



THE UNIVERSITY
of ADELAIDE



FAME Strategy

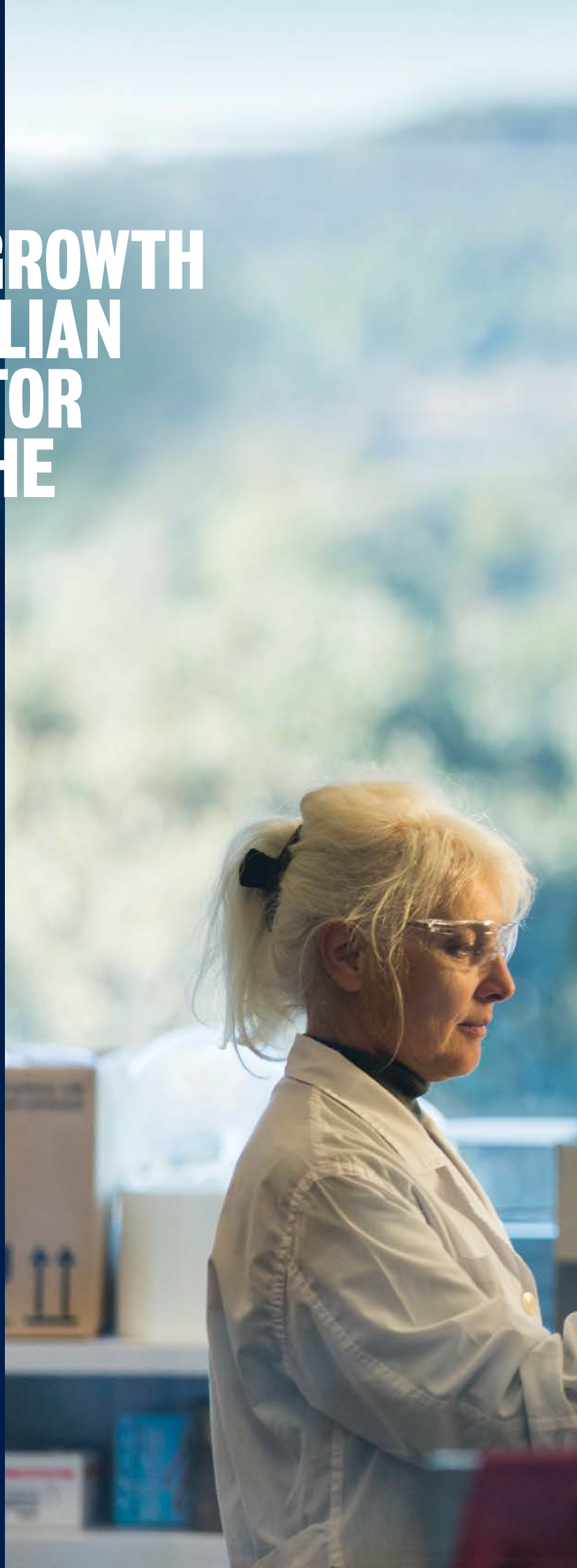
AGRIFOOD AND WINE

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VISION
SUSTAINABLE GROWTH
IN THE AUSTRALIAN
AGRIFOOD SECTOR
POWERED BY THE
ADOPTION OF
RESEARCH.



THE UNIVERSITY
of ADELAIDE



FAME

The University of Adelaide prioritises its research at scale within FAME (Focus And Magnets for Excellence) Strategies. Our (FAME) Strategies provide a platform that enables us to attract the best researchers and partners, and deliver positive impacts for our State and Nation through research excellence and its translation.

MISSION

The University will lead and coordinate transformative collaborations to deliver excellent research and innovation to and for the Agrifood sector. By attracting talent, and through active global engagement, Adelaide will be the leading research university internationally in Agrifood fields relevant to South Australia.





BACKGROUND

Australia produces enough food to feed in excess of 75M people annually.

The majority of food sold in Australia is grown and supplied by Australian farmers, yet at the same time Australia is able to export more than half of its agricultural produce. In 2018, agribusiness industries contributed \$138B to Australia's GDP, comparable to each of the mining and construction sectors.

The Australian Government and the National Farmers' Federation aim to grow the value of the national agriculture sector, delivering a major economic boost to the country, including to regional and rural communities. The Green Revolution over the last century has seen agricultural productivity improved through new crop varieties, synthetic fertilisers and agrochemicals, the expansion of mechanisation and irrigation systems, adoption of precision technologies and variable monitoring of application. However, there is urgent need to address the productivity issues being experienced across all areas of agribusiness. In particular, opportunities to accelerate technology adoption and overcome labour shortages that are slowing sector growth, while also finding new ways to add and capture value, including through SME enterprises.

Australia is currently well-placed to enhance its position as a global leader in Agrifood and Wine innovation. By seeking transformational solutions to the challenges facing the entire sector, Australia can form translational research partnerships between universities, industry and government that deliver commercial benefits to industry.

Food, Wine and Agribusiness is South Australia's largest export sector and a major source of employment. South Australia is responsible for 50% of the country's total wine production and 80% of premium wine. South Australian Horticulture is leading the nation for protected cropping, potato and onion production. Wheat, barley, and canola as well as other grain and pulses currently represent around 20% of the total Australian harvest. The wool and meat industries dominate the pastoral areas and parts of the South East. Each sector has potential for further growth.

The South Australian Government's Growth State Initiative aims to achieve an increase in Gross State Product (GSP) to an average rate of 3% per annum. As a key economic generator, Food, Wine and Agribusiness has been identified as one of the nine key growth sectors over the next ten years. The Food, Wine and Agribusiness Sector Plan will stimulate an ambitious growth agenda for the South Australian economy, aided by the State Government's EXCITE science and innovation strategy.

The University of Adelaide's Waite Campus is home to the largest concentration of Agrifood research capability and expertise in the southern hemisphere. Co-located on the Waite precinct are a number of organisations including SARDI, CSIRO and The Australian Wine Research Institute (AWRI).

The Roseworthy campus hosts an operating farm within a research and teaching precinct. The North Terrace precinct is home to cutting-edge digital, science, business, social, health and technology capabilities.

Through a coordinated approach with partners, the University can uniquely bring together existing agricultural expertise together with new technologies, businesses and entrepreneurs to drive the future of South Australia's agricultural and food and wine production.

PRINCIPLES

The University values:

- **Excellence in Research and Research Training** which we know is fundamental to the discovery, development and successful adoption of new approaches to primary production and value-add industries, and to developing the next generation of future leaders and innovators.
- **Collaboration** and partnering with national and international stakeholders which we know will provide new research and translational opportunities and pathways to market, as well as opportunities for the accelerated application of emerging technologies.
- **Convergence** which we believe will accelerate access to capabilities and technologies where disciplines intersect, giving rise to cross-sectoral disruption (e.g. from Health, Defence, Mining and Space into Agrifood).
- **Public engagement** which we know is essential for change. The human elements of agriculture are diverse but include community and consumer understanding, acceptance and shaping of novel products and processes, the intersection of behaviours with public health and food and nutrition security initiatives, and values relating to agriculture and food.

The University understands that critical success factors for the future of the Agrifood sector include:

- **Sustainability and Resilience** which ensure long-term impact with minimal depletion of resources, to deliver sustainable profitability in the driest state in the driest populated continent on earth.
- **Engage and Collaborate** internationally to ensure leadership in research excellence and impact.
- **Circularity** which reimagines efficiency at all levels of the supply chain by eliminating waste and creating transformative agricultural models that are sustainable, and that improve production landscapes in balance with environmental considerations.
- **Value Adding** beyond the traditional supply chains including through new foods that address population health, renewable energy to reduce carbon footprints, and through new capabilities and convergence from other sectors (e.g. Health, Defence, Mining and Space).
- **Differentiation** including through exploitation of niche as well as commodity opportunities.
- **Adoptability** such that investments can be rapidly translated to impact at the level of the individual farmer or SME.
- **Scalability** to allow for flexible, multi-purpose solutions across a wide range of Agrifood and Wine scenarios encompassing the delivery of precision solutions for grain, horticulture and livestock production and including the provision of modular energy generation, water security and waste conversion units for farms or Agrifood and Wine manufacture.

AIMS

The University will:

- **Align** its priorities with those of our strategic partners and build on those to address value chain challenges (and opportunities) in the Agrifood and Wine industries.
- **Partner** with stakeholders including those located already on University campuses, Rural Research and Development Corporations, and Agrifood and Wine companies and other businesses and SMEs aligned with growers and food and beverage manufacturers to help develop South Australia's economy.
- **Contribute** holistically to the national effort to address Critical Success Factors including by:
 - enhancing Adoptability and Differentiation
 - delivering step-changes in digitisation, decision-support and automation
 - embedding Circularity and Sustainability
 - aiming for carbon-neutrality with quantitation of existing benefits.
- **Promote** the establishment of a Translation and Innovation Investment Fund to support research leadership, research excellence and downstream translation and commercialisation activities as a value-add to the South Australian economy.
- **Develop** a targeted Action Plan to guide South Australia's continual progression toward national and international leadership in Agriculture, Food and Wine. The Plan will connect with the South Australian Government's Growth State Initiative to deliver a step-change for the Australian Agrifood and Wine Industries, including through engagement with cross-sectorial opportunities in allied sectors such as Health, Defence, Mining and Space.
- **Bolster** the Waite, Roseworthy and North Terrace campuses as Research Innovation Precincts through the launch of Research Missions; and delivered through Transformational Research Foci.
- **Educate** the next generation of research and business leaders including through industry-linked higher-degree training.

RESEARCH MISSIONS FOR TRANSFORMATION

The farm will always be at the heart of agriculture, but a new set of challenges has emerged.

Rising labour costs, increasing regulatory burdens, climate change, energy sector transformation, uncertain global markets and shifting consumer preferences are reshaping agriculture along the entire supply chain. Australia must pivot its industries to take advantage of the opportunities; and it must proactively shape the markets of the

future. There must also be consideration of the social implications and potential disruption of rural communities during periods of significant techno-economic change.

Research Excellence must be sustained and effectively translated to benefit South Australia and the nation through a convergence of University-Industry-Government collaboration and leadership, known internationally as a triple helix approach. With a combination of advanced research, technology and education, we aim to step-transform Australian, and in particular South Australian, Agrifood, Wine and broader bioresource economic value and job creation, by focusing investment into **Four Research Missions (RMs)** that are enabled through a series of **Transformational Research Foci (TRFs)**.

These Research Missions have the potential to step-change the economic value and resilience of South Australian agriculture and its associated businesses. The ambition in this FAME Strategy will require significant investment into enabling infrastructure and capable people. The proposed National Collaboration Hub for Innovation at Waite, along with the NCRIS Plant Phenomics Facility, provide important enablers for AgTech, Wine and Plant Science. The establishment of an 'off-grid' Research Precinct at Roseworthy with energy self-sufficiency through wind, solar and battery technologies will create many innovations and significant value linked to the Food-Water-Energy nexus. There exists opportunity to establish world-class Livestock Wellbeing and Resilience infrastructure connecting the Roseworthy campus to capabilities across the State and nation, with co-located animal science, production science and medical science capabilities, underpinning a State-wide Centre for Infectious Disease with a 'One Health' focus. Greater connectivity between the University's campuses, and to the digital and space precinct at Lot Fourteen, provide an opportunity for step-change leadership in Agrifood. Overall, these enablers are important foundations for this FAME Strategy.



UNIVERSITY OF ADELAIDE FAME STRATEGY – AGRIFOOD AND WINE

RM 1 DRYLAND AGRICULTURE

South Australia as a global hub for sustainable and regenerative dryland agriculture

Transformational Research Foci

- Drought resilience
- Sustainable farming landscapes and resilient environments
- Space and extreme environment agrifood and bioprocessing

RM 2 VALUE-ADDED AGRIFOODS

Innovation to create new markets and products for South Australian food and beverage manufacturers

Transformational Research Foci

- From genomics to quality traits for plants and animals
- Protein innovation-new foods from new crops and bioprocesses
- New healthier foods and ingredients

SOUTH AUSTRALIA

Research and development of agricultural technologies

Government, industry and agribusiness partnerships

Innovation, translation and commercial pathways

RM 3 SUPPORTING THE AGRIFOOD AND WINE VALUE CHAIN

Creating productivity uplift in the agricultural supply chains through off-grid and precision technologies

Transformational Research Foci

- A living-laboratory farm for technology
- Digitised food provenance
- Linking decisions and preferences with innovations and markets

RM 4 BIOSECURITY & LIVESTOCK WELLBEING

A self-sufficient location for biosecurity and animal welfare for One Health Outcomes in South Australia

Transformational Research Foci

- Livestock wellbeing and resilience
- Technology-improved animal sensing, production and supply chains
 - Infectious disease control and crisis response

DRYLAND AGRICULTURE

Managing the effects of climate change will be an ongoing priority for Australian farmers, with adaptation and resilience being crucial. A key need is to drive further gains in productivity, profitability and sustainability. The Federal Government has recently established three inter-connected strategic priorities:

- economic resilience for an innovative and profitable agricultural sector;
- environmental resilience for sustainable and improved functioning of farming landscapes; and
- social resilience for resourceful and adaptable communities.

RM1 will support dryland agriculture and food production for a future world where marginal lands will become increasingly important to our standard of living. The University will link with regional sites through our partnership relationships to service and support the unique dryland agricultural systems within South Australia. The food-energy-water-soil nexus remains

one of the most significant global science, policy and management challenges, especially in South Australia. Optimising the productive environment by improving microbiomes, soil structure, water and biodiversity can have positive effects on production which extend to improving the water cycle, carbon sequestration and ecosystem services. These developments will leverage the University's existing global leadership in plant genetics, plant breeding and stress resilience.

Drylands are home to more than 38% of the world's population and are the most sensitive areas to climate change and human activities. While Australian agriculture has a remarkable record of producing grains, vegetables and fruit and carrying livestock in dryland conditions, broadacre agriculture and pastoralism activities have degraded the condition (particularly the soil condition) of much of Australia's cropping and livestock production areas. While ongoing remediation efforts are reversing these historic effects and improving soil condition with some

Transformational Research Foci

- Drought resilience
- Sustainable farming landscapes and resilient environments
- Space and extreme environment agrifood and bioprocessing

considerable successes, impacts have been exacerbated by extended periods of drought and the increased frequency and intensity of bushfires affecting large parts of the country. Strengthening the economic, environmental and social resilience for future droughts and continuing to improve soils will assist producers and communities to become more productive, competitive and sustainable.

Landscape Recovery and Regeneration research can deliver longer-term sustainable economic and social benefits by creating better agricultural systems and through new approaches such as carbon sequestration and natural capital. These have the potential to provide new sources of revenue for farmers, while improving farm productivity and crop yields in the longer-term.

Research relevant to agriculture in extreme environments, such as in space, promises to be a disruptive source of innovation for dryland agriculture, with the potential to forge new international partnerships through the Australian Space Agency and the South Australian Space Industry Centre. Space is unforgiving and systems must be circular and self-sustaining, reflecting the ever-increasing pressures on terrestrial agriculture. Controlled Environment Agriculture and Synthetic Biology are fundamental to meeting this challenge, incorporating autonomous and processing technologies and continual data analysis, all of which will also be relevant to some of the toughest technical challenges in terrestrial arid and semi-arid regions. Investment in space agriculture will provide stretch technologies for earth agriculture and, importantly, will promote engagement between agriculture in South Australia and a new community of researchers operating at the cutting-edge of technology.



Transformational Research Foci

- From genomics to quality traits for plants and animals
- Protein innovation – new foods from new crops and bioprocesses
- New healthier foods and ingredients

VALUE-ADDED AGRIFOODS

The University of Adelaide including the Waite Precinct is known internationally for strength in research and education in plant breeding. RM2 will deliver world-leading initiatives in breeding for stress tolerance and will expand these into niche attributes linked to improved quality. RM2 will also lead to upscaling of research into genomic analysis for enhanced animal resilience and meat quality.

RM2 will drive our research into providing the raw materials for innovation in the food sector, expanding opportunities for the Australian and global food markets. It will connect agriculture to numerous opportunities in the health sector. Consumer demand is rising for healthier foods and dietary supplements or additives that are proven to be effective and safe. There is growing consumer awareness of the close relationship between diet quality and life-long health, from pre-natal development to old age. This avenue for innovation within the sector will allow South Australia to leverage its global reputation as the producer

of safe, clean, high-quality produce to create a range of value-added products that target healthy outcomes. This pivot provides an immediate avenue for the conversion of locally-produced, plant-based material into healthy ingredients and new food products. By accessing well-established collaborative networks that extend across the globe, the University with its South Australian partners will help develop a range of new higher-value food and beverage products to meet the changing market.

The latest processing technologies now allow the conversion of produce and food processing waste streams into healthy value-added ingredients and foods, creating huge potential for South Australia to create a range of niche food and beverage products from our existing broadacre, horticultural, livestock and aquatic produce. Expansion of pre-commercial food capabilities will enable a differentiated whole-of-value chain capability for South Australia that accelerates the innovation and commercialisation of new value-added Agrifood products. Additionally,

fermented beverages and food products are increasingly favoured by consumers, and can be created from a range of products including dairy, fruit, vegetables and grains. Fermented foods have been shown to promote beneficial health outcomes due to a range of antioxidant, bioactive, anti-hypertensive, anti-diabetic, and gut health-supporting properties, and are currently driving global consumer demand.

Plant-based protein is set to become a \$6B market in Australia by 2030. The State Government aims to establish a plant-based protein manufacturing sector in South Australia by 2030 and, in support, the University will enhance its Protein Innovation Capability. This initiative will connect plant breeders working on the development of grain varieties for high-fibre, protein and nutrient content directly to protein enrichment or isolation, formulation and the manufacture a range of novel products, healthy ingredients and low-cost animal protein.



SUPPLY CHAIN PERFORMANCE AND NEW MARKET ANALYSIS

Transformational Research Foci

- A living-laboratory farm for technology
- Digitised Food Provenance
- Linking decisions and preferences with innovations and markets

Boosting the performance of South Australia's supply chains will be critical in delivering future productivity improvements for the Agrifood and Wine sectors. While the adoption of AgTech represents the foundation for improving on-farm productivity, there are big efficiency gains and major benefits for primary producers in addressing the major sustainability issues that exist across the supply chain. Central to boosting productivity across the sector will be the emergence of local agribusinesses that supply the equipment, technology and services to monitor and address the supply chain challenges facing growers and agribusiness.

Remote and proximal sensing, automated systems and training facilities aligned to the application of new agricultural technologies will support the studies into Critical Success Factors. We aim to establish a living laboratory farm for technology at Roseworthy that will leverage expertise in energy, water,

soil science, phenomics and breeding to optimise resource availability. The physical site will link to virtual, digital twin test beds to optimise the development of decision support strategies. A key component of these initiatives will be the integration of innovation from Australia's energy sector, which will produce new disruptive opportunities for farmers, businesses and regions, including operational efficiencies and enhanced profit margins across the value chain. Furthermore, systems to capture carbon footprints across the supply chain will lead to new certification standards and assist Australian agriculture to achieve carbon neutral solutions and, in some circumstances, carbon positivity.

Evolution of the South Australian wine industry will be key to its success in a changing climate. The unique link between the vineyard, the fermentation and the enjoyment of wine opens up a wide range of opportunities across the value chain. RM3

seeks to connect sensing and automation in the vineyard directly with the wine-making process, the market and consumer. The outcome will see new technologies – and resilient varieties – implemented in the vineyard and winery that result in better wines, sustainable practices and more efficient and predictable bioprocesses.

Food safety, integrity, provenance and ensuring traceability are central to the profitability of primary production and processing in South Australia, and are essential for protecting and expanding future markets. The University will use its expertise to support provenance and traceability, and combat the risk of fraud or low-quality products (including ensuring products meet minimal chemical residue limits and sustainability criteria) that could jeopardise the reputation and market acceptance of the Australian food and beverage industries.



Transformational Research Foci

- Livestock wellbeing and resilience
- Technology-improved animal sensing, production and supply chains
- Infectious disease control and crisis response

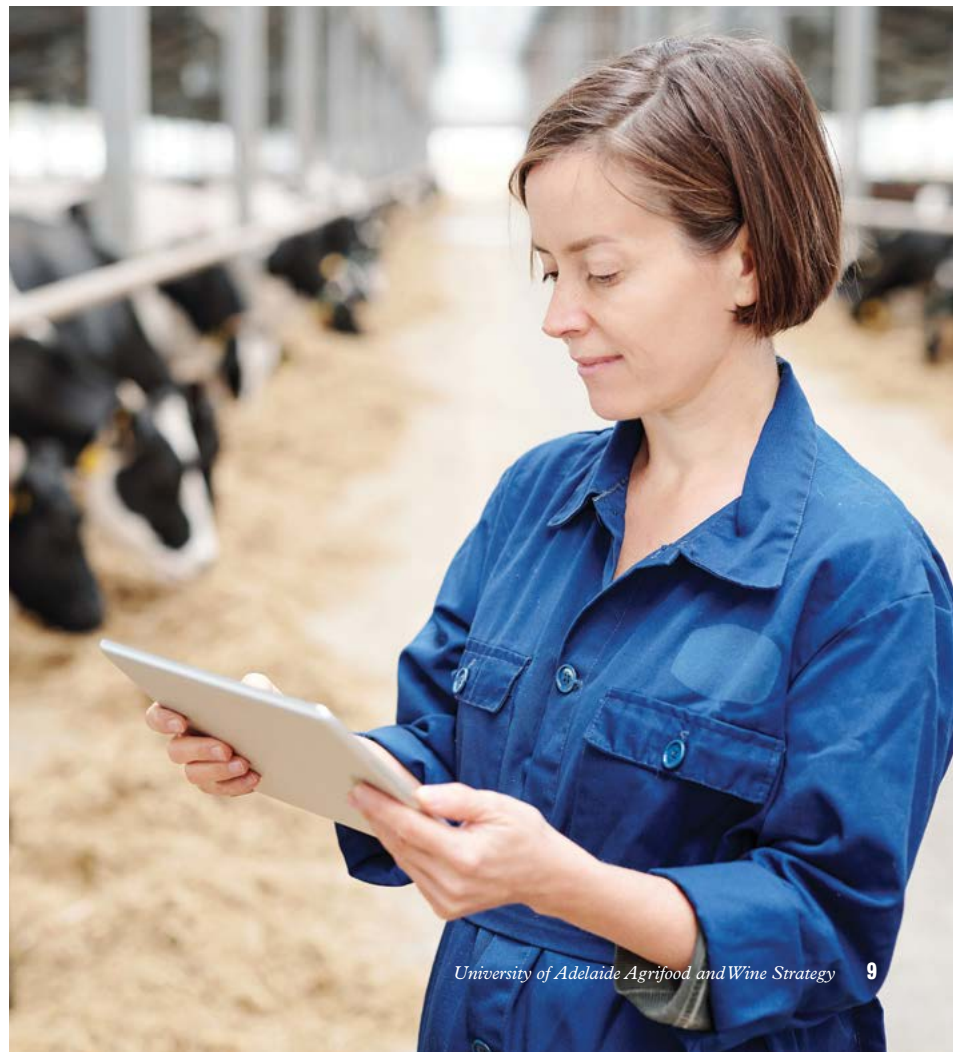
BIOSECURITY AND LIVESTOCK WELLBEING

Australia is one of the few countries to remain free from the world's most severe pests and diseases. Biosecurity plays a critical role in reducing significant risks to the productivity of agricultural industries, human health, and Australian plants and animals from imported pathogens. However, Australia's geographical isolation as an island nation is rapidly changing as the barriers of time and distance become less relevant as international travel and trade increase.

Our biosecurity systems and freedom from many global diseases, high animal welfare standards and sustainable production practices all support consumer confidence and market access for South Australian products. RM4 will develop a coordinated approach to drive 'One Health' outcomes in partnership with industry and government in South Australia; particularly in regard to food safety, the control of zoonosis and combatting antibiotic resistance.

RM4 envisages research linked to a State-wide Centre for Infectious Disease Control, with capability to consider biosecurity breaches involving animals and potentially inform the challenge of animal to human transmission of diseases. The benefits of strong animal welfare standards for application on 'humane farms' will also contribute to the reduction of environmental damage – recycling nutrients and improving the soil - and greenhouse gas emissions are often reduced when animals are healthy. The inclusion of shelter belts that sequester carbon can also yield animal welfare benefits.

Core research activities will include livestock wellbeing, wound healing models, automated animal production systems and parasitic and microbial pathology. RM4 will generate multi-sectorial opportunities beyond agriculture, including for defence, space and human health. By taking Roseworthy "off grid", we will create a self-sufficient State-based facility suitable for biosecurity crisis response and management close to, but separated from, Adelaide itself, providing for enhanced South Australian resilience drawing on "One Health" infrastructure.



FOR FURTHER ENQUIRIES

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