

# 2018 HIGHLIGHTS





**TASMANIAN INSTITUTE OF AGRICULTURE**

*TIA is a joint venture between the University of Tasmania & the Tasmanian Government.*



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**HORTICULTURE**

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**DAIRY, GRAINS  
& GRAZING**

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**FOOD SAFETY  
& INNOVATION**

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**AGRICULTURAL  
SYSTEMS**

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**LEARNING &  
TEACHING**

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**GLOBAL  
IMPACT**

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# ABOUT TIA

The Tasmanian Institute of Agriculture (TIA) is a joint research and education venture between the University of Tasmania and the Tasmanian Government.

We keep agriculture safe, sustainable and profitable in a world with fewer resources and a less predictable environment.

For more than 20 years, TIA has delivered hundreds of successful projects with global relevance and direct impact for Tasmania's vibrant agriculture and food sectors. We have unparalleled access to industry partners and prioritise research with real-world, practical results for agricultural producers and consumers.

TIA is consistently ranked as one of Australia's top research and education destinations for students, farmers and other stakeholders who seek to shape the future of how people are fed, clothed and cared for.

## DOZENS OF NATIONAL AND INTERNATIONAL RESEARCH PARTNERSHIPS INCLUDING

AUSTRALIAN RESEARCH  
COUNCIL

HORTICULTURE  
INNOVATION AUSTRALIA

DAIRY AUSTRALIA

MEAT AND LIVESTOCK  
AUSTRALIA

US AND AUSTRALIAN  
DEPARTMENTS OF  
AGRICULTURE



### 100+

POSTGRADUATE  
RESEARCH CANDIDATES



### 130+

SCIENTISTS AND  
TECHNICAL EXPERTS



### TOP 100

UNIVERSITY FOR  
AGRICULTURE  
(QS RANKINGS 2018)



### 39<sup>th</sup> IN THE WORLD

AGRICULTURAL  
SCIENCE (ARWU)



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# FROM TIA'S DIRECTOR

2018 was a pivotal year for TIA.

Continuing our tradition of educational excellence, we were rated by the Academic Ranking of World Universities as the 39th best agricultural science program in the world, ascending five places from our ranking in 2017.

In addition, our researchers continued to produce some of the world's best results-driven data on keeping agriculture safe, sustainable and profitable. The Australian Research Council's 2018 Excellence in Research Australia (ERA) report awarded TIA the highest possible rating of five (well above world standard) in both Agriculture, Land, and Farm Management and Horticultural Production. We were also rated four (above world standard) in Crop and Pasture Production, making us the only Australian institution to receive an above world standard rating in all three of these areas.

For the first time, the ERA report also evaluated institutions on the Engagement and Impact of their research. TIA's agricultural research received the highest possible ranking across the board, highlighting our strong relationships with industry, the media and the public.

TIA continues to build practical improvements to the agricultural industry in collaboration with Tasmanian, Australian and international partners.



## KEY HIGHLIGHTS

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Generating over 16 million exposures for TIA research and stories in Tasmanian, national and international media

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Gathering social research from hundreds of Tasmanian agricultural, food and beverage producers to help define the future direction of our research

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Discovering groundbreaking research to make the apple growing industry one of the most environmentally friendly in Australia

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Investigating the benefits of virtual herding for Tasmanian dairy farmers

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Launching a subscription-based food safety application used by some of the world's biggest food and beverage producers

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# EXCELLENCE IN RESEARCH

**“** *The world faces a tremendous challenge: How do we feed more people sustainably in a changing climate? Tasmania is leading the way because of our highly collaborative, cutting edge research.”*

*— TIA Associate Head of Research Ted Lefroy*

**TIA has officially confirmed its position as one of the leading agricultural research institutes in Australia.**

The Excellence in Research for Australia (ERA) National Report awarded the University of Tasmania the highest possible rating of 5 (well above world standard) in both agriculture, land, and farm management and horticultural production.

The University was also rated 4 (above world standard) in crop and pasture production, making it the only Australian university to receive an above world standard rating in all three of these areas.

The results are a reflection of TIA's impact-driven research environment, which engages heavily with industry to design projects that will yield real world benefits.

Our mission to keep agriculture safe, sustainable and profitable attracts some of the world's brightest minds and most eager students.



**AGRICULTURE, LAND  
AND FARM MANAGEMENT**

**HORTICULTURAL  
PRODUCTION**



**CROP AND PASTURE  
PRODUCTION**



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# FROM TIA'S ADVISORY BOARD

The TIA Advisory Board includes representatives from the University of Tasmania, the State Government and Tasmania's agricultural industries. The Board provides input on the strategic direction of research that is undertaken by the Joint Venture, to support prosperous, innovative and sustainable agriculture and food sectors in Tasmania.

Over the last 12 months, a major focus of the Board has been working to implement the actions in the White Paper *Growing Tasmanian Agriculture – Research, Development and Extension for 2050*, released in November 2017. The actions seek to harness TIA's research excellence to deliver on-farm impacts, increase productivity and promote innovation, competitiveness and sustainability in Tasmania's agriculture and food industries.

The projects featured in this report, such as the collaboration to address systemic downy mildew in poppies, are examples of how TIA's work is delivering on-farm impact to improve the competitiveness of Tasmania's agricultural sector.

I acknowledge the excellent work of TIA staff, as well as fellow members of the Advisory Board. The Board is central to TIA's governance structure and the inclusion of industry representatives reinforces the three-way partnership of Industry, Government and University that underlies TIA's ongoing success and recognition.

I look forward to working with the Board in the coming year as we continue to implement these measures, which will ensure TIA remains at the forefront of agricultural research and development, in partnership with industry and government.

Dr John Whittington  
(Chair) Tasmania Institute of Agriculture Advisory Board  
Secretary, DPIPWE



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# COMMUNICATIONS

In 2018, TIA's internal communications team developed widespread coverage of education and research stories in a variety of Tasmanian, national and international media outlets.

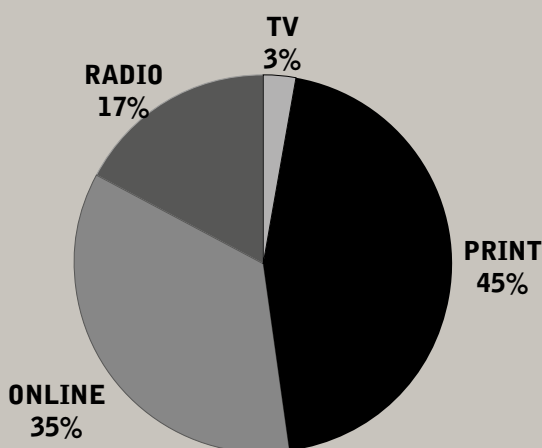
According to iSentia and Meltwater media reporting, TIA generated an estimated 16,625,000 exposures in print, radio, television and online pieces over the course of the year. The coverage was broken down at roughly 45 per cent in print, 35 per cent online, 17 per cent in radio and 3 per cent in TV.

Roughly 53 per cent of stories ran in Tasmanian media and 47 per cent ran in national or international sources.

TIA's internal communications team maintained an active social media presence throughout 2018, increasing Facebook likes by 22% over the year from 2,816 to 3,347. Our audience includes a healthy balance of agricultural industry representatives; current, potential and previous students; research and academic peers; potential partners and the general public.

Our team generated in excess of 686,000 exposures on Facebook, providing not only exposure for TIA's work, but also helping connect a new generation of students and graduates with industry partners. On average, 118 unique individuals engaged with each post made on Facebook.

WHERE TIA STORIES RAN



**16,625,000**

exposures of TIA stories in media

**22%**

increase in Facebook page likes

**53%**

of stories ran in Tasmanian media

**47%**

of stories made national or international news



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# FROM THE MINISTER

Through the Tasmanian Institute of Agriculture (TIA), the Government is working with farmers, researchers and agribusiness to set an exciting new direction in agricultural research in Tasmania.

The latest *Tasmanian Agri-Food ScoreCard* shows that we are firmly on track to reach the ambitious target to grow the farm gate value of agriculture to \$10 billion by 2050, with the value growing to \$1.60 billion in 2017-18. Remaining on track requires that we continue to innovate and make step-changes in productivity. This, in turn, requires world-class agricultural RD&E, which has on-farm impact.

The Government's White Paper: *Growing Tasmanian Agriculture – Research, Development and Extension for 2050* was launched in 2017. It sets out the Government's future direction for agricultural RD&E and TIA is a key partner in delivering on its objectives.

TIA, established through a joint venture between the Tasmanian Government and the University of Tasmania, is unique in Australia and the envy of many other jurisdictions. With the University of Tasmania's state-wide focus and global connections, TIA offers our agricultural sector unparalleled opportunities to engage in RD&E and to adopt the best available technologies on-farm. That is why, in 2018, we have been working with the University toward developing a new agreement to extend this valuable partnership.

I would like to thank TIA's Director and the team of researchers, technical and professional staff at TIA for their commitment to supporting prosperous, innovative and sustainable agriculture industries in Tasmania.

The Hon. Guy Barnett MP  
Minister for Primary Industries and Water



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# HORTICULTURE

TIA's horticultural researchers work closely with established and emerging industries, with a focus on quality and productivity in fruit and tree crops, grape and wine, berries, industrial and extractive crops, and vegetables. Our post-graduate students are a critical part of our research program.

# CRUNCHY, ENVIRO-FRIENDLY APPLES ALL YEAR

“ *More and more consumers are looking for fruit that not only tastes great all year round, they are concerned about how fruit is grown, how safe it is to eat and its environmental footprint.*”

— *TIA Researcher Dr Nigel Swarts*



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**New TIA research is poised to turn the apple growing industry into one of the lowest greenhouse gas emitters in agriculture. And consumers will enjoy better quality apples as a result.**

Consumers now want more than crunchy apples, they want fruit that is responsibly produced.

New TIA research shows that nitrogen is hands down the most important nutrient when it comes to managing apple quality and environmental impact.

The research answers questions about where nitrogen is stored in the tree, why timing of application has such a big impact on fruit quality as well as how nitrogen moves through the soil after rain or fertigation.

The results indicate a paradigm shift for how growers apply fertiliser.

Research shows that delaying nitrogen application until mid-November then applying small regular amounts of nitrogen through December will supply the apple tree with enough nitrogen.

This effectively keeps nitrogen levels in fruit tissue at almost deficiency levels, reducing tissue breakdown during storage so that apples stay crunchy right through the year.

By using this strategy, little or no nitrogen leaches below the root zone and emissions of nitrous oxide, a potent greenhouse gas, are kept to a bare minimum.

When using TIA's strategies, apple growing will be among the lowest greenhouse gas emitters based on tonnes of produce for any agricultural crop and deliver great credentials in environmental protection.

TIA's *Improved Productivity and Profitability for the apple and pear industry* project is part of the

apple and pear levy-funded PIPS program, which focuses on providing research outcomes on productivity, irrigation, pests and soils for the apple and pear industry.

## FAST FACTS



TIA research finds more efficient fertilisation for apple industry



Apples will stay crunchier, longer



Growing using this research will emit minimal greenhouse gases



# PROTECTING POPPIES

**“** *Growers are more conscious about sticking to rotations and this is helping to reduce the spread of the disease.”*

*—TIA Senior Research Fellow Dr Jason Scott*



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**In 2014, much of Tasmania's poppy crop was threatened by a devastating disease. TIA's Dr Jason Scott helped progress a rapid response research initiative that is still helping growers fight the disease four years later.**

In November of 2018, the Tasmanian Agricultural Productivity Group presented TIA's Dr Jason Scott with the Award for Agricultural Excellence in the category of Scientific Advancement. The award recognised Dr Scott's co-leadership of the collaborative research team working to understand and manage Systemic Downy Mildew disease.

It's a long-term project that continues to help reduce outbreaks of systemic downy mildew.

Dr Scott said systemic downy mildew spreads through contaminated seeds, soil and airborne spores.

A new focus of the research is analysing airborne spores to better understand the spread of the disease and provide growers with effective management strategies. Dr Scott was concerned to find that low levels of spores were being picked up before poppy

crops had been sown, indicating that contamination from the previous season's regrowth crops was a big issue.

Even if farmers start with very clean seed and a paddock that has never had poppies in it, airborne spores can still blow in and infect the crop.

Dr Scott said a future output from the project could be the development of a monitoring system that provides growers with warnings when spores are prevalent, helping them to improve timing of fungicide sprays.

The research is part of a \$1.6 million Australian Research Council Linkage Project 'Development of a risk management sys-

tem for systemic downy mildew of poppy' and is a collaboration with the Tasmanian Government, Poppy Growers Tasmania, SunPharma Australia and Tasmanian Alkaloids.

## FAST FACTS



Confirmed causal agent of systemic downy mildew



Confirmed seed- and soil-borne nature of SDM



Identified risks of uncontrolled poppy regrowth and weeds



# LONG-TERM SOIL HEALTH

**“** *Paddock 14 gives us an incredibly valuable tool to look at long-term soil health. It is one of only a few in the world operating over such a time span.”*

*—TIA Senior Research Fellow Dr Jason Scott*



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## One of the world's longest running cover crop research trials—and a key to sustainable farming—is quietly ticking along at TIA's Forthside Vegetable Research Facility.

The long-term cover crop research trial known as Paddock 14 provides a unique time capsule of cropping history over 14 years.

Paddock 14 consists of 12 plots that are sown each autumn with either annual ryegrass, the bio-fumigant Caliente mustard, or left as fallow.

In spring and summer, a commercial crop is planted across the whole site which has previously included potatoes, peas, poppies, barley, onions, broccoli and carrots.

Tasmania's processing potato industry and retired TIA scientist Dr Leigh Sparrow established the site in 2006. Their vision was to better manage crop rotation times, measure changes in soil health under cover crops

and reduce soil pathogens. There is good evidence that cover crops can be hugely beneficial to soil structure, fertility and preventing erosion, however their role in

suppressing plant disease and nurturing healthy soil microbial populations is less well understood.

Soil contains some of the greatest biodiversity on the planet.

Tracking how the soil microbial community responds to cover crops is uncharted territory.

In particular, what makes a 'good' soil microbe population and how to measure it is a relatively new and imperfect science.

The fact that some microbes like to share their DNA across species can make it particularly tricky to classify and measure them.

Paddock 14 provides a great model for North-

West Tasmania's resilient red ferrosol soil, but may have even greater benefit for trickier soil types, particularly erosion- and compaction-prone soils.

### FAST FACTS



Established with Tas potato industry in 2006



One of world's longest consistently running cover crop trials



Holds key to soil health and agricultural sustainability





# FAST, SIMPLE, CHEAP NITROGEN TESTING FOR WINE INDUSTRY

**“** *The goal is to develop a method to assess nitrogen levels using hand-held remote sensors that is fast, simple and cost-effective.”*

*— TIA PhD Candidate Harriet Walker*



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**In a first-of-its-kind project, a TIA student is working on speeding up nitrogen testing for Tasmanian winemakers. She is collaborating with Jansz to provide tangible, market-ready results.**

Healthy vines need the right amount of nitrogen to produce high-quality grapes.

The current method of testing nitrogen levels—petiole sampling—is time consuming. It requires cutting, gathering and labelling leaves from multiple locations in a vineyard. After all of that leg work, the samples then need to be sent off to labs for further analysis.

TIA PhD candidate Harriet Walker is developing a technique to instantaneously assess how much nitrogen is contained in the canopies of grapevines using hand-held remote sensors.

Ms Walker's trial sensors measure leaf greenness, which is an indicator of how much nitrogen the plant needs. The sensors have been used successfully in other agricultural industries, but this is the first application in wine production.

Ms Walker is trialling sensors on vines at Tasmanian vineyard Jansz Parish and working closely with Jansz viticulturalist James Aubrey. She is also working with fellow researchers to create an algorithm to predict nitrogen levels.




Researchers used leaf samples from Pinot Noir and Chardonnay vines with low, medium and high nitrogen levels and used the sensors to measure greenness.

They then assessed the total nitrogen content of the leaves over one season.

The results so far show that some of the sensors have potential to accurately estimate nitrogen levels in grapevine leaves.

Ms Walker's PhD research is funded by the University of Tasmania and Wine Australia with in-kind support from Jansz Parish Vineyard and TIA.

## FAST FACTS

-  Nitrogen levels indicate grape quality
-  Current testing is labour and time intensive
-  Hand-held sensors could make testing fast, simple and cheap



# SUSTAINABLE POTATO PRODUCTION

“A healthy soil can offer more opportunities and flexibility for potato growers. If the soil is more robust and resilient it may allow for shorter rotation times, which would be a massive incentive for growers”

— TIA Scientist Dr Robert Tegg



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**A TIA research team is critiquing scientific studies and real-world experiences of potato growers to identify the best strategies for sustainable soil health and opportunities for new research.**

There is abundant soil health information available worldwide, but sorting through the noise to find relevance for the Australian potato industry is challenging. TIA Scientist Dr Robert Tegg is distilling the vast knowledge bank of soil health into practical information for potato growers.

Understanding all the interacting components of soil health - the physical, biological and chemical factors - is essential in creating robust and productive soils that are able to sustain commercial potato production.

Growing potatoes requires a lot of inputs, including fertilizer and irrigation, and also involves a lot of soil disturbance particularly at planting and harvest. Practices such as cover cropping and reducing tillage and traffic, particularly when soils are wet, can help

improve soil health. These practices have been applied on certain farms for years; however, the way they are implemented as an entire system across a farm can make all the difference.

Managing soil health as a complete package using a 'farming system' concept is essential to long-term soil health, which probably ties in to greater profitability.

Particularly when we consider how important soil health is for potatoes. Healthy soil allows better root growth and more efficient use of nutrients and water.

A soil with higher organic matter is more stable and less prone to water and wind erosion, keeping valuable soil on-farm.

The project is funded by Hort Innovation using potato industry levies and funds from the Australian Government.

## FAST FACTS



Sorting through soil health information is time intensive



Whole system management key for better soil



Healthier soil means more, better potatoes







# **DAIRY, GRAINS & GRAZING**

TIA's Centre for Dairy, Grains and Grazing brings together interrelated research themes to enhance innovation, productivity and sustainability for livestock industries.

The centre's research themes include pasture, supplementary feeding, animal performance and innovative technology.

# COOL COWS IN WARMING WEATHER

“Managing the impact from hot weather and regulating livestock temperatures means farmers can more accurately predict milk production levels. This is essential for financial sustainability of the farm.”

—TIA PhD Candidate Janine Chang-Fung-Martel



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**An increase in average temperature of only one degree by 2030 is estimated to reduce current milk production in Australia between four and 10 percent per cow.**

Extreme weather events are on the increase, and this affects dairy farming practices.

A warming climate could mean dairy cows will have to be kept cool with shade, sprinklers and fans if future milk production and quality are to be maintained.

TIA is investigating strategies that will help farmers and their herds prepare for heatwaves, shifting rainfall patterns, and extreme weather events.

This three-year research project is exploring both short and long-term recommendations to help dairy farmers prepare for and manage climatic challenges.

Strategies to manage a warming climate include an alternate and more resistant forage base, changing infrastructure to ensure shade, feeding and milking when temperatures are cooler in the early morning or evening, and

genetic breeding for heat stress resilience in cows. Managing the impact from hot weather and regulating livestock temperatures means farmers can more accurately predict milk production levels. This is essential for

financial sustainability of the farm.

TIA is researching the possibility of returning more trees to paddocks to provide natural shade and increasing infrastructure to provide cooling.

Fans and sprinklers are already used in Australia to keep animals cool and are becoming more common, although they do have associated energy costs which need to be factored in.

The project is funded by Dairy Australia and the Australian Government

Department of Agriculture Fisheries and Forestry as part of its Carbon Farming Futures Filling the Research Gap Program.

## FAST FACTS



Temperature increase of one degree can reduce milk production by four to ten percent



TIA researching short- and long-term solutions



New breeds or pasture strains may offset production drop





# WEEDING OUT BAD PASTURE

**“** *When the growth of ryegrass slows down in summer or winter, plantain generally performs better, and by including plantain in the mix with ryegrass farmers can improve profitability.”*

*—TIA PhD Candidate Adam Langworthy*



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## **Contrary to what you might believe, for Tasmanian dairy farmers, putting together a better pasture may start with adding weeds back in.**

Five Tasmanian dairy farms participated in a TIA trial to determine the best way to include plantain (a forage herb) in traditional ryegrass pastures to boost productivity.

The trial was led by TIA Research Fellow Pieter Raedts and PhD candidate Adam Langworthy, and identified the optimal seeding rate per hectare for two different methods of adding plantain to an existing paddock.

Plantain could be described as 'lollies for cows' because it increases the palatability of pasture, encouraging cows to consume more which can lead to an increase in milk solid production.

Plantain typically survives for a duration of three years under grazing, as opposed to ryegrass, which can renew itself and can last for more than 15 years. It is not practical or

economical for farmers to renew a paddock every three years, and alternative management options are required for farmers to reap the benefits.

Trials started in ryegrass paddocks after spraying for weeds during Spring last year. The research team followed-up with observations during the season and dry matter cuts at the end of Summer.

The trials were challenging as army worms ate some of the seedlings and dry weather delayed germination of some of the seed, but the outcome was positive.

The project was part of Dairy on PAR, funded by Dairy Australia with in-kind support from TIA. The participating farmers are part of the Dairy on PAR feed-base network, run by the TIA Dairy Team.

### *FAST FACTS*



Adding the right weeds into a pasture may boost productivity



Plantain makes traditional pasture taste better for cows



Too much plantain can compete with traditional pasture



# BREEDING BETTER BARLEY

“Farmers and plant breeders have consistently asked for waterlogging tolerance genes to be incorporated into the current commercial [barley] varieties.”

—TIA Professor Meixue Zhou



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## Barley is big business for Australian farmers, but Tasmanian producers need a plant that is custom built to survive our wet, harsh winters.

Barley is particularly susceptible to waterlogging, which can cause significant yield losses. Researchers at the Tasmanian Institute of Agriculture have screened 300 wheat germplasm and identified a major gene controlling the tolerance of waterlogging in barley.

The gene could be the key to producing a new type of barley that can withstand the harsh conditions of a Tasmanian winter.

TIA Professor Meixue Zhou is leading the research, which could have significant impact on one of Australia's most important crops. Barley is Australia's second biggest cereal crop, after wheat, with annual production averaging eight million tonnes.

High rainfall during winter can significantly damage crops, so farmers in northern Tasmania tend to hold off sowing barley until spring, when conditions are drier.

Having identified the gene, the next step is to determine how the gene can be introduced into commercial varieties through backcrossing (instead of genetic modification) and marker assisted selection.

### FAST FACTS



Barley is Australia's second biggest cereal crop



TIA identified the gene that controls waterlogging



A new line of barley could boost Tasmanian production

Professor Zhou wants to integrate a specific gene that encourages the development of roots with large air-filled spaces. These air-filled spaces (aerenchyma) help transport air from the above-ground shoots to supply the roots of waterlogged plants.

This research could deliver a new line of barley to Tasmanian farmers with the same background of many preferred varieties.

The project was funded by the Grains Research and Development

Corporation and an Australian Research Council linkage project with the Department of Primary Industries, Parks, Water and Environment.



# BETTER SILAGE FOR MORE PROFITABLE DAIRY

**“** *If storage losses are reduced from 25 per cent to 10 per cent, income provided from the extra milk is increased by over \$10,000.”*

*— TIA Dairy Development and Extension  
Officer Samantha Flight*



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**As droughts continue to challenge Australia's food producers, TIA is working with Tasmanian dairy farmers to decrease their reliance on expensive concentrates (grain or pellets).**

With less predictable weather – particularly increased heat and droughts – on the horizon, it is more important than usual for dairy farmers to ensure they are making high quality silage.

Supplementing with high quality silage will allow cows to maintain, or increase, milk production during their lactation, and this can offset some of the need for more expensive concentrates. Poorer quality silage means lower production and potentially increased need for more expensive and higher energy supplements.

Improving the quality of 200 tonnes of silage from 8 MJ ME/kg DM to 9 MJ ME/kg DM will deliver a \$5,600 increase in milk production when milk is valued at 30 cents a litre.

In 2018, TIA's dairy extension team delivered a series of fodder and silage workshops with farmers from around the state to highlight a large

number of best practices to prepare for less predictable weather and increasing costs of concentrates.

These best practices included tips on when to cut and mow (e.g., after the morning dew has lifted), how to properly bale and wrap (e.g., within 24-48 hours after mowing), and how and when to repair bales (e.g., compact and dense bales). These practices and others work to keep silage in peak quality.

The practical extension advice delivered for Tasmania's dairy farmers could be implemented

at a low cost, easily recoverable with the savings generated in just the first year of high-quality silage production.

## FAST FACTS



Concentrated feed costs are on the rise



Droughts and hot weather may impact traditional foraging



Better silage means less reliance on concentrates



# FENCE-FREE FUTURE

“Once we know how animals respond and interact with the technology we can then explore how it can sustainably be used to increase dairy farm productivity through more tightly controlled stock movement.”

— TIA Research Fellow Megan Verdon



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**Researchers at the Tasmanian Institute of Agriculture (TIA) are part of a national program to find out how virtual herding technology could be used to optimize livestock and pasture management for intensive dairy farms.**

Virtual herding technology may revolutionise dairy farms of the future, but the application of the technology to intensively manage grazing cattle is still largely unknown. TIA Research Fellow Dr Megan Verdon is conducting trials at TIA's Dairy Research Facility at Elliott in North-West Tasmania. Dr Verdon, an animal behaviour specialist, investigated how to effectively introduce the technology to animals on a commercial farm.

The technology replaces a physical fence line with a virtual fence line which farmers can manage from remotely based on GPS locations. Virtual herding technology presents endless opportunities for intensive dairy farming, with potential benefits for productivity, profitability and sustainability.

The benefits of using virtual herding technology could be quite substantial for farmers. They could implement more intensive or

complex grazing regimes without the increased cost of labour or building the fences.

They could fence-off environmentally sensitive areas, more easily move animals away from waterlogged areas or improve pasture utilisation at sunrise and sunset.

The project is funded through the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit program.

It is a partnership between CSIRO, the University of Sydney, University of New England, the Tasmanian Institute of Agriculture, the University of Melbourne and Agersens Pty Ltd, with further funding support from the dairy, beef, wool and

pork industries and their respective RDCs; Dairy Australia, Meat and Livestock Australia, Australian Wool Innovation and Australian Pork Limited.

## FAST FACTS



Virtual herding uses GPS systems instead of fences



Farmers can manage herds and grazing remotely



TIA is evaluating its commercial application







# **FOOD SAFETY AND INNOVATION**

TIA's Centre for Food Safety and Innovation (CFSI) provides industry and government with access to cutting-edge research and knowledge of emerging issues related to food safety and shelf life.

# A PREMIUM ON FOOD SAFETY

**“ It is estimated that the food industry saves £1 million every hour by using ComBase.”**

**—UK Biotechnology and Biological Sciences Research Council**



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**TIA's new premium subscription food safety service builds custom solutions that can save millions of dollars. And its attracting some of the world's largest food and beverage producers.**

Turning a profit in agriculture isn't always just about growing more potatoes per hectare.

Many producers—from large-scale dairy farmers to boutique vineyards—need to consider thousands of factors that may impact not only the bottom line, but consumer health and safety.

If you add a new shipping destination, how can you tell what your projected spoilage or contaminant risk will be? Is your risk of a pathogen outbreak lower or higher? Are there environmental factors that could necessitate new packaging or shipping solutions?

CB Premium, or CB+, provides answers to those questions and a potentially infinite number of others.

CB+ is a user-friendly subscription-based predictive modelling service based on the world's largest publicly available database of quantitative food safety data – ComBase.

ComBase has more than 40,000 clients around the world, all seeking to minimise the risk of foodborne illness and food waste.




Users design safe and profitable systems utilising more than 65,000 records describing the behaviour of pathogens and spoilage organisms in diverse food environments.

Companies and scientists rely on ComBase to produce and validate predictive models and risk assessments, to manage food processes and supply chains.

ComBase is a joint initiative of the Tasmanian Institute of Agriculture and the USDA Agricultural Research Service.

CB+ provides customised models for subscribers who pay an annual fee. Shortly after launching in mid-2018, the service attracted the attention of Coca Cola, who signed on as an official sponsor.

## FAST FACTS

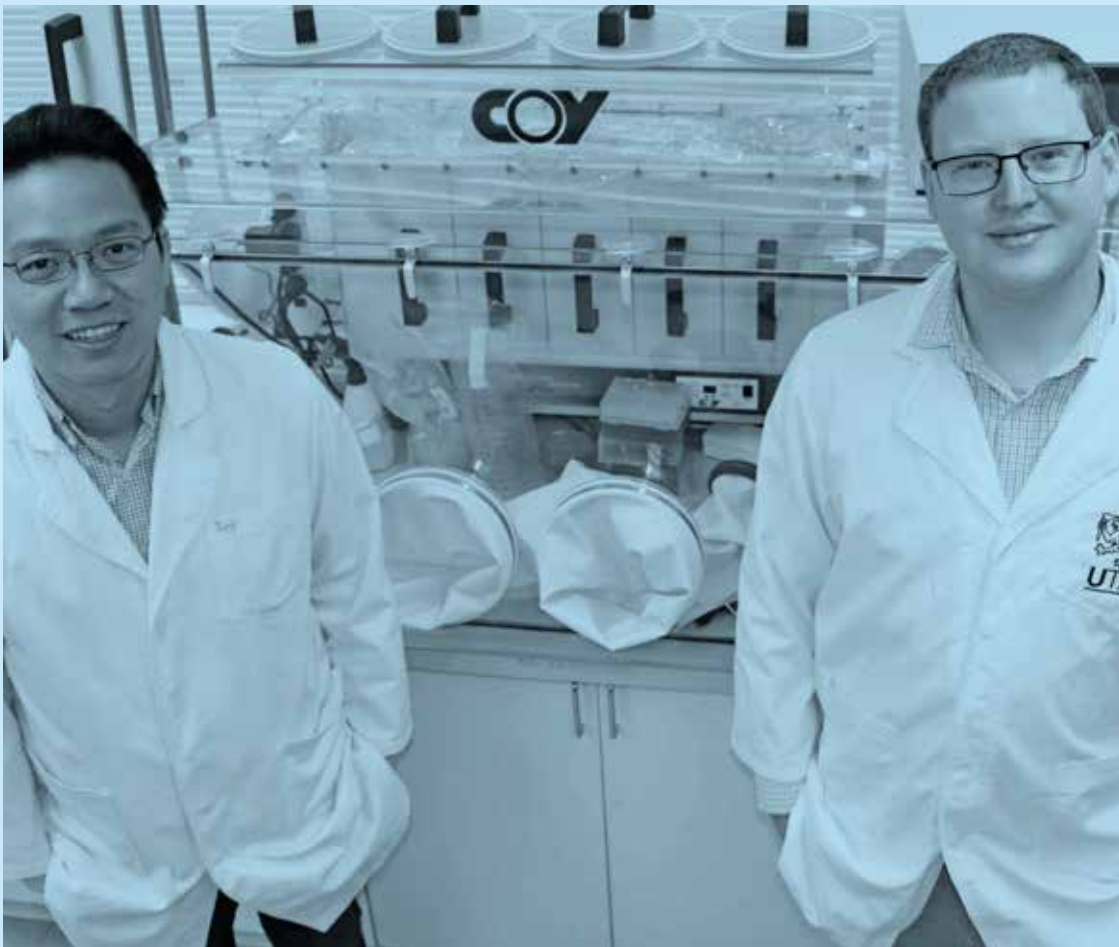
-  ComBase is the world's largest quantitative food safety database
-  CB Premium (CB+) is a new subscription-based modelling service
-  Coca Cola has signed on as a service sponsor



# KEEPING BEEF SAFE

**“** *We’re working with TIA to ensure we keep up with the latest in microbiological research and development, which is of benefit to the Australian red meat industry.”*

*— JBS Group Food Safety Quality Assurance  
Manager Michael Johnston, Sciences  
Research Council*



**TASMANIAN INSTITUTE OF AGRICULTURE**

*TIA is a joint venture between the University of Tasmania & the Tasmanian Government.*

**A team of TIA food safety researchers are working on a new method to reduce *E. coli* and potential pathogenic bacteria in beef which could give a leg up to Australia's domestic and export industries.**

TIA's researchers are working with industry in Tasmania and New South Wales to develop a practical solution that will help boost food safety and quality in Australia's red meat sector. Researchers have used laboratory and pilot trials to verify that spraying beef carcasses with oxidant and water during refrigeration, a process known as spray-chilling, causes significant reductions in *E. coli* numbers and helps maintain meat weight.

Some strains of *E. coli* are a risk to public health so reducing them is crucial, particularly for export markets.

Australia exports beef to over 100 markets, each with its own food safety tests and standards.

Meat and Livestock Australia (MLA) research on STEC (Shiga toxin-producing *Escherichia coli*) has found that "the health costs of STEC

infections in Australia are estimated to be \$2.6 million per year." MLA estimates the cost in the US as more than US \$300 million a year.

## FAST FACTS

-  The health cost of *E. coli* is roughly \$2.6 million/year in Australia
-  Each export market has its own food safety tests and standards
-  TIA found that spray chilling beef reduces *E. coli*

Imported Australian meat must meet the same standard as US beef. Testing and detection of pathogen-positive lots can lead to serious setbacks for the entire industry.

By designing trials with industry, TIA research produces solutions that work in real world conditions. It also helps industry keep up with the latest research and technological innovations.

TIA is a Principal Research Organisation for Microbial Ecology and Physiology (PROMEP).

The group's research is jointly-administered and funded by MLA with financial support from the Australian Meat Processor Corporation (AMPC).



# LONGER LASTING FRESH FRUIT AND VEGGIES

**“** *Our collaboration with horticultural industry professionals ensures research is targeted and relevant to industry needs.”*

*— TIA Food Safety Professor Tom Ross*



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## **A Tasmanian research project could increase the shelf life of baby spinach and other baby salad leaves, so it keeps fresh in consumers' fridges for longer and produces significantly less food waste.**

TIA PhD candidate Vongai Dakwa worked with research partner Houston's Farm, a Tasmanian grower and processor of baby leafy salad vegetables, on the project.

Baby leafy salad vegetables have a high respiration rate and short shelf life of about 12 days. Increasing this shelf life will meet consumer demand for longer shelf lives.

It will also reduce wastage, as losses can occur along the supply chain and during retail storage for various reasons, including temperature control.

A range of experiments developed with Houston's Farm examined the influence of storage temperature and bruising on shelf life. Baby leaves are tender and can be bruised during mechanical processes, such as harvesting and processing. Shelf life can be increased if cotyledons – the first leaves to appear from

a germinating seed – are not included within the packed baby spinach.

TIA's research also found a technique to remove grit more effectively during the washing stage that doesn't compromise product quality or shelf life.




Ms Dakwa's project is just one of 10 PhD projects from the ARC Training Centre for Innovative Horticultural Products.

The training centre mentors students who gain real-world commercial experience and will continue in careers advancing the fresh produce sector.

The training centre is funded by the federal government through the Australian Research Council Industrial

Transformation Research Program, Woolworths and the University of Tasmania, and receives in-kind support from the Tasmanian Institute of Agriculture.

### **FAST FACTS**

-  Baby leafy greens have a short shelf life
-  Longer shelf life reduces wastage and makes customers happier
-  TIA research uncovered techniques to increase shelf life



# WHAT MAKES ORGANIC PRODUCTS STICK OUT?

**“** *People buy organic food based on perceived benefits to health and the environment, but people are not clear what defines a product as ‘organic’.*”

*— TIA PhD Candidate Maria Massey*



**TASMANIAN INSTITUTE OF AGRICULTURE**

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**Organic food is big business worldwide. And Australia is no exception. But what exactly drives us to pick up an organic product from the shelf? A specialised online experiment unlocked some of the sales secrets.**

Almost half of Australia's organic food consumers increased their organic food budgets in 2018. But how do consumers decide which product to pull off a shelf and drop into their trolley?

TIA PhD candidate Maria Massey conducted an online experiment to find out. Over 400 Australian consumers of organic food participated in simulated supermarket shopping scenarios.

Participants were presented with a range of options for fresh and processed foods—strawberries, tomatoes, flour, sugar, pasta sauce and chocolate. Mrs Massey analysed the impact of different factors—like brand, price, packaging and where the product was produced—on the likelihood of purchase.

Mrs Massey discovered that labelling, packaging and origin all play a role. Consumers are more likely to buy a product if it has a certified organic label, is locally sourced and is in sustainable packaging.

Out of these three factors, local origin has the biggest impact on choice.

And while consumers prefer a certified organic label over a non-certified label, they're not exactly sure what makes food organic.




Prior to the experiment, Mrs Massey examined 25 years of consumer comments on the reasons they purchase organic food.

There isn't a universal definition of 'organic' food. The definition is inconsistent across national standards and certification authorities. There is a gap between policy makers' organic food definitions and the public's perception.

These are important findings for the Australian organics market, which has grown by almost 88 per cent since 2012.

This research was conducted as part of the Australian Research Council (ARC) Training Centre for Innovative Horticultural Products.

## FAST FACTS

-  TIA surveyed over 400 Australian consumers of organic food
-  Participants were more likely to buy certain foods
-  Labelling, packaging and origin all play a role



# MEAT SNIFFERS HELP EXTEND SHELF LIFE

**“** *I'm working to help ensure Australian lamb and mutton continues to be a premium quality product in the international market.”*

*— TIA PhD Candidate Laura Rood*



**TASMANIAN INSTITUTE OF AGRICULTURE**

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**When it comes to measuring the freshness of Australian lamb and mutton meat, sometimes it's as simple as following your nose. Volunteer noses could help lead to longer shelf lives for Australian meat.**

Australia is the world's largest exporter of sheep meat. Of 2017's total Australian production, we exported 57 per cent of lamb and 92 per cent of mutton to destinations that included the Middle East, US, Japan, South East Asia and China.

A new TIA study aims to increase profitability in the sector by increasing shelf life. As part of the experiment, volunteers took part in a multi-week experiment, regularly smelling meat to gauge freshness. TIA PhD Candidate Laura Rood recruited and trained a panel of 30 sensory volunteers.

First, meat samples were exposed to bacteria and stored past the end of the expected shelf life. Then volunteers smelled the meat every few weeks and evaluated the meat's quality. TIA is a Principal Research Organisation for Microbial




Ecology and Physiology (PROMEP). The group's research is jointly-administered and funded by Meat and Livestock Australia with financial support from the Australian Meat Processor Corporation.

TIA's PROMEP team previously identified the bacteria that are present on sheep meat at the time of spoilage. Now, Ms Rood has found that sheep meat goes off because of the make-up of the microbial community, as opposed to individual bacteria.

Extending the shelf life of sheep meat is particularly important given Australia's export times. Sheep meat generally has a shelf life of 12 weeks when it is stored constantly at minus one

degrees and is vacuum-packaged. Beef, under the same conditions, lasts for about 24 weeks.

## FAST FACTS

-  Australia is the world's largest exporter of sheep meat
-  Sheep meat has half the shelf life of beef
-  TIA identified factors that may reduce shelf life







# **AGRICULTURAL SYSTEMS**

TIA's Agricultural Systems Centre is helping to make sense of complex interactions within agricultural and food systems, a topic that is increasingly important for prosperous management of our natural resources into the future.

# FIXED TRAFFIC, BETTER SOIL

**“** *Using the same machinery wheel tracks year after year helps to minimise soil compaction in cropping zones.”*

*— Agricultural Systems Researcher John McPhee*



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**Research by the Tasmanian Institute of Agriculture has found controlled traffic farming is linked with improved soil health, creating the perfect environment for beneficial soil bugs to thrive.**

A close look at the abundance and diversity of soil bugs at TIA's Forthside Vegetable Research Facility is one of only three known peer-reviewed reports in the world investigating interactions between soil biology and controlled traffic farming. Controlled traffic farming is a crop production system involving clearly separated crop zones and traffic lanes that are put in place for the long-term.

Of particular interest in this research were soil arthropods, which are invertebrates ranging in size from 0.1 to 2.0mm. They have no capacity to burrow or dig through the soil, making them very sensitive to the physical structure of soil.

Soil samples from a vegetable production trial were taken at three different depths, ranging from the surface to a depth of almost 20 centimetres. Compared to

conventionally farmed soil, almost twice as many soil arthropods were found in controlled traffic zones during winter, and three times as many during spring.

The presence of soil bugs is important because many of them help crop production by eating pests and releasing nutrients by processing organic material.

Despite many farmer reports on this subject, there has been limited international research on the effect of controlled traffic farming on soil biology.

TIA's Tasmanian trial was broadly in-line with similar research, including a Queensland trial which found minimum tillage

and crop rotation for sugar cane production made significant improvements to soil health and reduced the occurrence of root disease.

## FAST FACTS



TIA trial one of only three known in world



Controlled traffic farming uses same machinery tracks every year



Maintains helpful bugs that eat pests and release nutrients



# WASTE NOT, WANT NOT

“ *In the Netherlands, the government is asking everyone in the business community, civil society and government to get involved, to contribute ideas and to deliver healthy food with minimal environmental impact.*”

— TIA PhD Candidate Melle Nikkels



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**Imagine a farm that produces no waste. Where any leftover agricultural biomass is used on the farm as a renewable resource. How could policy make this sustainable approach profitable for our farmers?**

This approach is one of the principles behind “circular agriculture”, a new way of thinking about agricultural production without negative environmental and social impacts.

This is our agricultural future:

Scarce resources used sparingly, less biomass wasted, renewable energy used, fewer imports needed and energy consumption and greenhouse gases reduced.

Right now, the Netherlands is completely transforming their agriculture sector to become a world leader in circular agriculture.

Dutch TIA PhD candidate Melle Nikkels is analysing how agricultural policy is delivered at a time when we’re experiencing the most significant change in agricultural practice since World War II. Circular agricultural policy aims to have no direct or indirect negative

impacts on biodiversity; it places a high priority on animal welfare, with the aim of farmers and society to better integrate.

One possible incentive is that circular agriculture farmers will get a premium on their products. Using less water and building better soil? That may equate to an extra 25 cents on each litre of milk you sell. Replanting trees to shade your herd naturally? That’s an extra 10 cents.

Income that is currently only based on production would instead also be based on service to society, such as biodiversity, water security, quality and the smallest possible footprint.

This could be an especially impactful system for our island home: More produce for local consumption and export and a preservation of our natural beauty as well.

## FAST FACTS



Zero wastage delivers healthy, safe, profitable and sustainable food



Dutch policy seeks input from business, community and government



Potential policies include price premiums for enviro-friendly farming



# 100 FARMERS GUIDE RESEARCH PRIORITIES

**“** *We can see from the data that Tasmanian producers are focussed on producing quality food, growing their businesses, looking after the land and contributing to community.”*

*— TasAgFuture Project Leader Dr Peat Leith*



**TASMANIAN INSTITUTE OF AGRICULTURE**

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## Farmers and food and beverage producers had their say in the future of Tasmania's agriculture and food sectors through the Tasmanian Institute of Agriculture's TasAgFuture survey.

Thanks to 100 in-person interviews and hundreds of online survey responses, TIA have access to an unprecedented level of information on Tasmania's thriving agricultural, food and beverage sectors from the most diverse group of respondents to date.

A diverse spread of responses from across the state, from a wide range of agricultural, food and beverage businesses and different age groups gives TIA an in-depth look at the needs, goals, motivations and priorities of Tasmanian producers.

Initial data from the TasAgFuture project is presented in reports based on region and type of agriculture or food business. The first look at this information can now be shared with participants, industry and government bodies, and the public through these reports, available at [utas.edu.au/tia/tasagfuture](http://utas.edu.au/tia/tasagfuture)

The various reports highlight a number of factors that constrain and influence Tasmanian agricultural and food businesses, and strategies Tasmanian farmers and producers

are using to advance their goals, for example, investing in professional development for staff.

TIA researchers are now analysing data from the survey and 100 in-depth interviews carried out earlier this year with food producers and processors.

The information will be further analysed and utilised by TIA leadership to develop a long-term research strategy that can best support the needs of Tasmanian farmer and food and beverage producers.

A detailed report summarising the analysis of all data collected through the TasAgFuture project will be available in early 2019.

### FAST FACTS



100 in-person farmer interviews were conducted across the state



Goals, motivations, needs and more identified for many sectors



Research priorities can be tailored to Tasmanian producers' needs





# DATA-DRIVEN AG

**“ Precision agriculture can help growers develop a deeper understanding of problem areas and identify appropriate management strategies such as variable applications of water, lime and fertilisers.”**

**— TIA Agricultural Systems Researcher John McPhee**



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**The Tasmanian vegetable industry looks a lot different than it did five or ten years ago, with increasing access to high-tech sensors, apps and web-based programs to aid decision making.**

In 2015, a collaborative project between the Tasmanian Agricultural Productivity Group (TAPG) and the Tasmanian Institute of Agriculture (TIA) was launched to investigate the benefits of adopting precision agriculture technologies. The Precision Agriculture Project, funded by the Tasmanian Government, finished in 2018.

One of the key facets of the project was to gather information on the extent of crop variability on Tasmanian vegetable farms.

Awareness and understanding of the reasons for crop variability are key factors in moving forwards with precision agriculture.

Six Tasmanian growers collaborated on the project and provided access to a specific paddock over three growing seasons from 2015 - 2018. The participating farms represent a range of soil types and enterprise mixes and

were located across Tasmania, from Sisters Creek to Tunbridge and Waterhouse.

The project, which used tools including yield monitoring, imagery, soil mapping and digital elevation modelling, uncovered inherent variability in vegetable crops. Variability within a single crop is often significant, with one instance showing a 14-fold difference in yield within the same paddock.

When the project commenced in 2015 most vegetable harvesters in Tasmania were not fitted with yield monitoring technology, which meant the research team relied on targeted hand sampling for much of the trial work.

Access to this technology is still a limitation in the Tasmanian vegetable sector, but there has been an increase in investment. For example, farmers are using more harvesters fitted with yield monitors.

## FAST FACTS



Precision agriculture technology is yielding vast data



Six Tasmanian farmers measured paddocks for three years



Data may help drive better management practices



# SPINNING DATA INTO GOLD

**“** *Pathways to Market is showing how science can deliver value to consumers and value chain partners that will improve global competitiveness and access to markets.”*

*—ARC Pathways to Market Research Hub  
Director Dr Laurie Bonney*



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**TIA-led Pathways to Market took a new step forward in 2018 with the addition of a nearly \$1 million project to improve the supply chain system for one of Australia's leading producers, Perfection Fresh.**

Increasing the profitability of a product and standing out from the competition is becoming an extremely precise science that analyses thousands of factors.

Pathways to Market seeks to leverage new technologies and data into more profitable management of agricultural systems from the ground up.

A new three-year collaboration with Perfection Fresh, valued at more than \$900,000, will fund the development of a new decision support system for the company's mango supply chain.

The new system will allow the company to better understand its entire supply chain, from farm to table. This will lead to higher quality fruit starting with improved forecasting of the crop.

Consumers around the world are demanding greater transparency about their food. They

want to know where it comes from, how it was produced, and importantly, if it is safe. Sustainability is rapidly becoming a necessary step to market entry.

Pathways to Market is an information sharing approach to research, focused on premium food exports, specifically to Asia and the US. Researchers investigate aspects of food quality, traceability, and the natural capital of the production environment, all of which involve additional sensing capability. The end goal is to create value for industry, government and community.

Pathways to Market is a five-year, \$5 million research collaboration providing digitally-bac-

ked solutions to Australian food exporters and their supply chains and is funded by the Australian Research Council, the University of Tasmania and industry participants.

## FAST FACTS



Pathways to Market uses data and tech to improve decision making



New \$900,000 collaboration with Perfection Fresh



Better supply chain management increases global competitiveness









# LEARNING & TEACHING

Tasmania is an agriculture powerhouse, containing a broad and dynamic industry that provides opportunities from paddock to plate. Our students' learning experience is practical and hands-on, built through access to dozens of successful producers in Tasmania and beyond. Combined with our cool, temperate climate, their agriculture education is applicable around the world.

# TIA TOPS WOOL CHALLENGE

**“** *It was great to see the eagerness and energy of the students so keen to learn about wool. [It's] a credit to them and their teachers.”*

*—NMC Project Manager Ben Watts*



**TASMANIAN INSTITUTE OF AGRICULTURE**

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**Tasmania's outstanding sheep and wool sector was represented for the first time at a national sheep and wool competition in 2018. Tasmanian students swept the competition aside, taking many top awards.**

Sponsored by Australian Wool Innovation (AWI), the 2018 National Merino Challenge (NMC) was held in Adelaide.

More than 120 students from 10 tertiary and 12 secondary institutions from five states enjoyed a weekend of wool industry education, skills and introductions at the 2018 NMC. TIA student Lauren Rowlands took the overall individual Champion spot in the Tertiary Division, while TIA student Rebecca Owen was named runner up.

Additionally, TIA's team was named best in the nation. Ms Owen also took home the Top Performer in Production and TIA Senior Sheep and Wool Industry Extension and Development Officer

Andrew Bailey was named the winning trainer. In its sixth year, the NMC has introduced more than 600 secondary and tertiary

students to basic wool industry knowledge and skills while also introducing them to a network of wool industry professionals.

The NMC gives young people an understanding of the career opportunities within the sheep and wool industries and delivers basic skills of appraisal using both traditional and modern methods.

The challenge has established itself as a leading education program for students interested in a career in the wool industry.

During the two-day event, students are introduced to and then assessed on their skills across a wide range of areas such as feed budgeting, condition scoring, breeding

objectives, wool harvesting together with the commercial assessment and classing of animals and fleeces.

## FAST FACTS



National Merino Challenge gauges student knowledge



Tasmanians attended for first time



TIA students, teams and staff swept most of the top awards



# STUDENT AG TECH STARTUP WINS BIG

**“** *Regardless of whether we're improving monitoring for live exports, tracking wool provenance or saving millions of dollars with smart parasite treatment, Easy Drench can drastically shift how we work with livestock.”*

*— TIA First-year Agribusiness Student  
Dylan Bellchambers*



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## Australia's agricultural industry may soon get a big boost to animal welfare and productivity thanks to two agricultural technology start-ups from the Tasmanian Institute of Agriculture (TIA).

In 2018, student-led start-ups Easy Drench and the Lambulance were the first ever Tasmanian entrants in the Australian eChallenge, an entrepreneurship program organised by the University of Adelaide. The eChallenge helps develop products from concept to market.

Easy Drench was awarded first place in the finals of the Wool Innovation category, aimed at improving sheep health, welfare and productivity.

The first-place prize netted the fledgling business \$10,000 and significant industry attention. The start-up had a preliminary meeting with a trademark lawyer the morning after their win. Given the potential applications of the product to

improve animal welfare in nearly every sector of Australia's agricultural industry, the start-up will now look to lock in the industry support they need to get the product on shelves.

Easy Drench is a small remote sensor that monitors health in individual animals and can automatically drench infected stock and alert producers to other risks.

The product would be a large step forward for agriculture.

In 2018's Australian eChallenge, over 70 teams competed across five categories, including wool innovation, climate response and medical innovation.

While TIA's other start-up – Lambulance – did not place in the finals, the drone-powered automated lamb triaging system drew extensive attention in Tasmanian and national media.

In addition to the \$10,000 prize for win-

ning the wool innovation category, Easy Drench also received mentoring to grow their business and may apply for access to the University of Adelaide's start-up incubator ThincLab.

### FAST FACTS



First time Tasmanian students entered Australian eChallenge



TIA student start-up Easy Drench won first prize



System would automatically drench infected stock





# AG GRADS GET THE JOBS

**“** *Studying ag at TIA, you get your name out there and make industry connections before you even graduate, which is such a big advantage.”*

*— TIA Graduate Georgia McCarthy*



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**Before TIA graduate Georgia McCarthy even donned her cap and gown, she landed a job with an industry leading consulting firm and a two-year internship to keep building skills.**

TIA graduates are in such high demand that employers are snatching them up before they can even graduate. In July Georgia McCarthy started working for consulting firm Macquarie Franklin. She sat through her graduation ceremony in August already fully employed.

Now more than ever, the world's smartest and hardest-working people are needed to make agriculture sustainable, profitable and safe. And the job market reflects it: A degree in agriculture opens doors to an industry with four to five jobs for every graduate.

As part of her degree, Georgia undertook work experience with Macquarie Franklin and Sheep Connect Tasmania.

Having the opportunity to develop her practical business skills and make connections in the industry was incredibly valuable. TIA's industry-connected educational programs

allow students to engage with producers and get real world experience from day one. Graduates proceed into a diverse array of careers within – and sometimes beyond – agriculture. TIA grads have gone on to jobs in forestry, aquaculture and even banking.

TIA Agribusiness grad Eleanor Vogel has done just that, scoring a job as an Agribusiness Relationship Assistant at Rural Bank in Adelaide.

During her degree Eleanor also made the most of the practical and networking opportunities on offer, undertaking work placement with Rabobank, representing Tasmania at the National Merino Challenge and attending the Australian

Women in Agriculture Conference.

TIA has one of the highest ranked agricultural programs in the world and offers more than \$300,000 in scholarships annually.

## FAST FACTS



There are 4-5 jobs available for every ag grad



TIA grads often have jobs before they graduate



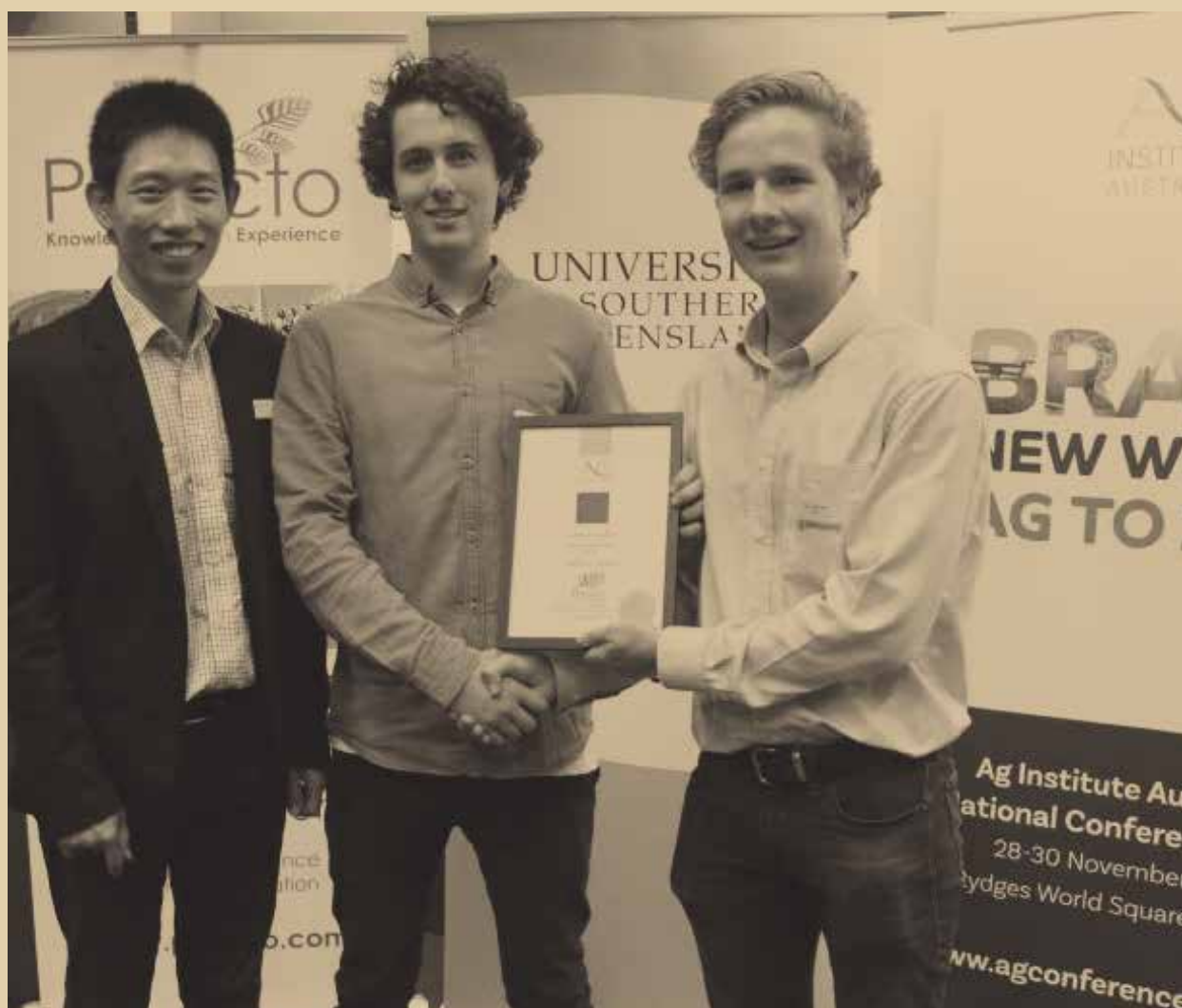
Students have access to more than \$300,000 of scholarships



# NATIONAL AWARD FOR BEE DECLINE RESEARCH

**“** *The high quality of the research projects this year are a testament to the incoming talent for Australian agriculture.”*

*—Ag Institute Australia Director Dr Daniel Tan*



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**TIA PhD candidate Ryan Warren wants to know why crucial honey bee populations are declining around the globe. His research garnered a national prize and attention around new monitoring tech.**

Ag Institute Australia hosted a competition among students from around the country to gauge which researchers are driving Australia's agriculture industry to a new future.

The finals of the competition were hosted in Toowoomba, Queensland. Competitors from all over Australia had to present their research to a panel of judges, including industry representatives.

TIA PhD candidate Ryan Warren was awarded the top prize – the coveted National Student Award – for his important work on declining bee populations. Mr Warren's research aimed to optimise a newly developed radio frequency identification system for monitoring variation in individual bee behaviour. By tracking individual bees wearing tiny Radio-frequency Identification (RFID) "backpacks", Mr Warren's research developed a more

refined monitoring system. Roughly 1,000 bees were individually fitted with the tiny backpacks to harvest key data. That system can now be utilised to conduct a wide range of research, contributing to increased

understanding of global bee decline.

The technology could reveal how weather, chemicals, or disease affect the health of honeybees and their hives, and ultimately, the pollination of our crops.

This project was the first known instance worldwide of the RFID technology being used on a full-strength commercial hive containing about 60,000 bees, instead of in the lab or with smaller test boxes.

One of Ryan's supervisors was TIA insect expert Dr

Stephen Quarrell, whose background in industrial electronics came in handy for a project involving bees, radio frequencies, and antennas.

## FAST FACTS



TIA student wins national research award



Project studies declining bee



First known application of technology in the field









# GLOBAL IMPACT

The impact of TIA's research and education grows within Tasmania every year, but has also spread beyond our island. A growing number of partnerships with government, education and industry in mainland Australia, Asia and beyond highlight the cutting-edge work carried out in our state every day.

# GROWING INTO ONE OF THE WORLD'S BEST AG SCHOOLS

“ *There is value in reimagining our relationships with food. Not only will we add value to the crops we produce, we will add value to our future.*”

— *TIA Director Holger Meinke*



**TASMANIAN INSTITUTE OF AGRICULTURE**

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## **TIA continues to be one of the world's premiere destinations for studying agriculture science, according to the 2018 version of the world's leading ranking of educational institutions.**

Every year, the Academic Ranking of World Universities (ARWU) releases a report detailing the world's top 500 universities for a number of subjects.

In 2018, the University of Tasmania was again ranked among the world's 50 best destinations to study agricultural science.

The University of Tasmanian and TIA were ranked as the 39th best place to study agriculture in the entire world. TIA and UTAS were rated better than Australian institutions including The University of Melbourne (40), The University of Adelaide (42) and several other prominent schools.

This significant improvement – the University and TIA rose 5 ranks from 2017 (44th) – is a reflection of TIA's continued dedication to world-class agricultural research, which

attracts many of the world's best and brightest researchers and students. Tasmania is an agriculture powerhouse, containing a broad and dynamic industry that provides

opportunities from paddock to plate. TIA gives students practical and hands-on education, built through access to dozens of successful producers in Tasmania and beyond.

Combined with our cool, temperate climate, an agriculture education at TIA is applicable in a huge range of countries around the world.

People are talking and thinking about their food more than ever before – where it comes from, how it's made, and its impact on our world. When students choose the University of Tasmania and TIA to study agriculture, they know they're signing on to help shape the future of our world.

### **FAST FACTS**



ARWU ranks the world's top 500 universities



UTAS and TIA are ranked as the 39th best in the world

## **GLOBAL IMPACT**



# COMBATING COUNTERFEIT CHINESE CHERRIES

“*Tasmanian cherries are so highly valued that there is a black market of counterfeit Tasmanian fruit in China.*”

—*TIA Director Holger Meinke*



**TASMANIAN INSTITUTE OF AGRICULTURE**

*TIA is a joint venture between the University of Tasmania & the Tasmanian Government.*

**The demand for Tasmanian cherries is so high in China that counterfeiters are mislabeling fruit grown elsewhere. TIA is working with producers and importers to get more authentic Tasmanian cherries into the market.**

Tasmanian government, TIA and industry leaders met with Chinese importers to discuss increasing Tasmanian cherry supply to China during the Australian trade mission in September.

Tasmanian cherries command a high price premium due to their quality, which has led to unscrupulous characters putting fake Tasmanian labelling on subpar fruit to capitalise on our island's carefully cultivated brand.

TIA will be working with Chinese importers and Tasmanian growers to clarify the characteristics that make Tasmanian cherries so highly valued and further improve their marketability.

It is no coincidence that Tasmanian cherries are so prized in China.

For nearly a decade TIA's researchers have worked closely with Tasmanian growers to achieve outstanding fruit quality and

consistency of yield. TIA discovered how to increase fruit set – by more than double in some varieties – and reduce the cracking in cherries which is caused by late season rainfall.

## FAST FACTS



Tasmanian cherries command high prices in China



Demand is higher than Tasmanian producers can meet



TIA is working to combat counterfeit fruit and increase production

The discussions were particularly timely, occurring just before the end of 2018. Cherries are highly sought after by Chinese consumers during Chinese New Year. Furthermore, significant tariffs on fruit and vegetable imports were scheduled to be lifted soon after the discussions thanks to the China Australia Free Trade Agreement.

TIA's commitment to cherry research that will benefit both Tasmanian producers and consumers around the world will continue in years to

come with a wide variety of projects investigating environmentally friendly methods of increasing yields, investigating health benefits of the fruit and much more.

**GLOBAL IMPACT**





# COLLABORATIVE PHD PROGRAM PROGRESSING

**“** *China is very interested in sustainable agriculture and resource use, which is fundamental to TIA’s research, development and teaching.”*

*—TIA Director Holger Meinke*



**TASMANIAN INSTITUTE OF AGRICULTURE**

*TIA is a joint venture between the University of Tasmania & the Tasmanian Government.*

## Research by the Tasmanian Institute of Agriculture (TIA) that helps irrigators save water in the Midlands could soon also improve management of grasslands in Mongolia.

During a trade mission in 2018, TIA continued to progress a sustainable agriculture research partnership with the Chinese Academy of Agricultural Sciences (CAAS).

CAAS is China's leading agricultural research institution, with 10,000 staff in a nation of 300 million farmers.

TIA are negotiating joint research with CAAS under the general themes of soils, water, pollination, horticulture, and food science. The schools are also developing a collaborative PhD program to tackle these research topics.

Just as Tasmanian research could benefit Chinese farmers, barley or pasture species bred by Chinese scientists for their environments may prove invaluable for our farmers in Tasmania.

Prior to the mission to China in 2018, the Australia-China Sustainable Agriculture Partnership held three meetings in Hobart,

involving government, scientists, industry leaders, and visits to local agri-businesses.

With the support of the State and Federal Governments, the partnership has been cultivated over several years by NRM South,

a Tasmanian branch of a national natural resource management network with strong achievements in extension work with local communities.

The ongoing visits – to sign an agreement, hold a forum, advance research proposals and finally to formalise the agreement – indicate that the relationship is valued and deepening.

While CAAS works with agricultural research agencies from more than 35 countries, the Academy appears to attach special importance

to its Tasmanian ties. The CAAS delegations to Tasmania were unprecedented in size and composed of delegates from three departments and seven institutes.

### FAST FACTS



CAAS is China's leading agricultural research institution



TIA has formalised a joint research partnership with CAAS



Four delegations have met to advance the agreement



# A (POTENTIALLY) HUGE NEW MARKET FOR TASMANIAN GROWERS

“Exploring the potential of growing traditional Chinese medicinal plants in Tasmania directly meets our mandate to create public as well as private benefits from our research.”

—TIA Director Holger Meinke



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**If conditions are right, a new research project between TIA, industry partners and Chinese universities could one day provide Tasmanian producers with access to a US \$50 billion market.**

Traditional Chinese medicine (TCM) is one of the world's oldest health systems and its market is set to expand greatly. In 2018 the World Health Organisation recognised the value of TCM by including a chapter on it in its International Statistical Classification of Diseases and Related Health Problems.

Quality and provenance are key attributes desired by the market. Wild resources are depleted and in rapid decline. Herbs are cropped domestically but these are relatively less desirable by the market.

The overarching aim of TIA's TCM project is to understand the aspects of key TCM crops that could, potentially, be grown and processed in Tasmania. Wild Chinese

ginseng, for example, commands premium prices relative to produce grown away from the native habitat. TIA will classify properties

such as form, texture, colour and size of Tasmanian-grown TCM crops to the sensory and chemical aspects of premium quality wild herbs prized by the Chinese market.

There is a growing acceptance by younger TCM consumers for new modes of delivery, such as powders and capsules. Considering the logistical challenges in exporting from Tasmania to market, this could represent an additional market advantage for Tasmanian producers.

This project will sit within the UTAS 'Research Hub for Chinese Medicinal Herbs' and will involve close collaboration with industry partner W&E Health as well as research partners South West University (Chongqing),

Nanjing University of Chinese Medicine and the Chinese National Authority for Traditional Chinese Medicines (Beijing).

## FAST FACTS



Traditional Chinese medicine is a US \$50 billion market



Wild plants are perceived to be better than farm grown



TIA project will analyse benefit of Tasmanian-grown TCM plants

**GLOBAL IMPACT**







**TASMANIAN INSTITUTE OF AGRICULTURE**





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