capacity and culture. Projects undertaken by the Institute all work closely with farmers, rural industries and all market chain stakeholders to ensure results are relevant and improve the welfare of rural communities.

In recent years, international development has centred on Indonesia, Cambodia, Papua New Guinea and Vanuatu, with past and planned areas of work to include Fiji, the Greater Mekong area, East Timor, Thailand and the Philippines.

https://www.une.edu.au/research/research-centres-institutes/irf/international-development-research

- *Graham Centre - CSU*

Since 1892, agricultural research and education have been conducted at the site now occupied by NSW Department of Primary Industries and Charles Sturt University.

Initially known as the Wagga Wagga Experimental Farm in 1893, the Farm was later developed in to the Wagga Agricultural College (1948) and the Agricultural Research Institute (1954). Early researchers included William Farrer, Nathan Cobb and Albert Pugsley. In 1976, the education and research functions of the Agricultural College became part of the Riverina College of Advanced Education, which later became the Riverina-Murray Institute of Higher Education and finally, Charles Sturt University in 1989.

In 1996, the NSW Agriculture Research Institute became a Centre of Excellence for Southern Farming Systems and Viticulture and today is known as the Wagga Wagga Agricultural Institute.

The Graham Centre is named after Edgar ("Eddie") Hugh Graham. He was the longest serving NSW Minister for Agriculture and held the regional seat of Wagga Wagga from 1941 until his sudden death in office in 1957. He opened the Department of Agriculture Wheat Research Institute in 1950 and the Agricultural Research Institute in 1954.

The Centre has more than 100 Members, of which most are employed directly by either CSU or NSW DPI.

https://www.csu.edu.au/research/grahamcentre/about-us

- *National Wine and Grape Industry Centre - CSU*

The National Wine and Grape Industry Centre conducts world-class research in grape and wine science, in the areas of plant pathology, vine physiology, fruit development, fruit and wine composition, sensory characteristics of wine, and consumer preference.

Generate outstanding research outcomes thanks to the impressive expertise of our researchers, excellent facilities and equipment, and our alliance with Charles Sturt University, NSW Department of Primary Industry, and the New South Wales wine industry association. We collaborate with commercial vineyards and wineries to ensure our research is highly relevant and improves profitability and sustainability in the Australian Wine Industry.

https://www.csu.edu.au/nwgic

- *Southern Cross Plant Science - Southern Cross University*

Southern Cross Plant Science achieves high international academic standards in research, with recent refereed publications in journals including: Science, PNAS (USA), Nature Genetics, Plant Physiology, Plant Biotechnology Journal, Plant Journal, Genetics, New Phytologist, Food Chemistry, J. Cereal Science, J. Medical Plant Research.

Research is focused on the genetics, genomics and phytochemistry underpinning selection, cultivation and utilisation of plants. Two major themes focused on how plants interact and adapt to the environment, and natural product composition and quality. Address key strategic research drivers of food security, human health and nutrition, climate change, regional sustainability and native plant conservation.

Targets and commodities include nutritional food, bioactives and other high value natural products from oilseed, grain, horticultural and plantation crops, forestry, herbal medicinal products, functional foods, health products and natural pesticides. We work with others at Southern Cross University and elsewhere to understand and develop natural products from the marine environment, including molluscs and algae.

https://www.scu.edu.au/research-centres/southern-cross-plant-science/about-us/

- *Forest research centre – Southern Cross University*

Researchers in Southern Cross University's Forest Research Centre investigate the ecology of native forests both in Australia and overseas, as well as studying how native forests and plantations can sustainably produce wood products, environmental services and carbon.

The research staff in the FRC have broad and varied interests but are particularly focused on:

- Tropical and subtropical forestry and agroforestry, domestication of native tree species
- Computer modelling for forest management and decision-support systems
- Ecology and management of forest birds, marsupials and amphibians
- New products from trees, especially from eucalypt plantations, including bioenergy
- Forest genetics
- Mixed-species plantations
- Community engagement in land-use planning.

The University's Southern Cross Plant Science Research Centre contributes to the Forest Research Centre in the areas of forest genetics and genomics.

https://www.scu.edu.au/research-centres/forest-research-centre/

- *Institute for Sustainable Futures, UTS*

key research areas are:

- Cities and Buildings
- Climate Change Adaptation
- Energy Futures
- Food Futures
- International Development
- Natural Resources and Ecosystems
- Resource Futures
- Social Change

- Transport
- Urban Water Futures

Victoria

- *The University of Melbourne*

The Faculty of Veterinary and Agricultural Sciences hosts or is a key member in a number of defined research centres across the fields of agricultural, food and veterinary sciences. As well as promoting cross-disciplinary research and collaboration, the centres also provide a number of specialised industry services.

- Animal Welfare Science Centre: A collaborative animal welfare research centre involving UoM, DEDJTR, SARDI and Ohio State University.
- Asia-Pacific Centre for Animal Health: Aims to optimise animal production and product quality through improved control of infectious agents.
- Centre for Animal Biotechnology: Contributes to the development of improved methods for livestock management and disease control.
- Centre for Equine Infectious Diseases: A centre for the study of equine diseases in Australia, with a focus on viral diseases.
- Unlocking the Food Value Chain: Australian food industry transformation for South-East Asian Nations (ASEAN) markets
- Mackinnon Project: education, research and whole farm consultancy for the extensive livestock industries.
- OIE-DX: OIE Collaborating Centre for Diagnostic Test Validation Science in the Asia-Pacific Region
- Poultry CRC: Aims to help Australia achieve sustainable, ethical poultry production in the face of population growth and climate change.
- Primary Industries Climate Challenges Centre: A collaborative venture between the University of Melbourne and Agriculture Victoria
- Healthy Soils for Sustainable Food Production and Environmental Quality

http://fvas.unimelb.edu.au/research/research-centres

- *Institute for Agriculture and Food, La Trobe*

Building on the success of the Centre for AgriBioscience (AgriBio), La Trobe University is tackling the global agrifood challenge by matching funds with industry for research infrastructure, people and resources.

A new state-of-the-art research and education training institute – the La Trobe Institute for Agriculture and Food (LIAF) – will result from this $25 million co-investment.

The Institute will hold a central position in the La Trobe research and innovation precinct, and will nurture and connect the critical mass of intellectual expertise needed to find solutions to the food and nutrition challenges of a growing population in a resource-constrained world.

AgriBio provides researchers with purpose-built facilities to support their work. Our technology platforms include:

- DNA sequencing and genotyping for plants, livestock and microbes.
- Specialised software for bioinformatics and complex statistical analysis.
- A Nuclear Magnetic Resonance spectrometer and multiple mass spectrometers.
- Controlled Environment Rooms for plant and pest research.

http://www.latrobe.edu.au/agribio/about

- *Centre for Regional and Rural Futures, Deakin*

The Centre for Regional and Rural Futures (CeRRF) delivers innovative research solutions to regional and rural communities by collaborating with industry, government, community and not-for-profit sectors. It also contributes to the design of smarter technologies to enhance regional and rural productivity.

The Centre claims to be unique in the Australian context as it has the capability and capacity to address regional and rural productivity problems with teams from engineering, science, business, economics and the humanities.

The Centre focuses on bridging the gaps between regional enterprises, governments and academia. With significant investment in cutting edge facilities and fitted with state-of-the-art equipment, CeRRF will be positioned as the premier centre for regional research and produce the best innovations that will positively impact rural communities here and around the world.

- *Centre for Frontier Materials, Deakin*

The Institute for Frontier Materials (IFM) is at the forefront of innovation in materials design and engineering research. Its main themes are: innovative manufacturing technologies and energy efficiency; resource and infrastructure sustainability.

Not sure how their work relates to natural fibres

Queensland

- *Queensland Alliance for Agriculture and Food Innovation QAAFI, UQ*

QAFFI was formed from the combined scientific expertise of researchers from The University of Queensland and the Queensland Government. It is comprised of three inter-related research centres, with a focus on the challenges facing tropical and sub-tropical food and agribusiness sectors in the tropical and subtropical systems.

QAFFI's mission is to significantly improve the competitiveness and sustainability of tropical and sub-tropical agriculture and food sectors through high-impact science. Its vision is sustainable agriculture and food achieved through science and innovation. It aims to be a world leading research institute in plant science, animal science, and nutrition and food sciences, delivering outcomes in discovery, learning, and engagement.

https://qaafi.uq.edu.au/about

- *Institute for Future Environments, QUT*

IFE is a transdisciplinary research and innovation institute at QUT that "brings together the brightest minds to collaborate on large-scale projects relating to our natural, built and digital environments. At IFE, we generate knowledge, technology and practices that make our world more sustainable, secure and resilient". Its research themes are linked to specific societal challenges and sectors of the economy.

- Growing the global bioeconomy - developing agricultural processes and products that are better for consumers, the environment and the economy.
- Managing for resilient landscapes - studying how our urban, agricultural and natural landscapes function, and how best to manage them to increase their resilience and adaptability.
- Infrastructure for sustainable communities - investigating how to design, operate and manage infrastructure that enriches communities while being sustainable, resilient and responsive to climate change.
- Embracing the digital age - investigating how Australia can identify and capitalise on the commercial and social potential of emerging digital technologies.

IFE hosts the ***Centre for Tropical Crops and Biocommodities (CTCB),*** a unique mix of international expertise in plant biotechnology, process engineering, industrial chemistry and commercialisation. The product research and development pipeline leads from gene discovery and genetic manipulation through to field demonstrations and pilot plant scale production.

Crop specialisations are in the areas of -

- Bananas - leading efforts to create a 'super banana' that is disease- and drought-tolerant and genetically modified for increased nutritional value. These bananas have the potential to save millions of people from starvation in underdeveloped countries.
- Sugarcane and sweet sorghum - driving innovation in the sugar industry and opening up opportunities for the production of biocommodities. Carries out commercial research into biorefining, investigating industrial biotechnology, sugarcane processing and biomass conversion.
- Tropical pulses - Pulse legumes such as chickpeas, lentils and beans are some of the world's most economical sources of protein and feed. In order to deliver higher quality products to international markets, we're developing pulses with increased nutritional value that are also resistant to drought and disease.
- Plant biotechnology - Advanced biotechnology techniques that help protect plants from pests and boost the nutrition and strength of plant crops.
- Biorefining and bioproducts - Research into biomass processing helps convert waste products into valuable and reusable materials and resources.

https://www.qut.edu.au/institute-for-future-environments/research/research-centres-and-programs/centre-for-tropical-crops-and-biocommodities

Mackay Renewable Biocommodities Pilot Plant

We develop new industrial products and processes with our industry partners to help build a sustainable and profitable biorefining industry in Australia.

The Pilot Plant, based on the site of an operating sugar factory, is a unique research and development facility that converts biomass into biofuels, green chemicals and other bioproducts. The plant can develop and demonstrate a wide range of technologies at the pilot scale and is available for use by industry and research partners.

The Mackay Pilot Plant has been funded by the Australian Government (through NCRIS Capability 5.5 - Biotechnology Products and the Super Science Education Investment Fund), the Queensland Government Smart State Facilities Research Fund and QUT. The facility is hosted by Mackay Sugar Limited, one of Australia's leading sugar manufacturers, on the site of the Racecourse Mill in Mackay, Queensland.

The aim is to increase the uptake of renewable bioproduct technologies in Australia by developing innovative, commercially viable products at the Mackay Pilot Plant.

Researchers from the Centre for Tropical Crops and Biocommodities use the plant to conduct commercial research in industrial biotechnology, sugarcane processing and biomass conversion for high value product development.

In collaboration with industry and research partners, we develop new industrial products and processes using a wide range of biomass feedstocks from the sugar mill, including: sugarcane bagasse, trash, molasses.

Through our partners, we have also access to various other biomass feedstocks, including: corn stover, forestry residues, sweet sorghum, energy grasses, other crops.

https://www.qut.edu.au/institute-for-future-environments/facilities/mackay-renewable-biocommodities-pilot-plant

- *USQ*

USQ research is aimed at strengthening agricultural productivity and environmental management challenges in Australia and overseas. We are working closely with industry to accelerate access to smarter, technology-based ways of increasing productivity, reducing costs and maximising the efficient use of available resources

USQ hosts the following research centres and institutes

- **Institute for Agriculture and the Environment** - brings together USQ's existing capability in agricultural engineering, plant pathology, climate science and agribusiness and puts them into a single research institute, to focus our efforts, to service the rural sector.
- **Centre for Crop Health** – specialises in crop protection in the northern region.
- **National Centre for Engineering in Agriculture** - research provider providing contract research and specialised consulting services. It offers a research and development (R&D) service to the rural production, manufacturing and processing industries covering all aspects of agricultural engineering, including in particular: irrigation application, storage and supply systems; water resource planning and management; sustainable soil management; precision agriculture; agricultural energy use and greenhouse gas emissions; smart technologies for rural industries and environmental management.

https://www.usq.edu.au/research

- *JCU*

JCU conducts nationally significant and internationally recognised research in areas such as marine sciences, biodiversity, tropical ecology and environments, global warming, tourism, and tropical medicine and public health care in under-served populations.

The University hosts the

- ARC Research Hub for Advanced Prawn Breeding - a consortium involving researchers and industry from James Cook University, CSIRO, Australian Genome Research Facility, University of Sydney and Seafarms Group. The goal of the Hub for Advanced Prawn Breeding is to develop and transfer to the farmed black tiger prawn industry the capacity to benefit from advanced genomic-informed breeding programs.
- Centre for Sustainable Tropical Fisheries and Aquaculture - focuses on the aquatic and aquaculture systems that produce food and the industries and communities that utilise them. Multidisciplinary collaborations aim to provide the synergies to address substantial research problems in a way that individual research groups cannot. CSTFA provides research outputs for sustainable food production to local, state, federal and international resource managers, both in government and in the private sector

https://www.jcu.edu.au/research/centres-and-institutes

South Australia

- *Waite Research Institute – University of Adelaide*

The Waite Research Institute (WRI) is an initiative of The University of Adelaide which was established to support collaboration between the Waite Campus partners to drive research for the benefit of Australia's agriculture, food and wine industries. Research covers:

- Sustaining agricultural systems: Agronomy, farm management, weed science, plant protection, plant pathology and health, agroforestry, extension, natural resource management, climate risk, soil health, soil science, entomology, precision agriculture.
- Crop improvement and food security: Genomics, genetics, grain quality, biochemistry, physiology, nutrition, breeding, horticulture, biometrics. Learn moreCrop improvement and food security
- Innovation in wine and viticulture: Wine chemistry, wine microbiology and microbial biotechnology, oenology (wine making), evaluation of wine quality, viticulture.
- Agricultural solutions for health and well-being: Biochemistry, post-harvest food quality and food safety.

https://www.adelaide.edu.au/wri/research/

The University of Adelaide also hosts -

- Australia-China Centre for Agriculture and Health & University of Adelaide
- Shanghai Jiao Tong University Joint Laboratory for Plant Science and Breeding
- Australia-China Joint Centre Research Centre in Grains for Health
- Fertiliser Technology Research Centre
- FoodPlus Research Centre

- *UniSA Agricultural Machinery Research and Design Centre (AMRDC)*

An experienced team of professionals from a range of academic disciplines in engineering, combined with practical farming and industry backgrounds. Research and design staff carry out targeted research projects and consultancy services based on an understanding of the machinery needs of farmers and engineering requirements of the agricultural industry.

The AMRDC team assists in all stages of machinery development - from basic research and design through to the construction and evaluation of prototype equipment and commercial machinery. On-site specialised facilities are used to research and develop farming technologies to suit Australian conditions. Many engineering developments are now in production, working in the field or installed in factories.

The multidisciplinary approach to problem solving sees research and design engineers working together, drawing on their specific skills and experiences and using state-of-the-art equipment and facilities. With strong links with industry, as well as national and international agricultural agencies, AMRDC research and design engineers are ideally placed to deliver practical outcomes in support of sustainable agriculture.

Areas of expertise cover both pre-harvest and post-harvest engineering applications, and include:

- Seeding system technologies in no-till farming systems
- Seeder machinery design and testing
- Concept development and full design of specialised machinery
- Soil mechanics and soil/tool/residueSustainable Agriculture 2 interactions
- Small scale mechanisation in international conservation agriculture contexts
- Grain harvester modifications for snail pests, high moisture harvesting and weed seed destruction
- Technologies for precision agriculture
- Dried fruit production and processing
- Almond processing
- Grain contaminant separation
- Grain storage
- Seafood production and processing

We also provide postgraduate supervision, expert specialist advice and consultancy services to industry related to these areas of research.

http://www.unisa.edu.au/IT-Engineering-and-the-Environment/School-of-Engineering/Research/agricultural-machinery-research-and-design-centre/

- *Flinders*

Flinders University hosts the following centres

- Centre for Climate Adaptation and Animal Behaviour
- Centre for Marine Bioproducts Development
- National Centre for Groundwater Research and Training

Western Australia

- *University of Western Australia Institute for Agriculture*

The UWA Institute of Agriculture aims to enhance The University of Western Australia's contribution to the advancement of agriculture and to the management of natural resources in selected international, national and regional settings.

For Western Australia, the Institute works with the agricultural and natural resource management sectors to create knowledge, and improve workforce skills, such that those committed to agriculture may advance their individual aspirations, contribute to local and regional prosperity, and exercise responsible stewardship of the environment.

Research themes cover -

- Crop root and rhizosphere
- Sustainable grazing systems
- Water for food production
- Food and human health
- Agribusiness ecosystems

http://www.ioa.uwa.edu.au/

Tasmania

- *Tasmanian Institute for Agriculture*

The Tasmanian Institute of Agriculture is a joint venture between the University of Tasmania and the Tasmanian Government.

This partnership has brought together the human and physical resources of the Tasmanian Government with the scientific research and teaching capacity of the University of Tasmania (UTAS) to create a centre of excellence in agricultural research,

development, extension, education and training. TIA's activities are funded by the Tasmanian Government, UTAS, agricultural research, development and extension organisations, resource management organisations, other granting bodies and industry.

http://www.utas.edu.au/tia/about-us/about-tia2/about-tia

ACT

- *Fenner School of Environment and Society - ANU*

Research areas include:

- Agriculture, landscapes & soils: World food security is primarily dependent on having viable agriculture. We are studying the development of sustainable farming practices involving different grazing...
- Bushfires & emergencies: Bushfires, floods and other naturally occurring events can be of sufficient magnitude to cause emergencies that greatly impact society. The number of people killed or...
- Climate & energy: The climate energy group has interests spanning climate science, climate adaptation, energy, environmental monitoring and management, sustainable development, and the...
- Conservation & landscape ecology: The Conservation and Landscape Ecology Group has been in operation for over 30 years under the guidance of Professor David Lindenmayer. The Group's work is based on a...
- Forests & woodland: Humans have been relying on forests and forest-based resources since before the first records were created. Consequently, humans have been involved in adapting to the...
- Human ecology & urban environment
- iCAM (the Integrated Catchment Assessment and Management Centre): iCAM is a highly interdisciplinary research group consisting of social scientists, economists, hydrologists...

http://fennerschool.anu.edu.au/research/groups

- *ANU CSIRO agriculture research lab*

The ANU-CSIRO Centre for Genomics, Metabolomics and Bioinformatics (CGMB) combines the strengths of two of Australia's best research institutions and aims to make discoveries in plant biological science that will benefit environmental management and crop deployment.

The new centre is located across various sites on the ANU campus and the neighbouring CSIRO Black Mountain facility, and includes a new laboratory and computer facility, a Joint Mass Spectroscopy Facility and new glass houses.

The centre will also make use of the National Computational Infrastructure (NCI), also on the ANU campus.

The Centre will also include an Ecogenomics and Bioinformatics Lab (EBL), which combines experimental and computer elements of research under the one roof, enabling researchers to generate and analyse data at the same time in the same location.

ANU Vice-Chancellor Professor Brian Schmidt AC said the partnership between the two institutions has already led to ground-breaking research in photosynthesis, plant immunity, disease resistance and energy efficient crops.

"This continued investment in plant science research means Australia will lead the world in the development of crops that are able to withstand the rigours of a changing climate, resist the ravages of disease, and utilise water, sunlight, and nutrients more efficiently," Professor Schmidt said.

http://biology.anu.edu.au/news-events/anu-and-csiro-open-new-agriculture-research-lab

2 Commonwealth/State/Territory Government RD&E Capability

Commonwealth

CSIRO Agriculture and Food is a team helping Australian farmers and industry improve productivity and sustainability.

Capability covers:

Boorowa Agricultural Research Station

The CSIRO is establishing a state-of-the-art agricultural research facility near Boorowa, NSW.

Animal science

We work with livestock farmers and allied industries to improve their productivity, profitability and sustainability through better livestock breeds and management practices.

Aquaculture

Our aquaculture research is undertaken with commercial partners and fosters the development of quality products such as healthy, genetically-superior animals raised on efficient, sustainable feeds.

Digital agriculture

Agriculture of the future will be digitally integrated at all stages of production, from understanding genetics to transport logistics. We are using our expertise in digital innovation and agriculture to improve decision making for farmers, agribusiness, policy-makers and researchers.

Food science for healthier, safer and more sustainable food

Our expertise in food science helps the Australian food industry compete in domestic and global markets and make food products for Australian consumers that are safe, sustainable and taste great.

Food security and global farming

The future world demand for food will place huge pressure on global food systems.

Plant science

We're helping cropping farmers more profitably and sustainably feed and clothe Australia and our export markets. We do this by helping improve plant breeds, better manage increasingly scarce resources such as water, and keep pests and diseases at bay.

Sustainable farm management

We're working with farmers to develop new tools and management practices to increase profitability and productivity, reduce resource use and maintain ecosystem health.

The research portfolio is detailed at Our Research.

New South Wales

NSW DPI conducts primary industries research in a large range of locations across NSW. Below is a list of major research centres as well as smaller research stations and locations:

Australian Cotton Research Institute, Narrabri
Bathurst Primary Industries Centre
Beef Industry Centre, Armidale
Condobolin Agricultural Research and Advisory Station
Cowra Agricultural Research and Advisory Station
Dareton Agricultural Research and Advisory Station
Deniliquin Agricultural Research and Advisory Station
Elizabeth Macarthur Agricultural Institute, Menangle
Glen Innes Agricultural Research and Advisory Station
Gosford Primary Industries Centre
Grafton Fisheries Centre
Grafton Primary Industries Institute
Narrandera Fisheries Centre
NSW Centre for Tropical Horticulture, Alstonville
Orange Agricultural Institute
Port Stephens Fisheries Institute and Research Centre of Excellence

Tamworth Agricultural Institute
Tocal Agricultural Institute
Trangie Agricultural Research Centre
Wagga Wagga Agricultural Institute
Wollongbar Primary Industries Institute
Yanco Agricultural Institute

Victoria

The Department of Economic Development, Jobs, Transport, and Resources (DEDJTR) supports a number of research centres and stations across Victoria.

AgriBio, - a joint initiative of the Government andLa Trobe University

DEDJTR Ellinbank is home to the National Centre for Dairy Research and Development.

DEDJTR Hamilton research centre researches new genetic and nutritional technologies and on-farm practices for Victoria's lamb industry.

DEDJTR Horsham is home to the Australian Temperate Field Crops Collection, housing more than 34,000 varieties of seeds.

DEDJTR Mildura centre contributes significantly to industry through research in citrus, dried grape, table grape and wine grape research.

DEDJTR Rutherglen's research covers a broad range of agricultural industries from lamb production to soil fertility.

DEDJTR Tatura is a research leader in irrigated agricultural productions systems, pest and disease management and innovative practice change.

PICCC (Primary Industries Climate Challenges Centre, Parkville) leads research, development and extension relating to climate change and the primary industries.

Queensland

Applethorpe Research Facility. A sole temperate fruit and vegetable research facility in Queensland.

Ayr Research Facility. The station is presently involved in the sorghum and mungbean breeding program, banana gene pool, mahogany selection and other horticultural trials.

Bowen Research Facility. RD&E in horticultural vegetable cropping including sweet corn, tomato, capsicum and melons.

Brian Pastures Research Facility. Provides an atmosphere suitable to the diverse requirements of intensive and semi-intensive environments of beef cattle research and development.

Bribie Island Research Centre. The first dedicated multi-functional aquaculture research facility to be built in Australia.

Bundaberg Research Facility. Provides support to horticultural, agricultural and sugar industries in the wide bay area of southeast Queensland.

Ecosciences Precinct. Facilities include research and educational laboratories, insect houses, controlled environment rooms, greenhouses, offices and workshops.

Gatton Research Facility. Research services to the horticultural and Aaricultural industries in subtropical Queensland.

Health Food Science Precinct. Delivering clean, safe and high quality food and animal products.

Hermitage Research Facility. A major centre for plant breeding and agronomic studies on agricultural crops grown in Queensland and northern New South Wales.

J Bjelke-Petersen Research Facility & Redvale field site. Leading and innovating a wide range of scientific research and development.

Leslie Research Facility. Service provider since 1962 for plant breeding and agronomic studies on grain crops throughout Queensland and northern New South Wales.

Mareeba Research Facility. Offers research, development and extension services to far north Queensland's agriculture industries.

Maroochy Research Facility. For more than 50 years, MRF has serviced Queensland's and Australia's tropical and subtropical fruit and nut industries.

Northern Fisheries Centre. Provides support to a unique aquaculture facility through salt-water supply and filtration.

Queensland Animal Science Precinct. World-class research facilities in the areas of animal growth, adaptation, welfare, health and vaccines.

Redden Street Research Facility. Research Facility with Agri-science groups including Food Technology, Horticulture and Forest Science, Regional Services and Biosecurity.

Redlands & QCDF Research Facility. Servicing the needs of the nursery, cut flower, parks and gardens, landscape and turf industries and housed the peak bodies for these industries.

Salisbury Research Facility. Equipped to undertake forest products research and development on semi-commercial, pilot and laboratory scales.

South Johnstone Research Facility. Primarily providing trial sites and infrastructure support for banana, papaya and timber RD&E.

Spyglass Research Facility. Leading role in research to advance tropical and subtropical beef production and ecosystem management, development, extension, education and training programs.

Walkamin Research Facility. Incorporating diverse aspects of irrigated and high rainfall tropical farming systems.

Queensland Alliance for Agriculture and Food Innovation. (QAAFI) a UQ research institute, comprised of three frontline centres, formed as a strategic alliance between The University of Queensland and the Queensland Government.

Western Australia

No government research centres or institutes entries found. Capability located under universities.

South Australia

South Australia Research and Development Institute (SARDI)

Major Government programs include:

Northern Adelaide Food Park

SA Food Innovation Centre

A Modern Transport System for Agriculture: A New Partnership Approach

Australian Pastures Genebank

South Australian River Murray Sustainability (SARMS) Program

New Horizons Program

Sterile insect technology (SIT) facility

Regional grants and loans

Northern Adelaide Plains Agribusiness Initiative

Note - department provides consultancy services. Many initiatives around food and wine.

Tasmania

Tasmania Institute for Agriculture – a joint venture arrangement. Identifies six centres.

Northern Territory

Under the Department of Primary Industry and Resources. Research is at Primary industry strategies, projects and research

3 CRCs Involved in the Rural Research and Innovation

Current CRCs

CRC for High Integrity Australian Pork

CENTRE ESTABLISHED: 2011–12; ROUND No. 13; GRANT (Years) 8; INCORPORATED; CRC POSTGRADUATE TARGET: 22; CRC PROGRAMME FUNDING: $19.86m

The Major Challenge

Pork is the most consumed meat worldwide with more than 125 million tonnes to be eaten between 2005 and 2015. In Australia, pork represents 19 per cent of all meat consumed, with a post farm-gate value of $2.9 billion and the direct generation of more than 8,000 jobs in regional Australia. With an unprecedented increase in global focus on food security, energy conservation, climate change, consumer health and the way food is produced, Australian pork can lead the world as a unique "food solution".

The Australian pork industry faces the key challenge of maintaining local production of high quality food for a reasonable price and for return on production capital invested, without negatively impacting pig welfare, the environment or the health of the consumer.

Through innovative, collaborative, whole value chain R&D and education programs within the CRC, the Australian pork industry will meet this challenge by facilitating production that is efficient and ethical with minimal need for sow confinement in stalls or crates (or widespread use of antibiotic medications); and by delivering key nutrients safely, and enhancing the health and well-being of consumers.

The CRC will also utilise revolutionary feed sources and effluent management systems resulting in emissions of less than 1kg of CO2 per kg of pork produced, and contribute significantly to Australia's economic growth and food security without drawing on the ecological capital of other parts of the world.

Research Programmes

1. Reduced confinement of sows and piglets;
2. Herd health management;
3. Healthy pork consumption;
4. Carbon conscious nutrient inputs and outputs;
5. Improving sow reproduction; and
6. Nutritional manipulations to enhance the performance and feed efficiency of growing pigs.

Areas of Research Expertise

Reproductive and lactational physiology; pig behavior; welfare and management; pig nutrition; veterinary science; quantitative and molecular genetics; disease diagnostics; supply chain management and carcase analysis; meat science; human nutrition; isotope analysis in traceability systems; on-farm production of algal feedstock; plant breeding and genetics; near infrared analysis of feed ingredients; in vivo analysis of feed ingredients; grain processing; effluent management; CO2 mitigation.

Essential Participants

Australian Pork Farms Group Ltd; Australian Pork Ltd; CHM Alliance Pty Ltd; Chris Richards and Associates Pty Ltd; Department of Primary Industries and Regions, South Australia (SARDI); Murdoch University; New Zealand Pork Industry Board; Ridley AgriProducts Pty Ltd; Rivalea (Australia) Pty Ltd; The University of Adelaide; The University of Melbourne; The University of Sydney; Western Australia Agricultural Produce Commission Pork Producers Committee

International Collaborations

Canada; Denmark; France; Netherlands; New Zealand; Singapore; United Kingdom; United States of America

Contact: CRC for High Integrity Australian Pork J.S Davies Building Roseworthy Campus University of Adelaide

CRC for Sheep Industry Innovation

CENTRE ESTABLISHED: 2014-15; ROUND No. 16; GRANT (Years) 5; INCORPORATED; CRC POSTGRADUATE TARGET: 12; CRC PROGRAMME FUNDING: $15.50m

The Major Challenge

The CRC for Sheep Industry Innovation (Sheep CRC) will continue the technological transformation of the Australian sheep industry by developing and delivering new tools to enhance animal wellbeing and productivity, to introduce a quality-based value chain for sheep meat and facilitate widespread adoption of DNA-based genetic technologies.

The use of genomic technologies will improve the rate of genetic gain in the national sheep flock by delivering new tests that have higher accuracies, provide for more flexible breeding objectives, and are useful for a broader range of sheep flocks. New test systems, at a significantly lower cost, are anticipated to lead to increased levels of use. Development of a computer app will make it easier to purchase rams that best contribute to achieving the breeding objectives of individual flocks.

Sheep wellbeing and productivity will be enhanced through the development of data management systems that incorporate information on genetic parameters, environmental factors and animal condition to better manage risk of compromised wellbeing. Environmental risk analysis, in conjunction with auto-monitoring systems, will provide the real time information required to make effective management decisions to maintain wellbeing, reduce on-farm mortality and improve productivity.

The Sheep CRC will also work with its supply chain partners to improve the lamb carcase grading system, so that it will provide the basis for quality-based trading and accurate feedback for producers and breeders. A cuts-based grading system will assist accurate assessment of value for both heavier lean lamb and yearling carcases for export.

The importance of meeting these challenges is recognised by all levels of industry, which are involved throughout the Sheep CRC's research and delivery programs.

Sheep breeders, commercial producers, processors, service providers, supermarkets and research agencies have all committed resources to the five-year plan.

Research Programmes

1. Enhanced sheep wellbeing and productivity;
2. Quality-based sheep meat value chains; and
3. Faster affordable genetic gain.

Areas of Research Expertise

Animal genetics and genomics; meat, marketing and supply chain management; animal welfare and management; education and training in livestock sciences.

Essential Participants

Australian Meat Processor Corporation Ltd; Department of Agriculture and Food Western Australia; Department of Economic Development, Jobs, Transport and Resources (Vic); Department of Primary Industries New South Wales; Meat and Livestock Australia Limited; Murdoch University; Sheepmeat Council of Australia; South Australian Research & Development Institute; University of New England; WoolProducers Australia;

International Collaborations

Contact: CJ Hawkins Homestead University of New England Armidale NSW 2351

Invasive Animals CRC

CENTRE ESTABLISHED: 2012–13; ROUND No. 14; GRANT (Years) 5; INCORPORATED; CRC POSTGRADUATE TARGET: 15; CRC PROGRAMME FUNDING: $19.70m

The Major Challenge

Rabbits, foxes, wild dogs, carp, feral pigs and other invasive animals are a serious threat to Australia's food and fibre security, our globally significant biodiversity and social wellbeing.

The Invasive Animals CRC aims to counteract these environmental, social and economic impacts, through the development and application of new technologies and by integration of strategic pest management approaches across agencies and jurisdictions. Research programs focus on reducing the impacts of rabbits, wild dogs, feral pigs and rodent damage and impacts and controls for carp and detection of other pest fish species.

Research Programmes

1. Land pests
2. Land pests (commercial products);
3. Inland water pests; and
4. Community engagement.

Areas of Research Expertise

Integrated pest management strategy development and implementation; invasive and overabundant animal ecology, physiology and reproductive biology; ecosystem management and restoration; techniques for monitoring, tracking and determining invasive animal distribution and abundance; human capacity-building; community engagement on invasive animal issues; commercialisation of control technologies.

Essential Participants

Australian Bureau of Agricultural and Resource Economics and Sciences; ACT Government Environment and Planning; ACT Government Territory and Municipal Services; Animal Control Technologies (Australia) Pty Ltd; Australian Wool Innovation Ltd; Connovation Ltd; Commonwealth Scientific and Industrial Research Organisation (CSIRO); Department of Agriculture and Fisheries, Queensland; Department of Agriculture and Food, Western Australia; Department of Primary Industries, New South Wales; Department of Economic Development, Jobs, Transport and Resources, Victoria; Department of Primary Industries and Regions, South Australia; Department of Primary Industries, Parks, Water and Environment, Tasmania; Department of Conservation, New Zealand; Grains Research & Development Corporation; Landcare Research, New Zealand; Local Land Services, NSW; Meat and Livestock Australia Ltd; Murray-Darling Basin Authority; University of Adelaide; University of Canberra; University of New England; University of Newcastle; The University of Queensland

Contact Details: UC Innovation Centre Building 22 University Drive South Bruce ACT 2617

Plant Biosecurity CRC

CENTRE ESTABLISHED: 2012–13; ROUND No. 14; GRANT (Years): 6; INCORPORATED; CRC POSTGRADUATE TARGET: 18; CRC PROGRAMME FUNDING: $29.65m

The Major Challenge

Growth in global trade, travel and tourism and changes in climate and agricultural enterprises expose Australia's plant industries to ever-increasing biosecurity threats from devastating plant pests. At risk are food security, $14 billion per annum

in crop exports (ABARE, 2010), the environment, sustainability of regional communities and, indirectly, human health and safety. Plant pests can have catastrophic impact.

The 2010 incursion of myrtle rust, which attacks native plants, emphasises the vulnerability of Australia's flora and unique landscape. If red fire ant was allowed to spread the agricultural, environmental and human impacts are estimated to cost $8.9 billion by 2041 (Natural Resource Management Ministerial Council, 2008).

In light of such risks, the need to strengthen Australia's biosecurity shield through an effective national and regional approach is recognised by government, industry and the community. The Plant Biosecurity CRC (PBCRC) is to developing and deploying knowledge and tools to provide the scientific support essential to safeguard Australia from the economic, environmental and social consequences of damaging plant pests and diseases.

Research Programmes

1. Early warning;
2. Effective detection and response;
3. Safeguarding trade; and
4. Secure future.

Areas of Research Expertise

Plant biosecurity risk and pest pathway analysis; diagnostics; surveillance; incursion impact management; stored grain pests; insect resistance; plant health policy and management; education and training; economic analysis; modelling; agricultural engineering; community engagement.

Essential Participants

Bio-Protection Research Centre New Zealand; CABI; Charles Darwin University; Co-operative Bulk Handling Limited; Commonwealth Scientific and Industrial Research Organisation (CSIRO); Department of Agriculture and Food, Western Australia; Department of Agriculture and Water Resources, Australian Government; Department of Agriculture and Fisheries, Queensland; Department of Economic Development, Jobs, Transport and Resources, Victoria; GrainCorp Operations Ltd; Grains Research & Development Corporation; Horticulture Innovation Australia Limited; Kansas State University; La Trobe University; Murdoch University; New South Wales Department of Primary Industries; Plant and Food Research New Zealand; Queensland University of Technology; South Australian Research & Development Institute (SARDI); The University of Adelaide; The University of Queensland; The University of Western Australia; Viterra Ltd

International Collaborations

Burundi; China; East Timor; Ethiopia; Indonesia; Japan; Kenya; Laos; Malaysia; Malawi; Mozambique; New Zealand; Rwanda; Tanzania; Thailand; Uganda; United Kingdom; United States of America; Vietnam; Zambia; Zimbabwe

Contact: Level 2, Building 22 Innovation Centre, LPO Box 5012 University of Canberra Bruce ACT 2617

Poultry CRC

CENTRE ESTABLISHED: 2009–10; ROUND No.11; GRANT (Years) 7.5; INCORPORATED; CRC POSTGRADUATE TARGET: 35; CRC PROGRAMME FUNDING: $27.00m

The Major Challenge

The Poultry CRC's major challenge is to help Australia achieve sustainable, ethical poultry production in the face of population growth and climate change. Australia's poultry industries must meet increasing demand for poultry products while using fewer resources and reducing environmental impacts. Water, feed and energy must be used more efficiently, while reducing greenhouse gas, dust and odour emissions, pathogens and pollutants. To ensure food security, productivity must be increased, without compromising food safety or welfare. The CRC's integrated program of research, development and education, with embedded end-user and research provider collaboration, can effectively meet this challenge.

Research Programmes

1. Health and welfare;
2. Nutrition and environment; and
3. Safe and quality food production.

Areas of Research Expertise

Poultry; food safety; vaccines; food security; welfare; diagnostics; environment; nutrition; egg quality.

Essential Participants

Australian Egg Corporation Ltd; Bioproperties Pty Ltd; Commonwealth Scientific and Industrial Research Organisation (CSIRO); Department of Agriculture, Fisheries and Forestry, Queensland; Rural Industry Research & Development Corporation; The University of Melbourne; University of New England

International Collaborations

Germany; Netherlands; United States of America

Contact: PO Box U242 University of New England Armidale NSW 2351

CRC for Spatial Information

http://www.crcsi.com.au/

Conducts user-driven research in spatial information that address issues of national importance. We also perform commissioned research projects for key clients.

Partners include federal and state government agencies, universities and over 50 companies. During the life of the CRCSI, our partners will invest more than $160 million (cash and in-kind).

Bushfire and natural hazards CRC

https://www.bnhcrc.com.au/

The focus of the Bushfire and Natural Hazards CRC reflects the impact of natural hazards on the Australian community and the need for emergency services, land managers, all levels of government and the private sector to understand a range of hazards more thoroughly.

The Bushfire and Natural Hazards CRC is conducting coordinated and interdisciplinary research. This includes working with communities to improve disaster resilience and reduce the human, social, economic and environmental costs from bushfires and other natural hazards.

Recently announced CRCs

Food Agility CRC

http://www.foodagility.com/overview/

Mission

The Food Agility CRC aims to empower Australia's food industry to grow its comparative advantage through digital transformation.

The Food Agility CRC brings together 54 participants from food, technology and research sectors guided by agile methods to achieve our vision. The CRC will integrate the agile culture and processes of the digital economy through a whole-of-value-chain lens for fresh and processed food.

We will develop and use digital technologies for sharing data to build brand, markets, jobs and exports across the food value chain so that:

- producers can capture value by responding to rapidly changing consumer preferences
- exceptional quality and food safety records can drive our brand
- environmentally and socially sustainable practices are driven by data
- reduced risks incentivise investment
- a digitally capable workforce drives productivity and higher margins
- trans-disciplinary research solves business problems and
- industry can access social media and consumer preference market insights.

The Federal Government has announced $50 million for a new Food Agility Cooperative Research Centre (CRC) to help producers with innovation and technology.

With an additional $160 million committed by 54 partners in private business and universities — including the University of Technology Sydney, Queensland University of Technology, Brisbane, and Curtin University in Perth — the whole fund is $210 million over 10 years.

As consumer preferences change rapidly, the CRC aims to help producers adapt and develop food that will have good safety records, high quality, and ensure production is environmentally and socially sustainable.

Bronwyn Harch, executive director of the Institute for Future Environments (IFE) and professor of applied statistical science at QUT, will become the Food Agility CRC's first research director.

She said the aim was to deliver research quickly to food manufacturers and farmers.

"First of all we're trying to help the agriculture and food sector be agile to what the consumer globally and nationally are looking for in their food," she said.

"Secondly we're going to connect industry to researchers in an agile method, where industry will be leading the project and industry expects us to deliver quick and fast.

"Every few months, they'll see the outcomes of our research, instead of waiting for the end of years."

Professor Harch suggested lettuce as an example.

"We'll work with producers. We'll take out our technology sensor providers to talk about the best sensors on water and rainfall, matching it with the Bureau of Meteorology data," she said.

"Then we'll try to forecast what the demand is from their retailers, so we can minimise wastage.

"While Australia is a world leader in agricultural productivity and Australia is also an early adopter of technology, it is true that technology in the food and agriculture sector is lagging behind."

The National Australia Bank is the only bank partner

NAB Agribusiness general manager Khan Horn said this was an opportunity to ensure the future of the industry as well as high quality, environmentally sustainable and affordable food for all Australians.

http://www.abc.net.au/news/rural/2017-03-07/government-committed-to-making-food-agility-research-centre/8332078

The Challenge

Digital technology is accepted as a key enabler across the food value chain. Despite the clear global trends, the Australian Farm Institute found in a 2016 report that Australia is far behind the US in using digital information systems and software platforms due to capital and data constraints.

World population will grow to 9.6 billion by 2050 driving food demand. As incomes rise in emerging economies, so too does kilojoule intake and, more importantly, a switch to protein. The world is on the cusp of a huge leap in demand for higher-value food products.

Australia has a comparative advantage in agriculture with a reputation for quality and safety, but consumer preferences are rapidly shifting and we face competition. In a world where everything is digitally connected, data is a critical asset. Food is no different – yet agriculture has the lowest digital adoption of all industries.

Imperatives

Food Agility will use contemporary agile and user-centric design principles, combined with deep engagement with the food sector, to optimise adoption of digital services.

The science methodology includes:

- strong engagement by growers in problem definition and project design, so that projects address real business needs.
- strong focus on user-led app design and adoption.
- ongoing deployment of research outcomes into apps used by growers, and tracking metrics to provide real-time feedback to researchers, for rapid adaptation of the interface and project design if needed.
- leveraging technology partners' data and technology to develop apps, accelerate research outcomes and provide rapid pathways to commercialisation and adoption.

High Performance Soils CRC

$39.5 million over 10 years

CRC for High Performance Soils ($39.5 million over 10 years with $136.8 million cash and in-kind participant contributions) to help farmers bridge the gap between soil science and farm management giving them the tools and knowledge to make decisions on complex soil management issues. These will help them optimise productivity, yield and profitability and ensure long-term sustainability of their farming businesses.

CRC for Honey Bee Products

$7 million over five years

CRC for Honey Bee Products ($7 million over five years with $19.2 million cash and in-kind participant contributions) to help link unique floral hive sites to product quality control processes to underpin the healthy product image for national and international markets. Interdisciplinary researchers and the honey industry will create valuable proprietary knowledge and systems and provide training platforms for continuous industry improvement.

Fighting Food Waste CRC

$30 million over ? years

The Fight Food Waste Cooperative Research Centre (CRC) aims to tackle the growing international problem of food waste by reducing food waste throughout the supply chain, transforming unavoidable waste into innovative high-value co-products, and engaging with industry and consumers to deliver behavioural change. Winning this fight has a $20 billion annual prize by increasing industry profitability, tackling food insecurity and enhancing Australia's reputation as a sustainable and trusted producer of premium food products.

The Fight Food Waste CRC directly supports the Federal Government's National Food Waste Strategy as well as its science and research priorities in food, advanced manufacturing and health. It also directly aligns with the Food and Agribusiness Sector Competitiveness Plan prepared by Food Innovation Australia Ltd (FIAL). Specifically, the proposed CRC aligns with the plan's four knowledge priorities:

- Food security and sustainability
- Enhanced production and value addition
- A global marketplace
- The future customer

The Fight Food Waste CRC will take a triple-bottom line approach to preventing and transforming food waste and developing the circular food economy.
See http://www.pir.sa.gov.au/food_and_wine/fight_food_waste_crc

Previous CRCs

Over the period from 1991 to 2016 a total of 211 successful CRC applications have been lodged, with a total Commonwealth investment of $3.972 billion. Successful CRCs have been heavily concentrated in the agriculture fisheries and forestry, environment, and health medical and biotech sectors.

Table 1: Number and Value of CRCs Over Life of Program

Industry	Number of successful applications	Value of successful applications	Proportion of value
Agriculture fisheries and forestry	50	943.1	23.7%
Construction and infrastructure	5	74.9	1.9%
Environment	44	815.0	20.5%
Health medical and biotech (non-ag)	38	762.5	19.2%
Information and communications technologies	20	343.3	8.6%
Manufacturing and Materials	22	455.2	11.5%
Mining and energy	24	384.6	9.7%
Services	6	140.4	3.5%
Social outcomes	2	53.2	1.3%
	211	3,972.0	100.0%

Calculated from data at https://www.business.gov.au/assistance/cooperative-research-centres-programme/cooperative-research-centres-crcs-grants/crcs-information

Quite clearly the CRC program has been a major source of R&D investment for the rural industries sector. Whilst there have been many assessments of the economic impact of CRCs prior to and during, and after their operation, using various economic modelling techniques (Allen Consulting Group, 2012), there is little "on the ground" evidence of sustained impact over time in terms of value created for the sector, for farmers, for communities, or the economy.

The 50 successful CRCs are listed below, together with a brief description of purpose and previous iterations of the CRC.

Table 2: Successful Rural Research and Innovation CRCs

CRC	Period	C/W Funds	Purpose	Previous iterations
4 - CRC for Soil and Land Management	1991-1997	15.2	To develop innovative soil-based technologies for improved soil and land management. The focus was on clean, green management of land that emphasised efficient use of natural resources and minimised off-site impacts.	N/A
5 - CRC for Temperate Hardwood Forestry	1991-1997	8.6	To undertake research on temperate hardwood breeding strategies, quantitative genetics and tissue culture.	No. 145 - CRC for Forestry - 2005-2013
14 - CRC for Plant Science	1991-1998	15.2	To apply new technologies, particularly molecular genetic technologies, to key problems in plant biology.	N/A
25 - CRC for Industrial Plant Biopolymers	1991-1998	12.7	To establish the science and technological base for the manufacture of natural polymers, such as gums, thickeners and stabilisers.	No. 98 - CRC for Bioproducts - 1999-2006
7 - CRC for Tropical Pest Management	1991-1998	10.2	To develop improved and sustainable management of tropical pests through a cooperative and integrated program of research, education, training and implementation.	N/A
17 - CRC for Hardwood Fibre and Paper Science	1991-1999	13.1	To improve wood quality through genetic and silvicultural research on plantation and regrowth eucalypts, and provide technologists with directions for improving processes and product quality.	N/A
21 - CRC for Viticulture	1992-1999	12.4	To undertake research and education efforts in viticulture for dried fruits, table grapes and wine grapes.	No. 92 - CRC for Viticulture - 1999-2006
22 - CRC for Tropical Plant Pathology	1992-1999	9.3	To provide new and more effective ways of controlling plant diseases, with a reduced reliance on chemicals and greater reliance on durable resistance.	No. 100 - CRC for Tropical Plant Protection - 1999-2006
41 - CRC for the Cattle and Beef Industry	1993-1999	17.3	To improve the quality and consistency of beef to match the exacting requirements of our new customers in Asia and better cater for Australian preferences and diets.	No. 151 - CRC for Beef Genetic Technologies - 2005-2012
42 - CRC for Vaccine Technology	1993-1999	11.0	To develop the technology necessary for the production of new and improved human and veterinary vaccines from the fields of immunology, cell biology and molecular biology.	No. 82 - CRC for Vaccine Technology - 1999-2006
47 - CRC for Sustainable Cotton Production	1993-1999	11.0	To develop and implement sustainable cropping systems for the Australian cotton industry.	No. 155 - Cotton Catchment Communities Cooperative Research Centre - 2005-2012
35 - CRC for Premium Quality Wool	1993-2000	15.5	To improve the quality and competitive position of Australian wool in the world textile fibre market.	N/A
37 - CRC for Food Industry Innovation	1993-2000	11.0	To undertake research and development for the manufacture of improved and novel natural food ingredients, principally from micro-organisms.	N/A
43 - CRC for Aquaculture	1993-2000	14.3	To build the skills and technology for a competitive, sustainable, and environmentally acceptable Australian aquaculture industry.	No. 123 - CRC for Sustainable Aquaculture of Finfish - 2001-2008
60 - CRC for Quality Wheat Products and Processes	1995-2001	12.1	To improve wheat quality and expand from wheat production to wheat-based products and services.	No. 122 - CRC for Value Added Wheat - 2001-2008
58 - CRC for International Food Manufacture and Packaging Science	1995-2002	16.2	To apply scientific and innovative expertise to the food and packaging industries. Focus was given to intelligent manufacturing systems for horticulture products as well as general food manufacturing and processing.	N/A
56 - CRC for Sustainable Sugar Production	1995-2003	15.7	To foster a profitable Australian sugar industry by enhancing the quality of its natural resource base and meeting the environmental expectations of an informed community.	N/A
69 - CRC for Molecular Plant Breeding	1997-2003	15.1	To develop new technologies in molecular biology and implement effective strategies for their use in cereal and pasture grass breeding programs.	No. 126 - Molecular Plant Breeding CRC - 2003-2010
64 - CRC for Sustainable Production Forestry	1997-2005	15.9	To undertake research on genetic improvement, sustainable management, and resource protection in respect of forestry.	No. 145 - CRC for Forestry - 2005-2013
73 - CRC for Sustainable Rice Production	1997-2005	15.4	To increase the economic contribution of the rice industry to the regional and national economy through increased efficiencies in production, increased revenue from new value-added products and increased exports, and improvements in the management of soil and water resources.	N/A
101 - Australian Cotton CRC	1999-2005	12.4	To conduct research into the management of cotton insect pests, weeds and diseases, diagnostics, biodiversity and vegetation management.	No. 155 - Cotton Catchment Communities Cooperative Research Centre - 2005-2012
83 - CRC for Cattle and Beef Quality	1999-2005	15.0	To conducted research in meat science, genetics, growth and nutrition, animal health and welfare, feedlot, and in waste management and education.	No. 151 - CRC for Beef Genetic Technologies - 2005-2012

CRC	Period	C/W Funds	Purpose	Previous iterations
92 - CRC for Viticulture	1999-2006	18.0	To introduce quality viticulture management from 'vine to palate'.	No. 21 - CRC for Viticulture - 1992-1999
98 - CRC for Bioproducts	1999-2006	13.7	To develop commercially valuable materials produced by plants.	No. 25 - CRC for Industrial Plant Biopolymers - 1991-1998
117 - CRC Wood Innovations	2001-2008	16.3	To conduct research into the fundamental properties of microwave energy and its influence on wood modification, permeability and on the relief of growth stresses in logs and sawn timber.	N/A
120 - Australian Sheep Industry CRC	2001-2008	17.8	To impact on the profitability of the sheep industry by optimising returns from both wool and sheep meat.	No. 206 - CRC for Sheep Industry Innovation - 2014-2019
122 - CRC for Value Added Wheat	2001-2008	17.2	To increase knowledge of wheat quality, produce nutritional and industry technology benefits and assist in the transition of wheat breeding from the public to the private sector.	No. 60 - CRC for Quality Wheat Products and Processes - 1995-2001
123 - CRC for Sustainable Aquaculture of Finfish	2001-2008	16.5	To develop and contribute to a vibrant and rapidly growing aquaculture industry through world's best practice aquaculture production technologies, innovation, collaboration and commercially focused research.	No. 43 - CRC for Aquaculture - 1993-2000
109 - CRC for Innovative Dairy Products	2001-2009	17.6	To develop and commercialise new and innovative products using genomic and reproductive technologies.	No. 180 - Dairy Futures CRC - 2010-2016
126 - Molecular Plant Breeding CRC	2003-2010	29.9	To develop the latest molecular technologies and their delivery to grain and pasture industries through various breeding programs.	No. 69 - CRC for Molecular Plant Breeding - 1997-2003
129 - CRC for Sugar Industry Innovation through Biotechnology	2003-2010	28.0	To build a sustainable and profitable export-based sugarcane industry.	N/A
130 - Australian Biosecurity CRC for Emerging Infectious Disease	2003-2010	17.5	To develop research, education, and technologies that strengthen the national capability to predict, assess, monitor, detect, identify and respond to emerging infectious disease threats which impact on national and regional biosecurity.	N/A
135 - CRC for Irrigation Futures	2003-2010	16.0	To continually improve irrigation policies, tools, practices and processes.	N/A
140 - CRC for the Australian Poultry Industries	2003-2010	21.5	To support the cost-effective and socially responsible production of safe, quality poultry products for domestic and export markets.	No. 176
142 - CRC for Innovative Grain Food Products	2003-2010	24.1	To research, develop and commercialise healthy grain food products, and higher-value grains as a source of unique industrial and pharmaceutical compounds and new processing and manufacturing technologies.	N/A
152 - CRC for an Internationally Competitive Pork Industry	2005-2011	23.8	To develop better grains and grains processing methods and systems to enhance the efficiency of production and quality of pork.	No. 187 - CRC for High Integrity Australian Pork - 2011-2019
149 - CRC for National Plant Biosecurity	2005-2012	33.5	To provide underpinning biosecurity science on harmful pests and diseases that can impact on food safety and security, trade, market access, market development and, ultimately, the profitability and sustainability of plant industries.	No. 191 - Plant Biosecurity CRC - 2012-2018
151 - CRC for Beef Genetic Technologies	2005-2012	30.0	To increase the competitiveness of Australian beef businesses.	No. 83 - CRC for Cattle and Beef Quality - 1999-2005
155 - Cotton Catchment Communities Cooperative Research Centre	2005-2012	26.5	To facilitate the world's best practice in production, environmental and catchment management practices, including research to increase yield and fibre quality and to improve social and economic conditions in cotton communities.	No. 101 - Australian Cotton CRC - 1999-2005
156 - Invasive Animals CRC	2005-2012	29.6	To develop and apply new technologies and integrate strategic pest management approaches.	No. 192 - Invasive Animals CRC - 2012-2017
145 - CRC for Forestry	2005-2013	26.6	To drive innovation for increased profitability in a rapidly changing environment, and underpin the management of native forests and plantations to enhance environmental services such as biodiversity, carbon sequestration, water quality and yield.	No. 64 - CRC for Sustainable Production Forestry - 1997-2005
163 - CRC for Sheep Industry Innovation	2007-2014	15.5	To improve productivity and meat quality in the sheep industry.	No. 206 - CRC for Sheep Industry Innovation - 2014-2019
166 - Future Farm Industries CRC	2007-2014	34.1	To develop innovative farming systems and new perennial plant species and cultivators that improves productivity through effective water use and maintaining ground cover.	No. 106 - CRC for Plant-based Management of Dryland Salinity - 2001-2007
165 - Seafood CRC	2007-2015	35.5	To assist the seafood industry to profitably deliver safe, high-quality, nutritious Australian seafood products to premium markets, domestically and overseas.	N/A
180 - Dairy Futures CRC	2010-2016	27.7	To develop new approaches to selective breeding of both pasture and cattle to build a more resilient and profitable dairy industry.	No. 109 - CRC for Innovative Dairy Products - 2001-2009
176 - Poultry CRC	2010-2017	27.0	To conduct research and drive education and training to help Australia's poultry industry achieve sustainable, ethical poultry production in the face of population growth and climate change.	No. 140 - CRC for the Australian Poultry Industries - 2003-2010
187 - CRC for High Integrity Australian Pork	2011-2019	19.9	To address the major challenge the Australian pork industry's faces in maintaining local production of high quality food for a reasonable price without negatively impacting pig welfare, the environment, or the health of the consumer.	No. 152 - CRC for an Internationally Competitive Pork Industry - 2005-2011
192 - Invasive Animals CRC	2012-2017	19.7	To counteract the environmental, social and economic impacts of invasive animals through the development and application of new technologies and by integration of strategic pest management approaches across agencies and jurisdictions.	No. 156 - Invasive Animals CRC - 2005-2012
191 Biosecurity CRC	2012-2018	29.7	To develop and deploy knowledge and tools to provide the scientific support essential for safeguarding Australia from the economic, environmental and social consequences of damaging pest incursions.	No. 149 - CRC for National Plant Biosecurity - 2005-2012
206 - CRC for Sheep Industry Innovation	2014-2019	15.5	To enhance sheep wellbeing and productivity, value-based trading of sheep meat and deliver affordable technologies to transform the Australian sheep industry.	No.163 - CRC for Sheep Industry Innovation - 2007-2014

4 Major agribusiness private equity investors

Australian Agricultural Investment Fund

From website - https://www.aaif.biz/

As one of Australia's leading private agricultural management companies, Australian Agricultural Investment Fund provides specialist independent advice and unrivalled service to clients seeking direct investment opportunities in Australian agriculture.

Experts in the Australian agricultural farmland sector, we have the knowledge and experience to guarantee that every client is shown the farmland or agribusiness opportunities available in Australia that best meet their requirements on income and risk.

AGRICULTURE AND CHANGE

Agriculture worldwide is going through rapid change due to concerns in food security, political instability, environmental damage and increasing population.

The age-old institutional structure of family farms is being challenged.

New ways to own & operate farms are being implemented.

For agriculture to grow into the future, it must OWN THE VALUE PATHWAY from paddock to plate! By controlling this, producers can deliver food security, stability and environmental sustainability, and deliver more high quality SAFE product to the consumer from the same land holdings.

The AAIF vision is to own Australian agricultural assets within the value pathway. We will give investors the option to invest in individual assets or reduce risk by investing across a group of agricultural assets. These assets are not only LAND but agribusinesses, processing plants, food wholesale outlets and input cost business – ALL WHICH are connected within the agricultural value pathway.

AAIF, through experience and a comprehensive network, can assess and provide services to help investors find these investments.

The unique structure of AAIF will serve two masters:

The Investor – giving choice & security

The Consumer – by building an Agricultural business that has control and leverage to deliver safe & environmentally friendly food products from paddock to plate,

https://www.aaif.biz/about-1/

QIC

Australian investment manager QIC plans to raise AUD400m (€280m) from institutional investors over the next 12 months to invest in food and agriculture.

QIC made its first significant investment in May, jointly acquiring an 80 per cent stake in one of Australia's oldest and most established cattle stations on behalf of its clients along with the UK-based Pension Protection Fund (PPF) and the Queensland government's Defined Benefit Plan. The transaction involved an equity investment of around AUD300m.

The business, founded in 1877 and known as the North Australian Pastoral Company (NAP), owns 5.8m hectares across Queensland and the Northern Territory, and around 178,000 head of cattle. NAP's largest shareholder was the Foster family, with the UK-listed MP Evans agribusiness group owning 34 per cent. The family has retained a 20 per cent interest in the business, which has an enterprise value of AUD519m.

QIC plans to bring small groups of institutions to co-invest, just as it did with the UK fund in the NAP acquisition. Although the AUD78bn manager has large portfolios in real estate and infrastructure, private equity accounts for just AUD5bn of funds under management, and, in the private equity sector, weighting to food and agriculture is less than 10 per cent.

Cummins said the sector had been identified as a growth area, and that QIC wanted to expand into dairy, horticulture and grains. Food and agriculture is an emerging thematic investment for institutional investors. Firstly, there is strong and growing demand from traditional markets, where consumers are now looking through the food supply chain as opposed to looking at food as a commodity. Secondly, the rising middle classes in Asia is looking to consume more protein, in particular beef. High-quality food will become increasingly scarce as farmland becomes a limited resource.

Over the next 5-10 years, we see this asset class evolving, and it will become part of institutional portfolios. It is likely institutional investors could allocate a couple of percentage points of their capital to food and agribusiness."

FarmInvest

http://farminvestaustralia.com.au/about-farminvest/

The aim of the Fund is to create a diversified portfolio of land assets, across both production systems and geographical regions. The Fund does not intend to operate farming businesses but rather lease the land to experienced professional farmers with a proven track record and management capacity. This will allow investors

to effectively invest across a broad range of Australian agricultural land assets, under a professional asset management regime, designed to optimise exposure to capital growth whilst accessing annual distributions through lease returns.

The Australian Farmland Investment Fund is being created to take advantage of the significant opportunity for an agricultural land fund to capitalise on the ongoing demand for sustainable, food producing land assets, in a stable socio-political environment, proximate to the growing population base of Asia and the Subcontinent.

Australian FarmLand Investment Fund (The Fund)

Structure of the Fund

The Fund is an unlisted, open-ended Unit trust. The Fund will only be offered to investors who are "wholesale clients" as defined by the Corporations Act and thus there is no requirement for the Fund to be registered as a managed investment scheme with the Australian Securities and Investments Commission (ASIC). The assets of the Fund will be held by a custodian, CIPN, on behalf of FarmInvest Australia. FarmInvest Australia will issue Units as trustee of the Fund and as an authorised representative under CIPL's AFSL.

Opportunity to Invest in Agricultural Land

The long-term objective of the Australian Farmland Investment Fund is to build a portfolio of diversified agricultural land assets which delivers optimal exposure to capital growth and ongoing revenue to investors whilst limiting direct exposure to commodity cycles and operational risk. FarmInvest Australia believes there is an evolving structural shift in the ownership and management of productive land in Australia, largely driven by the need to achieve economies of scale and production efficiencies. The speed of this shift is being enhanced by a generational change to facilitate an emerging professional farming segment while allowing an ageing farmer population to retire.

According to the Food and Agriculture Organisation:

- By 2050 there will be a global population of more than 9 billion people. Effectively, there will be 70 million additional people for agriculture to feed each year.
- Over the next 30 years, hundreds of millions of people will rise to join the middle class in developing countries. Increased prosperity will stimulate a change in dietary needs, generally comprising a rise in calorie consumption per capita and an increase in higher protein diets. Both increased calories and more protein require more resource intense production. This will, in turn, drive both carbohydrate and protein markets.

At the same time it is widely acknowledged that increased urbanisation and climate change are likely to reduce the availability of arable land and increase pressures on water resources.

While the investment varies between regions and enterprise type, good quality farmland can be purchased for $1,000 per tonne of wheat produced, compared to regions in Europe where this cost may be up to three times greater . In FarmInvest Australia's view, Australian rural land in comparison with other regions of the world presents a compelling value proposition.

FarmInvest Australia believes that Australian agricultural land ownership structures will follow the United States and European trend where a greater proportion of land is leased to lessee farmers. This creates a prime opportunity for new investment into Australian agriculture to complement capital needs to facilitate this trend in land ownership.

Investment Objective

The Fund's investment objective is to create a diversified low risk portfolio of rural property that targets a long-term net return derived from capital appreciation and income.

FarmInvest Australia intends to achieve this objective through:

- Acquiring a diversified portfolio of assets that include properties that can grow grain, wool, meat, horticulture and other agricultural commodities across a range of geographical locations.
- Applying selection methodology tools that balance income yield through historical capital growth with lease returns. (See Figures 5-11)
- Undertaking a thorough lessee selection process focussed on financial capacity, proven track record and property maintenance philosophy.
- Being focussed on efficient management and administration to control fee structures and management costs.

http://farminvestaustralia.com.au/australian-farmland-investment-fund/

ROC Partners

Macquarie private equity spinoff targets agriculture, real estate

by Sarah Thompson Tony Boyd, Oct 15 2014

ROC Partners managing director Michael Lukin says the firm is planning to spend part of its $5 billion war chest on unlisted opportunities in agriculture and real estate – opportunities outside 'mainstream private equity'. Photo: Dominic Lorrimer

Veteran private equity operative George Penklis has been lured out of retirement by a firm spun out of Macquarie Group to work on a new strategy focused on direct investment in Australian agriculture and real estate.

In a move that will be closely watched by the Australian $21.4 billion private equity industry, ROC Partners , which ended its association with Macquarie in March, is planning to spend part of its $5 billion war chest on unlisted opportunities in agriculture and real estate.

ROC managing director Michael Lukin told The Australian Financial Review that the goal behind the significant change in strategy was to come up with investments outside "mainstream private equity".

"What we are looking to do is build relationships with operators in the real estate and agricultural space in Australia and ultimately, Asia, and combine that with the institutional relationships and structuring capability that we have at ROC Partners," he said.

The team at ROC, formerly known as Macquarie Investment Management Private Markets, are Australia's largest private equity fund of funds manager.

Their strategy has been to take money from Australian and offshore superannuation and sovereign wealth funds and allocate it to private equity managers. It is a relatively common business model in other parts of the world. But the fund of funds approach is losing its lustre in Australia.

'Sophisticated' super funds

Traditional clients, such as sovereign wealth and global pension funds, have developed resources in-house, enabling them to bypass intermedia-ries such as ROC and go directly to traditional private equity firms such as Pacific Equity Partners or Quadrant Private Equity.

At the same time, fee structures used by fund of funds managers are being questioned as super funds attempt to cut costs. With investors wanting better exposure to specialist asset classes – often outside the traditional sectors targeted by PE firms – the time seems right to expand ROC's investment approach.

"Our business has evolved away from fund to funds for Australian clients over the past 11 years since we picked up our first separate account in 2003 with the government employees of Western Australia," Mr Lukin said.

"Australian pension funds are far more sophisticated than they were 10 years ago. They have internal capabilities and they can do a lot in-house, so we need to be able to provide them with a truly tailored advisory service – not just a product. So we are looking at opportunities outside the usual scope of private equity."

Agriculture has its obvious attractions to firms such as ROC. Mr Lukin says it has "almost been a cottage industry" that is yet to benefit from operational and financial skills that should exist within a good PE firm.

"What we want to do is really institutionalise and formalise that in a way that allows our investors to have the same kind of relationship they have with, say, a Crescent Capital Partners or a Next Capital in the agricultural space," Mr Lukin said. "We will look at partnering with someone directly rather than a fund to funds model."

Expansion in Asia

ROC has 24 employees including four based in Asia, with offices in Hong Kong and Tokyo. The firm hopes to expand in the region and believes having an agriculture business is critical to achieve that goal.

Mr Penklis is a well-known figure in private equity circles. He was one of Quadrant Private Equity's founders along with Chris Hadley , and left the firm in 2013.

"I am excited to look at opportunities, particularly in agriculture and real estate, where private equity traditionally hasn't played," Mr Penklis said. "Australian institutional investors haven't had a professional access point to these opportunities and I am keen to help Mike [Lukin] build this."

Mr Lukin nominates a "core group of half a dozen" local PE firms as having key relationships with ROC. Does he worry a more direct approach by ROC will put him in competition with these investors?

"We don't want to be competing with our existing relationships and we don't want to jeopardise our existing business and the service we provide our -clients in the existing space," Mr Lukin said. "[Agriculture and real estate] are sectors private equity does not operate in, and secondarily it's with assets that do not suit PE – generally highly capital intensive, longer-tenure style assets.

"It's not the type of assets that our key relationships in private equity look at. And you know, if we do find ourselves at the fringe, we are not going to be competing with our relationships so we will let it go through to our preferred [partner]."

He said ROC would also be happy to pass on opportunities to its partners if there was a conflict.

"Nobody is doing this," Mr Lukin added. "Plenty of people [are] doing private equity, plenty of people [are] doing real estate, but there's no one that can give that broader market view on the opportunities available across those markets."

http://www.afr.com/business/agriculture/macquarie-private-equity-spinoff-targets-agriculture-real-estate-20141014-11cpfu

Catalyst Partners

"Investing in Australian agriculture is a specialist field. Both senior partners of the firm have lived and worked on commercial rural operations and retain a personal interest in farming properties. Both partners have degrees in Agricultural Economics and retain many long term client covering most facets of farming in Australia, from intensive irrigation to large scale grazing enterprises. This puts them in an ideal position to understand and identify investment opportunities, but also to provide expert management services of farms ongoing once in operation. Catalyst Partners offers exemplary service to farming operations and is devoted to keeping up to date in the rapidly changing Agricultural environment"

http://catalystpartners.com.au/home-international-clients/investing-in-australia-agriculture-property-private-equity-securities-fixed-interest/investing-in-australian-agriculture-day-to-day-management-extensive-expertise/

Aux Venture

Want a great return in a rapidly growing alternative asset class?

Invest in Agriculture

Today, the reasons to invest in agriculture are compelling. This asset class presents investors with real assets that are intimately connected to the globes growing population's most basic need – to eat. Further, corrections in global markets means that agriculture can also meet

investment return appetites with passive investment opportunities in Australian farmland now readily able to reach 5-8* per cent fixed net returns.

Globally, both climate change and increasing depletion of agricultural land are leading to increasing scarcity, in turn driving investment returns from farmland. Powerful macro trends strongly support investment in farmland as every day the world's population grows by a net of 200,000 yet on that same day 30,000 hectares of farmland is lost. The FAO has predicted that to reach the world's demand for food by 2050, global food productivity will need to double and this will need to be achieved with significantly less farmland than we have today.

Effective investment in agriculture can greatly support this needed growth in productivity and sustainability of farmland for food production. Aux Venture has been developing investment opportunities in Australian agriculture since 2009. We believe Australia represents one of the best destinations for food security and agricultural based investment due to sovereign stability, potential for further productivity gains, relative price of agricultural land by productivity output, accessibility to scale, domestic need for effective capital and the opportunity to partner with multi-generational farmers that produce some of the best quality food in the world.

Further, half the world's population is located in a prime position for supply from the Australian food bowl. Asian markets are rapidly growing in close proximity to sustainable livestock production in Australia's north. There is also a strong productivity, resource and technology base to support further development and growth, giving Australian farmland investment opportunities sustainable and attractive return capabilities.

Aux Venture has investment ready opportunities available for astute direct foreign investors, passive investors, private equity, debt purchase or joint venture investment interests. Catering for direct investors as well as institutional placements, Aux Venture develops all of our investment opportunities from the ground up. Using extensive networks in the Australian agricultural industries as well as a diverse, hands on practical background, our expertise has a depth that is hard to find in investment managers.

Aux Venture brings a unique skill set to investment development and can offer exclusive opportunities that represent some of the best investment offerings available.

http://www.auxventure.com.au/investment.aspx

Hamersley Agriculture

http://www.hamersleyagriculture.com.au/view/about-us

Hamersley Agriculture will invest in Western Australian beef production through the acquisition of pastoral properties, cattle and farm equipment. There will be significant investment set aside for a capital improvement programme, with a focus on maximising the carrying potential of each property through water infrastructure, fencing and feed which will lead to higher cattle turnoff (revenue) and capital returns (inextricably correlated to the carrying capacity of the property). Hamersley will then look to sell the beef to both domestic and international customers.

Hamersley Agriculture has a team built on the premise that no-one knows Western Australian agriculture better than Western Australian pastoralists and agricultural professionals. Most of the management and operational team were born and raised in the state and have significant local agricultural experience.

INVESTMENT PHILOSOPHY

To acquire and aggregate good value pastoral properties suitable for the entire beef production supply chain and produce at a large scale consistent good quality cattle for sale to long term contracted offtake partners, disintermediating and systemising where possible to maximise margins and operational efficiency and also maximise the re-sale value of the land through best practice infrastructure investment.

The philosophy is to underpin our strategy with a first class management team and a culture of "farmer up not investment banker down" which has been key to attracting and retaining the best agricultural talent Western Australia has to offer.

"We also have developing market channels in China"

5 Accelerators, seed, and start-up funds

Sprout X

http://sproutx.com.au/

"SproutX is the centre of Australia's $1.2 trillion agriculture opportunity. Through the SproutX Pre-Accelerator, Accelerator and Co-working space programs, innovation within the sector is enabled through the empowerment of entrepreneurs. Join us as we revolutionise Australian agriculture and take agtech to the next level".

SproutX opens first co-working space for agriculture start-ups

The Australian February 7, 2017

DAVID SWAN

Agtech start-up accelerator and innovation hub SproutX is betting the farm on innovation, opening Australia's first co-working space for agriculture start-ups.

The Melbourne-based hub, led by Tasmanian native Sam Trethewey, will offer a free space for eligible start-ups in a bid to become the centre of Agtech in Australia and continue boosting the country's $60 billion agriculture industry.

"This is a great space that provides an opportunity for anyone in agriculture or anyone wanting to pivot into this space to come and mingle. We've already seen a couple of deals and connections made because of the people they've met in the space," Mr Trethewey told The Australian.

According to Mr Trethewey, a big surprise so far has been the proportion of people from outside the agriculture industry using the space and the collaborations -between those outsiders and members of the industry.

"Uber didn't come from within the taxi industry and it's the same for agriculture," he said. "We need people coming in from the outside with fresh ideas, and bigger and better ways of thinking to look at the challenges."

SproutX, which is a joint -initiative between finance outfit Findex and the National Farmers Federation, has just completed its first pre-accelerator intake with 100 national start-up finalists. The online program culminated in an online pitch night on Twitter, in which the top 10 start-ups pitched their agtech ideas to more than 1.4 million people who tuned in via @AgChatOz.

Mr Trethewey said to continue seeding agtech start-up companies in Australia SproutX had opened its pre-accelerator course content to the public, under an open source licence.

"Nothing like this has been done in Australia," he said.

One of those promising early success stories is Smart Shepherd, a hardware tech start-up designed to help curb lambing losses.

"The sheep industry loses about half a billion dollars a year in lamb mortality; lambs that just don't get to market, they die -during birth, or they're mismothered," Smart Shepherd co-founder David Rubie said.

"The average sheep breeder loses 30 per cent of his lambs. The basic problem we're trying to solve is to get farmers to work out which mothers are no good, so we use Bluetooth low-energy tags for $5 each and hang those on the -mother. It works out which tags are nearby, and replicates what farmers normally have to do manually."

Mr Rubie said there were challenges around programming the hardware, and getting validation on how much to charge for his product.

"SproutX said why are you thinking so small, they break you out of that perspective. They said if you can let any breeder, not just small stud ones, but any breeder, find out the pedigree of their lambs then they can participate at a much higher level," he said.

"Being involved with SproutX has given us a lot more legitimacy, we've got people interested now and we've had approaches from a whole bunch of people."

Start-ups that completed the free pre-accelerator program received $1000 cash and $10,000 worth of services.

"Our goal is to make Australia the No 1 destination for agtech and that's why we're opening up our content to everyone," said -Andrew Lai, accelerator director of SproutX.

"We've been stunned by the quality raw talent that has come through our program and who knows how many more people are out there who would benefit from learning best-practice methods."

The innovation hub has also appointed a new director, a co-founder of the world's largest agricultural crowd equity platform AgFunder, Michael Dean. He previously helped develop agribusiness opportunities in Africa through his business SeedRock Africa Agriculture, and has worked with major Australian agriculture businesses.

"Our farmers are among the best in the world, yet the industry isn't getting the support and funding that it needs to drive technology innovation to boost farm efficiency and productivity," Mr Dean said. "On a per capita basis, Australia spends 32 times less than the USA on agricultural venture capital."

Mr Dean will help mentor Australia's newest agtech start-ups and Mr Trethewey said he'd be a "vital strategic asset" to the hub's global ambitions.

"I see SproutX as an outstanding and long overdue initiative to facilitate the development and commercialisation of the best Australian agricultural and food technology innovation,'' Mr Dean said.

"I believe both SproutX and AgFunder can be -instru-mental in helping to launch our best new -agtech, not only into the Australian market, but also the $8 trillion global agriculture sector."

http://www.theaustralian.com.au/business/technology/sproutx-opens-first-coworking-space-for-agriculture-startups/news-story/94de94d2104797d160a5accd8af9c65a

SparkLabs Cultiv8

SparkLabs Cultiv8 is a unique world class accelerator and research facility co-founded by the SparkLabs Group, Asia's leading tech accelerator group, and the NSW Department of Primary Industries (DPI), together with a number of leading farms and large corporate partners.

For the successful applicants to the program, Cultiv8 offers the following:

- Exposure to a 120+ global network of mentors through Asia's largest Accelerator group
- DPI's research labs with 650+ scientists and engineers

- 25 research stations on over 13,000 hectares of agricultural trial sites across four climatic regions (temperate, sub-tropical, coastal and alpine)
- The top-tier network of entrepreneurs, venture capitalists, angel investors and executives
- Legal advice from MinterEllison, one of the top 5 law firms in Australia
- Asia's growing demands are providing Australia's experienced Agricultural and Food Industries with an immense opportunity in the decades ahead. Leveraging off this knowledge base can promote your businesses potential to extraordinary heights.
- Advisory workshops from KPMG through their world class IoT and AgTech divisions
- Access to the space and resources within the Global AgTech Ecosystem or GATE through SparkLabs Cultiv8's as a Foundation Partner

The focus is on helping great entrepreneurs from the Ag and Food Technology sectors to prototype, scale and commercialise their products. The program will be eight months in length and provides funding, office space, a structured program and access to plus access up to A$100,000 for an agreed equity stake.

Cultiv8 has a global focus and will be situated in Orange, Australia, within the Global AgTech Ecosystem or GATE, taking the resources to the opportunity rather than the opportunity to the resources through a partnership between the NSW Department of Primary Industries, SparkLabs Cultiv8 and a range of large corporate partners.

SparkLabs Cultiv8 invests up to A$100,000 in all startups in exchange for an agreed equity position.

Each startup gets matched with 4 to 6 mentors. We consider our global mentors to be our greatest asset. Our mentors come from a range of backgrounds, some with specialised Industry experience, others with broader technology experience.

We believe that our startups will grow exponentially through weekly sessions with our world-class mentors. Every week, startups participate in weekly teaching sessions, where they have the opportunity to learn from and network with renowned Australian and international entrepreneurs. In addition during Office Hours, startups can seek intensive feedback from Cultiv8's Partners.

Demo Day highlights the end of our accelerator program. At this event, startups have the opportunity to pitch to eminent global investors.

Additionally, startups can gain much needed exposure and promote themselves in front of the media and influential figures from the industry.

SparkLabs provides free office space in The Global AgTech Ecosystem, the centre of Australia's AgTech startup scene, perks ranging from cloud services, legal counsel among others.

https://www.sparklabscultiv8.com/

And from CSU …

Statement from CSU Deputy Vice-Chancellor (Research, Development and Industry) Professor Mary Kelly

Friday 15 Sep 2017

Charles Sturt University (CSU) welcomes today's announcement by NSW Department of Primary Industries (DPI) of the Global Ag-Tech Ecosystem (GATE), a collaborative technology and research facility based at Orange Agricultural Institute.

As Alliance Partners with NSW DPI in the Graham Centre for Agricultural Innovation and the National Wine and Grape Industry Centre, CSU supports the further strengthening of the innovation network in regional NSW.

The GATE compliments the AgriTech Incubator at CSU in Wagga Wagga, due to be launched at 9.30am on Monday 18 September.

The AgriTech Incubator at CSU, which has been developed in partnership with the NSW Government's Boosting Business Innovation Program, aims to spark innovation and economic development in the Riverina by offering incubator programs, providing co-working spaces, fostering greater participation of women in entrepreneurial activities, and supporting SMEs to overcome R&D challenges through access to the University's facilities and expertise.

These incubators are an important part of the broader innovation ecosystem which CSU is fostering in regional NSW through the development of the AgriSciences Research and Business Park (AgriPark) in Wagga Wagga. The AgriPark brings research, collaboration, innovation and sustainability together in the heart to the vibrant Riverina region.

http://news.csu.edu.au/latest-news/charles-sturt-university/csu-research/statement-from-csu-deputy-vice-chancellor-research,-development-and-industry-professor-mary-kelly2

CSIRO Main Sequence Ventures

The CSIRO Innovation Fund invests in start-up and spin off companies, and SMEs engaged in the translation of research generated in the publicly funded research sector.

The CSIRO Innovation Fund invests in the development of early stage technology opportunities from the public research sector. This initiative is part of the Australian Government's National Innovation and Science Agenda .

Main Sequence Ventures is the manager of the CSIRO Innovation Fund 1, LP.

The CSIRO Innovation Fund is intended to help improve the translation of publicly funded research into commercial outcomes and stimulate innovation in Australia. This will help successful business to grow – boosting Australia's productivity and exports, and generating jobs through increased commercialisation of research outcomes, particularly in priority sectors of the Australian economy.

Main Sequence Ventures

We will invest in companies translating research into global-scale businesses. We know that this takes more than money. We work harder to understand the world that these founders imagine. We are as comfortable in the lab as we are on the front-line with customers. We will invest capital, and ourselves, to systematically reduce risk and increase opportunity by combining the operational velocity of startups with the deep curiosity of Australia's research sector.

We believe the next great cohort of disruptive companies will come from those scientists, technologists and creative thinkers who are prepared to challenge the status quo.

Backing the best founders

We are prepared to back the best, most ambitious founders. We believe that mission driven founders are the key to building the best companies. It's not necessary to have the 'right experience' to do this, but it is necessary to have the right vision and drive.

Backing your vision

We carefully analyse your company and how your solution best solves an acute market problem. We listen carefully, and are prepared to back you before it becomes evident your solution will prevail.

Support from seed through expansion financing

We are prepared to invest throughout your company's life, from seed through to expansion. Our partners have invested with many of the top tier venture funds and will assist your fund-raising efforts along the way.

Access to the brain trust

We have our genesis in CSIRO and have access to a deep well of data scientists, physicists, synthetic biologists, chemists, astronomers and experts in other disciples. Each member of the management team has been an entrepreneur and understands the difficulties of building a company. We are here to help.

Long term view

We take the long view and are in this for the duration. We believe that building an enduring company takes time and discipline. We are prepared to support you through this journey and assist with anything from the smallest detail to helping design the strategy. We become your world's best assistant once we make an investment.

Networks and connections

We have strong networks of contacts, ranging from other venture investors to founders, to scientists, to executives. We can often connect you with the right critical hire, customer, or funding partner. We try to ensure you become part of the community of ambitious leaders building the future.

Wondering where our name came from?

In the universe, vast molecular clouds collapse under gravity, igniting to become new stars.

Stars with the perfect combination of mass and chemical composition sustainably burn for billions of years under nuclear fusion, these stars are on 'the main sequence' and so too are the best companies.

https://mseq.vc/mission/

For portfolio companies see https://mseq.vc/portfolio/

Grow Lab by Cicada Innovations

Cicada Innovations creates, validates and nurtures deep tech businesses. It partners with visionary technical founders to provide them with business support from ideation all the way through to incubation. It supports entrepreneurs through our team of business advisors, industry, research and knowledge partners as well a through our curated community of successful founders.

Cicada was established as ATP Innovations with the support of The Universities of Sydney and NSW, UTS and the ANU. It has a community of 70+ companies and 400+ innovators in its state-of-the-art facilities located within the Australian Technology Park.

Cicada selects startups that are working on scalable deep technologies to join its portfolio and gain access to full-time business mentors, community of entrepreneurs, investor and industry network as well as our facilities comprising office, lab and event space. Cicada takes up to five per cent equity in the business as a mechanism for aligning its interests with the entrepreneurs' and offer subsidised, flexible rent for office space.

Cicada Innovations runs pre-incubation programs for startups that are at early-stage concept development. Programs run for 3-6 months, culminating with events that provide exposure to investors and industry. Individuals and startups accepted into our pre-incubation programs are at the early-stage concept development, looking to build their first product prototype and find their first customers.

Program graduates are given priority in their applications to join the incubator in which they will receive long-term tailored support (for up to 5 years post-graduation).

The *GrowLab accelerator* was established 2017, backed by the MLA Donor Company, and focused only on deep tech applications. The accelerator provides tools, structure and milestones to determine how best this technology can become a successful start-up. It does not offer seed funding.

ABOUT GROWLAB

Growlab is a specialised program for deep tech startups looking to improve the Australian and global food and agriculture sectors. Agtech has been identified as part of a global $100B market opportunity, with Australia perfectly positioned to take advantage of this movement. Companies participating in Growlab range from biotechnologies to remote sensing and robotics, to food processing technologies to food products.

Through the course of the three months accelerator, businesses will be taken through a structured customer development process, developing their business model and complemented by structural business knowledge. By the end of Growlab participating startups will be ready to start pitching for scale up investment, kicking off with a public Growlab demo day and optional private investor pitch following the end of the program.

All participants of Growlab must commit at least one full day per week of workshop-style activity on site at Cicada Innovations in Eveleigh, Sydney, in addition to at least twenty hours of additional work each week including customer interviews and developing individual components of a business case. As part of program entry all applicants which reach the interview stage will undergo a full due diligence process prior to program acceptance.

Investments –

FarmTek – a smart collar for determining sheep genetics, improving sheep breeding programs.

FARMpay – a secure online platform for grain trading, FARMpay connects all stakeholders along the supply chain. It is designed to provide rapid data and payment for on-farm grain sales and provide a more efficient, equitable, transparent and secure process for grain growers, grain traders and grain buyers.

FluroSat – a remote sensing technology and analysis tool to optimise farm management by providing early stress detection in crops, and enabling efficient resource inputs and maintenance of yield.

Livestock Labs – an implantable livestock welfare and management monitor.

Nanoscent – a deep technology company combining patented nanosensors and proprietary software, investigating value to the Australian livestock industry.

SwagBot – an autonomous on-farm robotic ground vehicle SwagBot is capable of navigating through rugged terrain and has successfully demonstrated its ability to operate in the environment of a cattle station. Future research will be applied toward autonomous farm activities including monitoring and interacting with plants and animals.

http://cicadainnovations.com/growlab/

Simplot Ignite (in collaboration with Slingshot)

A corporate-backed food tech accelerator offering investment and an intensive mentoring programs for businesses to scale

https://www.f6s.com/simplotigniteaccelerator

Slingshot, Simplot joins forces to launch first food tech accelerator

25 November 2015

Peter Dinham IT Wire

Australia's first food tech accelerator has been launched by accelerator program developer Slingshot and major food manufacturer Simplot.

The launch of the digital innovation accelerator program, Simplot Ignite, announced on Wednesday, is aimed at startups kin Australia's food tech space.

Simplot Australia Managing Director Terry O'Brien says the program is now open to applicants who are looking to turn their innovative food tech idea into a profitable business.

As part of the three-month program, each of the selected startups will receive $30,000 investment in exchange for 10 per cent equity and have the opportunity to work with Simplot Australia, which is home to many of the country's food brands including John West, Bird's Eye, Leggo's, Edgell, Lean Cuisine and Chiko.

Participating startups will also receive a 12-week tailored mentoring program including business training and development, marketing, infrastructure support, legal and financial advice and have the opportunity to pitch their idea to investors, media, other companies in the food tech space and the startup ecosystem during the program's Demo Day.

The participants will also have the opportunity for second-round investment of up to $100,000 from the Slingshot Venture Fund.

Applications for Simplot Ignite must focus on one of the key themes including nutri-genomics and personalised nutrition, customer acquisition and retention, food solutions for healthy ageing, agribusiness or convenience in food.

O'Brien says Simplot got a taste of the calibre of Australia's digital innovation scene as a sponsor of HackFood, Australia's first food tech hackathon, held earlier in November at Fishburners Sydney.

"We want to bring some fresh thinking to Australia's food system and work with entrepreneurs who are passionate about improving it. HackFood marked the first time innovators came together to tackle the challenges faced by the food industry and with the food market valued in the trillions, we know there is so much more Australian startups can bring to the table if given the right opportunities."

In addition to the startup accelerator program, Simplot Ignite also includes a Scaleup Program with the goal of providing established startups an opportunity to bring their products and services to the nationwide Simplot Australia market.

Under the program, startups will be able to work with existing customers and access services provided by Simplot's strategic partners and sponsors.

Slingshot co-founder Craig Lambert says Simplot Ignite is an example of how major corporations can leverage the agility of disruptive startups to generate new ideas and grow their business.

"Simplot Ignite is an effective, low-risk platform to stimulate creativity, improve productivity and develop game-changing technology for the wider food industry. By pushing the limits of digital innovation, Simplot and the program's startups can have a direct impact on a market that is ripe for disruption."

https://www.itwire.com/it-industry-news/strategy/70483-slingshot-simplot-joins-forces-to-launch-first-food-tech-accelerator

6 Recently Formed Agribusiness Start-ups

The sources for this Attachment include Startup Muster, Agfunder and direct searches on the basis of knowledge of the start-up sector in Australia.

Ag DNA

https://agdna.com/about, https://www.linkedin.com/company/2688513/

AgDNA is an enterprise level precision farming platform that combines data science and the Internet-of-Things (IoT) to help commercial crop producers increase yield, reduce input costs and maximise farm profitability.

AgDNA Set to Disrupt $20B Precision Ag Industry

EMILY DEMAREST , AgFunder News

APRIL 8, 2015

Farming is growing smarter, but with so much disparate on-farm data amassed from precision ag equipment, it's often tough to capture what matters and weed out what doesn't. Paul Turner, the CEO of mobile management platform AgDNA, wants to make the data collection process a little less overwhelming. He launched the cloud-based data analytics platform in 2013 with the goal of putting vital information into the hands of growers, contractors, agronomists, and equipment dealers worldwide.

"Commercial farming is moving from manual records to machine generated data from tractors, irrigation equipment, and remote sensors. Now that we have all this data, how do we apply it?" said Turner. "Our algorithms could help farmers feed the world."

By automating the delivery of precision ag data to Apple and Android devices, the platform is positioning itself as a one-stop data management tool for workers across the ag production spectrum. Founded in Brisbane, AgDNA has users in 156 countries with 2.8 million acres managed to date.

According to Turner, desk-bound data entry just isn't practical for growers. "Farmers work long days. They don't want to spend their evenings staring at a computer," he said. "With AgDNA, farmers no longer have to be tied to the office."

The platform processes machine-generated data—like seeding records, weather data, soil quality, and yield—and provides subscribers with real-time, geo-spatially accurate information about every acre of farmland. Growers can then benchmark progress, view seed prescriptions, assess equipment performance, and determine what crops will best thrive under current conditions.

In addition to its consumer-facing app, AgDNA has also developed "Platform-as-a-Service" white label precision farming apps for some of the world's largest farm equipment dealers, *including many under the John Deere umbrella*. AgDNA is one of a select few companies licensed to access production data for MyJohnDeere.com, and has also fostered partnerships with Case New Holland, AGCO, Valley Integration, and Reinke Manufacturing, among others.

"You'd be hard pressed to find another system that does what AgDNA does—automating data collected from farm machinery and delivering useful insights directly to your phone or tablet," he said.

The company is raising a $2.4 million funding campaign on AgFunder this month. If successful, AgDNA will broaden its dealer network to include all major international markets, and aims to have 40 million acres covered by 2018. Looking at the big picture, Turner hopes that the data-crunching platform will better connect the farming community and its burgeoning fleet of Internet-enabled machinery.

Agriculture has undergone four revolutions, he said. The first was mechanization, followed by plant nutrition and genetics. The fourth, Turner says, is data. "The data revolution is going to maximize the benefits of the first three and help feed the world's growing population."

https://agfundernews.com/agdna-to-disrupt-20bn-precision-ag-industry.html

Agersens

https://agersens.com/about/

Agersens is a new technology startup company developing an animal collar and phone app to help beef and dairy farmers reduce their labour costs and increase their productivity by automating the movement and control of their livestock.

Agersens first product is the eShepherd – a GPS based collar and smart device app that will:

- help beef and dairy farmers increase productivity while also reducing their costs
- improve the health and welfare of livestock
- promote a cleaner environment by preventing cattle from polluting our waterways, or overgrazing and damaging our land.

Agersens eShepherd tags: Cash posted for virtual fences

The Weekly Times

April 28, 2017

VIRTUAL fencing for cattle is set to hit the Australian market later this year, following a successful $2 million fundraising round by Melbourne-based agri-tech company Agersens.

The eShepherd product enables farmers to "fence", move, muster and monitor their livestock remotely via smart phone, and builds on patented technology originally developed by the CSIRO.

With eShepherd, farmers create a virtual fence on an app that communicates with a collar worn by each animal.

Animals are trained to respond to prompts provided by the collar, which can also collect data to help farmers improve animal health and make better farm management decisions.

Agersens general manager Ian Reilly, said there was a global market for the Australian innovation, with demand from cattle and dairy farmers in NZ, the US, South America, Europe and South Africa.

"eShepherd will transform the productivity, profitability and sustainability of global livestock farming by automating rotational or cell grazing, avoiding overgrazing while improving animal health and welfare," he said. "It will improve profitability by cutting labour, fencing and other input costs.

"It has impact on a number of levels — not only does it help farmers and livestock, but it can be used as flood and fireproof fencing to prevent cattle pollution of waterways and national parks while avoiding injury to wildlife associated with conventional fencing."

This device will be the first of its kind on farms anywhere in the world.

Government is taking virtual fencing seriously, — the Federal Government has given Agersens $640,000 to accelerate commercialisation and Dairy Australia last year awarded $2.6 million to lead a four-year industry testing program. Victorian and NSW Government based Catchment Management Authorities and Local Land Services are providing funding support for trials on rivers and wetlands.

http://www.weeklytimesnow.com.au/agribusiness/cattle/agersens-eshepherd-tags-cash-posted-for-virtual-fences/news-story/acfacc5fb444cdfd71cf615f5559e5af

Innovation partners are CSIRO; North East Catchment Management Authority; North East Catchment Management Authority; Murray Local Land Services; AusIndustry commercialisation grant; Department of Sustainability Water Population and Communities; Dairy Australia; Meat and Livestock Australia; Australian Wool Innovation; Australian Pork; The University of Melbourne; University of New England; The University of Sydney; Tasmanian Institute of Agriculture; Tasmanian Institute of Agriculture; University of Idaho.

AgKonect

http://agkonect.com/

AgKonect Pty Ltd is a new company begun by Barry Sullivan and Peter Whittle. It is based in Brisbane, but will work with you in any state or country.

We are a delivery partner for the Konect platform by Global GBM Pty Ltd, an Australian company with over 20 years of experience in this field.

Konect uses free base maps or client GIS data in any format. It is system agnostic and is available on iOS, Android and Windows on any modern smartphone or tablet. It can be used offline and synchronised when back in range.

From the website -

> In our combined six decades in agriculture, environment and biosecurity, we have built and used spatial data systems in many contexts. The power of these systems is widely understood, but their complexity has put them out of reach of many potential users - until now. We can overcome that and bring these powerful tools to individual users, small and large enterprises and whole industries.
>
> Konect is a commercial spatial data platform that is available to any user by subscription. The machinery sits in the background, we build the interface, and you do your work, better. It's like dining in a restaurant - you don't even need to know what happens in the kitchen. The cost to users is very affordable and the technical demand is "four clicks".
>
> We have been using Konect for two years and it is the best system available - we have decided to base our business on it. The possibilities are endless and every day new ideas emerge. Any field-based business has much to gain from using Konect.

agAlytics

http://agalytics.com.au/

agAlytics is developing a smartphone enabled reader for improved soil fertility management. A system for georeferenced soil sampling, and the accurate measurement of soil nutrients and pH.

It is a portfolio company from University of Queensland ilab -
http://www.ilabaccelerator.com/?portfolio=agalytics

AgDraft

https://www.agdraft.com.au/

AgDraft is an online marketplace for farmers to post jobs to a extended network of workers that are effectively "referenced checked' by their peers, making hiring quick and reliable.

AgWorld

https://agworld.com.au/index.php

A dedicated team of agronomists, developers and customer support staff from various agricultural backgrounds who come to work every day aiming to improve the world of agriculture.

We build Collaborative Farming Solutions that go beyond farm management and work on your iPad, iPhone and the web to simplify your farming experience and give you full control of your farm, wherever you are.

We put farmers and agronomists first, they are our heart and our core. If they can strengthen their businesses sustainably and profitably, the rest of the world will benefit enormously.

We have offices all around the globe which provide support for Australia, New Zealand and the USA.

Agworld

From itunes:

Agworld is a powerful cloud based data management system for the Agriculture industry featuring farm planning, document management, data capture tools, geo-spatial mapping, an industry information library, communications tools and much more.

Our online / offline iPad application, in conjunction with our cloud hosted web system, is a powerful new way to capture, manage and leverage your Agricultural business data whilst in the field. We have developed from the ground up an Australian first, true cloud synchronised, offline capable iPad application which removes the need for after hours computer work. You can access, record and communicate the information you need while in the field.

Unlike competitors who are implementing simple spreadsheets or cut down, online only web pages, we are innovating in the areas of synchronisation and user interface. Use this in conjunction with or instead of our Anoto digital pen platform and you'll have the best of breed for all of your Ag related data capture, management, communications and compliance requirements.

Platform: iPad

Country of Origin: Australia

Cost: App only $109.99

http://www.farmingwithapps.com/2013/01/11/agworld/

See also http://www.farmweekly.com.au/news/agriculture/agribusiness/general-news/agworld-app-opens-up-whole-new-world/2488540.aspx?storypage=0

Agworld app opens up whole new world

Agribusiness

TYSON CATTLE 19 Mar, 2012

THE world of farming is going through an era of technological breakthroughs.

With Variable Rate Technology (VRT) and auto steer leading the way in the production line over the last few years, there has also been an increase in focus on the bookkeeping side of things.

With iPhones, iPads and iClouds all the rage in the metropolitan areas, the products are becoming more common in country regions.

The Agworld app allows farmers to be able to maintain accurate farm management data all on one location.

Through the Agworld app, Agworld sales representative David Jefferies said farmers were able to enter the details of their farm management into their iPhone or iPad and immediately have the information stored back to their laptop and home computer, saving farmers the time of having to enter the data a number of times.

Mr Jefferies, who spoke at the recent 2012 Crop Updates, said the Agworld app was starting to generate some interest among farmers and consultants since its release two years ago.

"The uptake has been very positive," Mr Jefferies said.

"I think once people start to realise the benefits of it (Agworld app) and see what it does in addition to the traditional software packages, then I think they will really start to see the benefits of it, particularly as we start to see more agronomists come on (and use the product)."

Mr Jefferies said the first year of release saw farm consultants take on the program and it allowed them to be able to connect with clients.

"They were connecting to their clients and they were sending their things via the web but what we are starting to see this year was the flow-on affect starting to come through," he said.

"We are starting to see consultants become a lot more comfortable with what the app does and familiar enough to be able to take that out to their clients.

"We have seen a lot of interest from suppliers in supply companies and where they can get the messages out to key consultants in a very targeted way."

He said the Agworld app allowed contractors to fill out the details of what they had done and enter in the data, saving time to the farmer.

"Spray contractors for example can hand over the invoice but also have the spray records sitting in the grower's inbox without even having to use any paperwork," he said.

Mr Jefferies said the application was perfect for farmers because as they were using auto steer in their tractor, they could be entering in data on their iPhone or iPad so it was already on their home computer when they finished.

Mr Jefferies said there was a free version available where farmers could see everything they wanted to see but if they wanted to get involved further and start putting in their own records there was a cost of $408.

http://www.farmweekly.com.au/news/agriculture/agribusiness/general-news/agworld-app-opens-up-whole-new-world/2488540.aspx?storypage=0

CropLogic

CropLogic was formed in 2010, based upon intellectual property from the New Zealand Institute for Plant and Food Research Limited. CropLogic aims to improve crop yields by combining advanced research and technology

with an in-field agronomy support team to provide accurate advice to growers. Over the space of six years, the Company has undertaken over 600 field trials in the development of its technology, working with some of the largest potato processors in markets of interest.

Since its incorporation, CropLogic has steadily grown into an international agronomy services company driven by leading research and technology with highly skilled and trained personnel, specialist knowledge of cropping systems, regional know-how and emerging data analytics and predictive tools platforms.

With science and technology 'behind the scenes', CropLogic can provide our agronomists with high-quality field information and scientific modelling, so they can predict the behaviour of soils and crops, and promptly identify any potential issues growers might face.

From the website -

> At the core of our approach is one simple idea: by modelling and predicting the response of commercial crops for day-to-day agronomy decisions - such as irrigation and fertilizer inputs - we can improve crop performance and yields.
>
> We target large, irrigated growing operations that supply food processors. Our field team of agronomists take the 'technical salesforce' role, so we can maintain a high degree of expertise and credibility in a market that demands such traits.
>
> CropLogic acquires data from many sources, including in-field soil moisture and temperature information, and in-field and macro-environmental weather information. The technology analyses this data against plant and soil models to determine and predict plant requirements and health. By using scientific modelling, and monitoring these factors in-field, CropLogic can identify problems early on - earlier than if the technology relied solely on remote sensing, imaging, or in-field soil moisture probes. The technology also establishes a top-level field view through aerial imagery. Such imagery can be used to identify pest, weed, and irrigation problems that could otherwise be overlooked by in-field sensors.
>
> As an agronomy services company with a global growth strategy, CropLogic has been clear about its strategy to initiate market entry via acquisition. This model is based upon acquisition of targets that provide key strategic attributes and regional market share, and into which CropLogic's technology can be introduced to drive efficiencies, increase revenue and further regional growth.
>
> CropLogic acquired a 100 per cent interest in Indigo Systems Limited in 2014. This company held intellectual property and expertise relating to in-field control systems and wireless communications, and the acquisition provided the complimentary technology to allow further development of the CropLogic platform

In early 2017, CropLogic acquired the assets of Professional Ag Services Inc., an agronomy services company based in Washington State, USA. Servicing crops across the Pacific, Northwest for some 27 years and with a team of approximately 15 agronomists, the acquisition of Professional Ag Services Inc. significantly added to CropLogic's presence in the USA in both local knowledge and technical expertise.

https://www.croplogic.com/about.html

CropLogic mashed in rough ASX debut

by Simon Evans

Financial Review Sep 12 2017

Agricultural technology company CropLogic had a difficult start to life as an ASX-listed company on Tuesday but chief executive Jamie Cairns expects it will be a "reasonably temporary" blip.

CropLogic uses a range of "internet of things" devices and equipment embedded in paddocks and fields to help growers of potatoes, corn, wheat, cotton and soybeans to improve crop outcomes and more accurately predict returns on investments. It has been busy in the potato industry in the United States in particular and has been working closely with four big multi-national firms, McCain, Simplot, PepsiCo and the $6 billion Lamb Weston company, which is listed on the New York Stock Exchange.

CropLogic made a subdued debut on the ASX on Tuesday morning, with its opening trades at 16¢, below the issue price in its IPO of 20¢. The company issued 40 million shares in a raising handled by Hunter Capital Advisors. The stock reached a high of 17.5¢ but then fell back again to close at 15.5¢.

Mr Cairns, who was previously the chief executive of Snap Internet in New Zealand, said the company had a bright long-term future in agri-tech and was unperturbed by the subdued opening. "There's a long-term element to it. The bell-ringing is done and it's time to get on with things," he said.

"I think there's probably a little bit of disappointment. I imagine it's going to be a reasonably temporary thing. We've got a strong pipeline of activity coming through."

Harvesting data

The company uses high-tech probes in fields that continuously collect data on soil moisture, below-ground temperatures and rainfall, along with aerial imagery devices to enhance crop yields. CropLogic was established in 2010 and the technology it uses was originally developed by a government body, the New Zealand Institute for Plant and Food Research.

The NZ Institute for Plant and Food Research is the 16th largest shareholder on the company's register with a holding of 1.37 per cent among the top 20 shareholders furnished to the ASX prior to trading. The biggest shareholder in the company is venture capital firm Powerhouse Ventures Limited, which holds 14.9 per cent.

CropLogic has completed successful trials on potato crops in the United States, Australia, China and New Zealand, and is stepping up the use of its systems in other industries including corn, wheat, soybean and cotton

Read more: http://www.afr.com/business/agriculture/crops/croplogic-mashed-in-rough-asx-debut-20170911-gyfggz#ixzz52WZo0jDS

Most recently, CropLogic has begun establishing an Australian corporate structure ahead of commercial activities in this region.

Dragontail Systems

Dragontail Systems is a Technology leader for the Fast Food/Quick Service Restaurants food preparation, delivery, marketing and management processes.

iPaddock Apps

http://www.ipaddock.com.au/

Born out of the need for practical tools for practical farmers, iPaddock Apps are the creation of Western Australian Grain Farmer and Mechanical Engineer, Mic Fels.

iPaddock brings to you iPaddockSpray and iPaddockYield – functional, farmer-focussed Apps designed to save you money, optimise your yields, improve productivity, and increase your profits. iPaddock Apps are easy to use for every skill level, regardless of your App experience. They are fully hosted on your device, with no requirement for internet access other than for syncing devices, so they work, in the paddock where you need them most.

Multiple device syncing is free, and once you have installed an iPaddock App onto your device, you have everything you need, with no ongoing subscriptions or fees. You can literally download and go, all for a one-off purchase from the App store.

Built, tried and tested in the real world, by real farmers

iPaddock Apps are low cost, high value tools that will pay for themselves many times over through better decisions, better organisation, and removing human error from your daily operations.

Farm management for the 21st century

iPaddockSpray and the award winning iPaddockYield are both ground-breaking farm management tools that can be tailored to your specific farm requirements. Learn more about the capabilities of these apps and how they will benefit your farm, or simply download from the App store to start maximising your farm management potential today.

iPaddockIndustries

http://www.ipaddock.com.au/ipaddockindustries/

iPaddock machinery is specifically aimed at cost effectively taking the stress out of major farm jobs, while drastically improving productivity. After all, Productivity equals Profit.

Our Innovations:

The Unstacker (Patent App) picks grain up off the ground and puts it into waiting vehicles at over 6 tonnes per minute. When the crop is ripe, you've got to get it off. Every day lost at harvest is up to a 1 per cent loss in value, and even a one day delay early in a 5000t cereal program equates to 25t of lost yield. (SEPWA, 2007). The Unstacker allows you to drop grain anytime on an unprepared paddock site and pick it up just as easily, so the headers never have to stop: trucks or no trucks.

Alpha Disc (Patent App) is a robust, low maintenance, low cost single disc seeding system that uses a rippled disc and load bearing press wheel to accurately place seeds into a firm, well shaped furrow. Seeding with discs can increase productivity by 50 per cent with the same size machine, but conventional disc seeders are notorious for reliability and chemical issues in Australian conditions. Alpha Disc is the answer to these issues. Built in Canada using the latest Aeon rubber spring technology, Alpha Disc units are now available as bolt on modules to suit standard 4" (100mm) tool bars.

Nexgen plants

http://www.nexgenplants.com/

Nexgen is an emerging plant trait company delivering non-GM solutions for a range of pathogens, production traits and consumer traits. Its solutions help agriculture-dependent communities around the world improve returns and respond rapidly to emerging opportunities and challenges, and developing the next generation of globally valued crops for food, fibre, energy and ornamentation..

Its proprietary transformation technique is developing crops that are virus-resistant; fungal-resistant; salt-tolerant; high in anthocyanin content; and aromatic.

The Nexgen Story

2017 Development of salt tolerant rice, aromatic rice, high anthocyanin tomatoes.

2016 Successful creation of tomatoes resistant to Cucumber Mosaic Virus and validation by an independent government agency. Submission of a provisional patent for a new non-GM breeding approach.

2015 Second collaborative project with a multinational food and beverage company.

2014 First collaborative project with a multinational plant biotech company.

2013 Investment by two Venture Capital firms, Yuuwa Capital and UniSeed.

2012 Commercialisation Australia grant funding to facilitate market engagement and capital raising.

2011 Proof of Concept work on tobacco and Arabidopsis including development of transformation pathways.

2010 Proof of Concept funding from UniQuest Pty Limited, the main commercialisation company of The University of Queensland.

2009 The Nexgen technology was discovered and developed by Professor Peer Schenk and his research team at The University of Queensland

http://www.nexgenplants.com/timeline/

Nexgen Plants is commercialising two novel platform technologies: the first enables the rapid conference of pathogen resistance, production traits and consumer traits in the world's major food, fibre, energy and ornamental crops; the second is a virus-resistance technology that can respond rapidly to emerging virus challenges.

The Nexgen plant breeding technology enables companies to develop elite lines that have pathogen resistance or other consumer traits, creating the next generation of non-GM varieties. While Nexgen's proprietary transformation technique has application across a range of traits, a key focus has been on the creation of virus resistant varieties.

The Nexgen virus resistance technology:

1. Enables resistance for RNA type viruses to be conferred in a plant variety.
2. The technology can also be used to screen TILLING populations and germplasm collections for naturally occurring resistance.
3. The transformation timeframe ranges from between 9 and 24 months depending on the information that is available on the variety and the virus.
4. Provides durable resistance against plant viruses and resistance for a number of related virus isolates/variants.
5. Resistance is conferred to offspring enabling the development of F1 hybrids.
6. Potential to confer resistance in multiple viruses in the one variety.

Ovass

http://www.ovass.com/

Ovas provides Geospatial Analytics for Global Intelligence & Insights. It helps provide transparency to an ever changing world through the power of satellite imagery & artificial intelligence.

From Muru-d

Founders: Ravi Nichani & Dave Newman

A former channel platform manager for Best Buy Europe and a NEC solutions architect have partnered to create Ovass. Combining remote sensing with computer vision and AI, they help businesses make decisions through spatial imagery. Capable of finding lost planes in the ocean, travellers in the bush or weapons of mass destruction.

https://muru-d.com/startups/profile/ovass/

Roots Sustainable Agriculture Technologies

Roots – Sustainable Agricultural Technologies Ltd. is developing and commercializing disruptive, modular, cutting-edge technologies to address critical problems being faced by agriculture today, including plant climate management via root zone temperature optimisation and the shortage of water for irrigation.

Roots has developed proprietary know-how and patents to optimize performance, lower installation costs, and reduce energy consumption to a minimum — all in order to bring maximum benefit to farmers.

Roots was established in 2012 and graduated in 2016 from the prestigious technology incubator program administered by the Israel Chief Scientist Office.

The Yield

https://www.theyield.com/

The Yield is an Australian agricultural technology company on a mission to transform food and farming practices by building secure, scalable digital technology.

We work closely with produce growers to design our products because we're committed to solving real challenges – at farm level and throughout thAlle food chain.

No one knows the land better than growers. We want to help them make faster, more informed decisions that impact yield and reduce their risks. We do this by providing an integrated set of AgTech solutions that sense, analyse and predict on-farm growing conditions, and then deliver information in a usable format.

The Yield technology combines hardware, data analytics and user-friendly apps. Our AgTech solutions can be applied across the food chain to help increase yield, reduce waste, mitigate the risk and cost associated with bad weather, and aid environmental sustainability.

The world needs to produce 60 per cent more food by 2050 to feed the planet. This is happening during a time of unprecedented resource constraints and climate change. Our vision is to help meet this challenge without compromising the future.

7 Australia's largest food processing companies

Source: Austrade

Table 3: Australia's Largest Food Processing companies

Rank	Company	Sales ($billion)	Parent	Description
1	Lion	5.1	Japan	Kirin-owned Lion employs almost 6,750 people in Australia and New Zealand and operates in the beer, spirits, wine, milk, fresh dairy, juice and soy beverages segments.
2	Coca-Cola Amatil	5.0	Australia	Coca-Cola Amatil is one of the largest bottlers of soft drinks in the Asia-Pacific region and one of the world's top five Coca-Cola bottlers. It also produces packaged fruit and vegetable snacks and related products.
3	GrainCorp	4.1	Australia	GrainCorp provides services to the grain industry, including bulk commodity storage and handling, marketing, merchandising and logistics across operations in Australia, New Zealand, Asia, Europe and North America. The company is part owned by US food processing and commodities trader Archer Daniels Midland.
4	CBH Group	4.1	Australia	CBH Group is a cooperative deriving revenue from grain storage, handling and marketing for its members. The company has also invested in flour processing facilities and bulk shipping operations.
5	JBS Australia	3.6	Brazil	JBS Australia is a division of JBS, Brazil's largest food multinational, and the world's largest meat company. In Australia, it has 10 meat processing plants and five feedlots. It acquired Primo smallgoods in 2014.
6	Olam Investments	3.6	Singapore	Olam is the local subsidiary of Singapore-based trader Olam International. The company operates integrated supply chains for five key products in Australia (cotton, almonds, pulses, grains and wool) to deliver these worldwide.
7	Glencore Grain	3.6	Switzerland	Glencore Grain, a subsidiary of Swiss-based Glencore AG, operates in all Australian states and originates, handles, stores, transports and markets wheat, barley, oilseeds, pulses, meals, and cotton. It owns Viterra Australia's storage and handling services.
8	Incitec Pivot	3.4	Australia	Incitec Pivot manufactures, distributes and sells fertilisers, explosives and chemicals throughout Australia, Asia and North and South America.
9	Devondale Murray Goulburn	3.0	Australia	Devondale Murray Goulburn processes, manufactures and distributes whole milk and dairy products from processing sites in Victoria, New South Wales and Tasmania. It is investing A$200 million over three years to almost double its dairy processing capacity [needs update].
10	Teys Australia	2.9	Australia	Teys Australia is Australia's second largest meat processor and exporter, operating three feedlots and six beef processing plants across Queensland, New South Wales, Victoria and South Australia. Teys Australia is 50 per cent owned by US-based Cargill Inc, a global producer and marketer of food and farm commodities and services.
11	Cargill Australia	2.8	United States	Cargill Australia is the local subsidiary of the US-based food and agricultural product supplier, operating in oilseed processing, flour milling and beef processing, and grain and oilseed storage.
12	Nufarm	2.8	Australia	Nufarm is the largest manufacturer of crop protection products in Australia and supplies domestic and international markets. Nufarm also has a growing seeds platform encompassing canola, sorghum and sunflower seeds.
13	Inghams	2.4	United States	Inghams, owned by investment firm TPG, is the largest poultry processor in Australia. Its operations extend across fully integrated farming, primary and further processing operations.
14	Agrium	2.3	Canada	Agrium SP is the local subsidiary of Canada's Agrium, providing rural services and commodity management.
15	Food Investments	2.2	United Kingdom	Food Investments is part of the UK-based ssociated British Foods and generates the majority of its Australian revenue through subsidiary George Weston Foods. Its products include bread, baking products, small goods, cakes and ingredients.
16	Nestlé	2.1	Switzerland	Nestlé Australia is a wholly owned subsidiary of the Swiss-based giant Nestlé S.A. It employs more than 6,000 people in 70 offices, with factories and distribution centres located across the region.
17	Goodman Fielder	2.1	Singapore	Goodman Fielder produces packaged food ingredients, consumer branded food, beverages and related products. Its five core divisions are bakery, dairy, flour and cake mix, spreads and dressings, and mayonnaise. Goodman Fielder was acquired by Singapore's Wilmar International and Hong Kong's First Pacific in March 2015.
18	Carlton & United Breweries	2.0	United Kingdom	Carlton & United Breweries is Australia's second largest brewer and is owned by SABMiller, the world's largest brewer.
19	Treasury Wine Estates	2.0	Australia	Treasury Wine Estates has over 11,000 hectares of vineyards, sales totalling over 30 million cases of wine annually and over 3,000 employees.
20	Queensland Sugar	1.9	Australia	Queensland Sugar is involved in the marketing, export and supply of bulk raw sugar. The Brisbane-based company is joint-owned by the state's sugar growers and millers.
21	Wilmar Sugar	1.8	Singapore	Wilmar Sugar Australia, owned by Singaporean agribusiness Wilmar International, operates sugar refineries to produce cane products, sweeteners and bioethanol. It is the largest raw sugar producer and refiner in Australia and eighth largest producer globally.
22	Asahi Holdings	1.8	Japan	Asahi, the Australian subsidiary of Japan's largest brewer, encompasses Schweppes Australia and water bottler Mountain H2O.
23	Mondelez Australia	1.7	United States	Mondelez Australia, formerly Kraft Australia, is a subsidiary of the world's second largest food company, Mondelez International. Mondelez opened the first stage of

Rank	Company	Sales ($billion)	Parent	Description
				Australia's largest food R&D facility in 2013. It will invesits chocolate factory in Claremont, Tasmania in 2015.t A$20 million to transform
24	Unilever Australia	1.6	United Kingdom	Unilever Australia's portfolio of brands includes Flora, Continental, Bertolli,Streets, Lipton and Bushells, as well as a number of personal care and homecare brands. It acquired T2, an Australian tea retailer in 2013.
25	Parmalat Australia	1.5	France	Parmalat Australia, a subsidiary of the global Parmalat Group with majority shareholding by French multinational Lactalis, processes and distributes milk, cream, dairy products and fruit juices for the domestic and export markets. Headquartered in south Brisbane, Parmalat Australia employs approximately 1,800 people.
		69.4		

Source: Austrade

Total sales amount to 4.3 per cent of GDP. The level of investment that these companies commit to research and development in Australia is not known.

Many of the previously Australian owned companies uded to make a significant commitment to R&D, including, for example, Goodman Fielder.

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