Australian Government
Australian Research Council

EI 2018 ENGAGEMENT AND IMPACT

Engagement and Impact 2018

University of Tasmania

TAS07 (HLS) - Impact

Overview

Title

(Title of the impact study)

Advancing a Productive, Sustainable and Prosperous Agricultural Environment in Tasmania and Beyond

Unit of Assessment

07 - Agricultural and Veterinary Sciences

Additional FoR codes

(Identify up to two additional two-digit FoRs that relate to the overall content of the impact study.)

05 - Environmental Sciences
06 - Biological Sciences

Socio-Economic Objective (SEO) Codes

(Choose from the list of two-digit SEO codes that are relevant to the impact study.)

82 - Plant Production and Plant Primary Products
83 - Animal Production and Animal Primary Products

Australian and New Zealand Standard Industrial Classification (ANZSIC) Codes

(Choose from the list of two-digit ANZSIC codes that are relevant to the impact study.)

01 - Agriculture

Keywords

(List up to 10 keywords related to the impact described in Part A.)

Dairy

Regional development

Pasture

Wine

Greenhouse gas emissions

Irrigation

Soil management

Sustainability

Cool temperate climate

Sensitivities

Commercially sensitive

No

Culturally sensitive

No

Sensitivities description

(Please describe any sensitivities in relation to the impact study that need to be considered, including any particular instructions for ARC staff or assessors, or for the impact study to be made publicly available after EI 2018.)

Aboriginal and Torres Strait Islander research flag

(Is this impact study associated with Aboriginal and Torres Strait Islander content?
NOTE - institutions may identify impact studies where the impact, associated research and/or approach to impact relates to Aboriginal and Torres Strait Islander peoples, nations, communities, language, place, culture and knowledges and/or is undertaken with Aboriginal and Torres Strait Islander peoples, nations, and/or communities.)

No

Science and Research Priorities

(Does this impact study fall within one or more of the Science and Research Priorities?)

Yes

Science and Research Priority	Practical Research Challenge
Food	Enhanced food production
Soil and water	Minimising damage to, and developing solutions for restoration and remediation of, soil, fresh and potable water, urban catchments and marine systems.
Environmental change	Options for responding and adapting to the impacts of environmental change on biological systems, urban and rural communities and industry.

Impact

Summary of the impact

(Briefly describe the specific impact in simple, clear English. This will enable the general community to understand the impact of the research.)

The Tasmanian Institute of Agriculture (TIA) at the University of Tasmania is a Joint Venture with the Tasmanian Government that undertakes research for impact in agri-food productivity and sustainability that is of global significance.

Across 2011–2016, its research has:
• increased on-farm profitability by improving water use efficiency in irrigated production systems;
• increased pasture production and utilisation contributing to significant increases in dairy production in the state;
• reduced emissions in dairy by developing models to underpin mitigation strategies;
• increased the value of wine yield and quality production by preventing disease; and
• improved the commercial attractiveness of cool climate wines by developing new wine-making techniques.

Beneficiaries

(List up to 10 beneficiaries related to the impact study)

Tasmanian and Australian rural communities

Irrigators

Dairy and wine grape producers in cool climates

Agricultural consultants

Tasmanian Department of Primary Industries, Parks, Water and Environment, and the Tasmanian Department of State Growth

Countries in which the impact occurred

(Search the list of countries and add as many as relate to the location of the impact)

Australia

Details of the impact

(Provide a narrative that clearly outlines the research impact. The narrative should explain the relationship between the associated research and the impact. It should also identify the contribution the research has made beyond academia, including:
- who or what has benefitted from the results of the research (this should identify relevant research end-users, or beneficiaries from industry, the community, government, wider public etc.)
- the nature or type of impact and how the research made a social, economic, cultural, and/or environmental impact
- the extent of the impact (with specific references to appropriate evidence, such as cost-benefit-analysis, quantity of those affected, reported benefits etc.)

- the dates and time period in which the impact occurred.

NOTE - the narrative must describe only impact that has occurred within the reference period, and must not make aspirational claims.)

In 1996 a Joint Venture Agreement between the University of Tasmania and the Tasmanian Government established TIA for research. In 2009, TIA's remit was broadened to include industry development.

TIA's vision is profitable and sustainable agriculture and a healthy bioeconomy for society. Its mission is to advance innovations in agriculture and food through research and education. It is a global and national leader in cool temperate agricultural systems, but its research specifically targets Tasmania's multi-million-dollar agri-food industries and supports the Tasmanian Government's goal of creating a $10-billion-a-year sustainable agricultural sector by 2050.

TIA's research has created an expansive array of methods, technologies, and practitioner guidance that played a significant role in the marked growth in agricultural productivity in Tasmania recorded by the State Government between 2011 and 2016, including dairy, $312 to 386 million; vegetable, $184 to 217 million; and wine, $40 to 96 million.

WATER AND SOIL USE
Water for Profit (June 2015 to 2018) is a $1.5 million collaboration between TIA, the Tasmanian Government, and the Tasmanian Farmers and Graziers Association. Smarter Irrigation for Profit, from the 2015/16 irrigation season, is a $1.5 million Rural Research and Development (R&D) for Profit collaboration with Dairy Australia and the Federal Government. Combined project outcomes ensured sustainable soil management and were applicable to 13 new irrigation schemes.

Measurable changes reported by the end-users were:
• power savings of up to 66%, such as a $20,000-per-year saving for one farm;
• the implementation of variable rate technology in 2015-2016, which led to a reduction in water use of 29–34%;
• average pasture growth rates doubling and on-farm savings of $1,000 per day in purchased feed costs for a herd of 800; and
• optimised fertiliser use research, which involved soil mapping information to save $280,000 in 2011-2012 for 6 farms.

Water for Profit's participatory approach engaged industry and the community and was an innovation success story. It was featured in 'Stakeholder Engagement for Inclusive Water Governance', OECD, 2015. As one grower stated: "Water for Profit is a very valuable program. It provides practical experience – there is a lot to apply back into our business to make it better and more profitable over time." (Mount Ireh Estate, Longford 2016.)

DAIRY
TIA's pasture research is focused on the development and application of grazing management principles with the aspiration of achieving 20 (irrigated) and 12 (rain-fed) tonnes of dry matter per hectare (DM/ha) per year pasture consumption. Subsequent adoption over the past 10 years has shifted the industry average of 8 tonnes DM/ha to 11.0 tonnes DM/ha, and is valued at approximately $70 million per annum, based on an average cost of replacement feed. The application of scientifically designed grazing management principles has resulted in some farms reporting more than 100% increases in pasture production and milking per hectare from 2012-2016.

For example: "This farm used to have 200 hectares, 280 cows, and we used to only ever cut 30 bales of silage off it. Now with 800 cows we're 600 bales off the same dairy block." (Manager, Montana Farm, Tasmania, 2015.)

Through the Sense-T Pasture Productivity project (2014-2015), TIA as lead, in collaboration with the CSIRO, successfully developed cloud-based capability to ingest real-time, in-situ sensor data and regional Australian Bureau of Meteorology climate data and fuse those with a pasture growth model, and a suite of pasture management tools (apps), termed the My Pasture app. The outcome of this research was a capacity to make more risk-informed, on-farm management decisions. The early stage adoption of this tool by the dairy industry in Tasmania increased outputs of all agriculture industries in Tasmania (2014-2015) to the value of $1.38 million, and increased State Gross Product by $0.37 million (Sense-T Stage 2 Pasture Productivity Report; Institute of Project Management 2016).

Interviews with dairy farmers, policy-makers and industry-enabled benchmarking of greenhouse gas emissions (2012-2015) led to the development of models. These are now utilised nationally by the Dairy Farm Monitoring project (through the Department of Environment and Energy web site) to estimate and reduce the emissions of dairy farms (over 300 in 2016).

WINE
Production losses due to grapevine powdery mildew and botrytis diseases (Scholefield and Morison, 2010) are some $128 million per year in Australia. TIA's research between 2004 and 2012 underpinned decision tools for the prediction of disease pressure events. TIA estimates that innovative growers in high-input viticultural regions who are applying the research saved $10 million per year (2012-2016) by reducing disease.

One vineyard manager, after following TIA's practice recommendations, said: "For the first time in 10 years I can't find any powdery mildew. I'm quite excited by all of this. It appears to have worked." (Former Vineyard Manager, Clover Hill, Tasmania 2013.)

As part of a Cool Climate Wine-making research program (2012-2015), TIA developed a revolutionary maceration technology for the extraction of colour from Pinot noir wine grapes. Major benefits, e.g. 55% increase in stable pigments in wines, led to the method being fast-tracked into a 2016 Wine Australia project that involved an evaluation of major wineries across the nation.

This innovative technology is critical for the $5-billion per annum Australian wine sector, as climate change is leading to more compressed harvest windows, which limits processing throughput. In 2016, a leading Italian wine equipment manufacturer, Della Toffola, commercialised TIA's technology and released it in 2017.

Associated research

(Briefly describe the research that led to the impact presented for the UoA. The research must meet the definition of research in Section 1.9 of the EI 2018 Submission Guidelines. The description should include details of:
- what was researched
- when the research occurred
- who conducted the research and what is the association with the institution)

In 2015-2018, two irrigation research projects took place. One, involving Dr James Hills, David McLaren, Mark Freeman, Dr Bill Cotching, and Dr Marcus Hardie, focused on variable rate irrigation in dairy production systems. The other, involving Dr Hardie, Dr Cotching, Sue Hinton, Dr Matthew Harrison, and David Phelan, focused on irrigation decision support, soil management under irrigation and soil mapping for investment decisions.

In 2012-2015, research on 'Whole of Farm System greenhouse gas mitigation' benchmarked current greenhouse gas emissions and assessed the efficacy of strategies for reduced emissions. This work was led by Dr Harrison, Karen Christie, and Dr Richard Rawnsley. In 2014-2015, the same team undertook further research: biophysical simulation models based on field experimentation with radio collars were coupled with real-time data ingestion for water- and nitrogen-use efficiency to build the tool 'Pasture Predictor'.

University researchers, including Dr Kathy Evans, collaborated with the CSIRO from 2012-2015 on the management of wine grape diseases. Their research created a fundamental model for host-pathogen interactions and spatial distribution in the field.

Research on optimising extraction of colour and flavour compounds from the skin of Pinot noir was investigated using novel wine making techniques for maceration. This work was undertaken by Dr Angela Sparrow, Associate Professor Dugald Close and Dr Richard Smart in 2012-2015.

FoR of associated research

(Up to three two-digit FoRs that best describe the associated research)

07 - Agricultural and Veterinary Sciences
05 - Environmental Sciences
06 - Biological Sciences

References (up to 10 references, 350 characters per reference)

(This section should include a list of up to 10 of the most relevant research outputs associated with the impact)

1. Bramley, R.G.V., Evans, K.J., Dunne, K.J. and Gobbett, D.L. (2011). ‘Spatial variation in response to ‘reduced input’ spray programs for powdery mildew and botrytis identified through whole-of-block experimentation’, Australian Journal of Grape and Wine Research, 17, 341-350.

2. Christie, K.M., Gourley, C.J.P., Rawnsley, R.P., Eckard, R.J. and Awty, I.M. (2012). ‘Whole-farm systems analysis of Australian dairy farm greenhouse gas emissions’, Animal Production Science, 52(11), 998-1011.

3. ’Carbon Farming Initiative Dietary Fats Calculator and the Beef Nitrates Feeding Calculator’. Greenhouse in Agriculture, University of Melbourne.

4. ’Dairy, Beef and Sheep Greenhouse Accounting Framework (2012-2013)’. Greenhouse in Agriculture, University of Melbourne.

5. Harrison, M.T., Christie, K.M., Rawnsley, R.P. and Eckard, R.J. (2014). ‘Modelling of pasture management and livestock genotype interventions to improve whole farm productivity and reduce greenhouse gas emissions intensities’. Animal Production Science, 54(12), 2018-2028.

6. Hills, J. (2016, November). ‘Smarter Irrigation for Profit - Increasing farm profit through efficient use of irrigation input to dairy pastures’, Proceedings of the 7th Australasian Dairy Science Symposium, Sydney, Australia.

7. Merry, A.M., Evans, K.J., Corkrey, R. and Wilson, S.J. (2013). ‘Coincidence of maximum severity of powdery mildew on grape leaves and the carbohydrate sink-to-source transition’. Plant Pathology, 62, 842-850.

8. Rawnsley, R. and Henry, D. (2014) ‘Sense-T Pasture Predictor’. Sense-T.

9. Sparrow, A.M., Holt, H.E., Pearson, W., Dambergs, R.G. and Close, D.C. (2016). ‘Accentuated cut edges (ACE): effects of skin fragmentation on the composition and sensory attributes of Pinot noir wines’. American Journal of Enology and Viticulture, 67(2), 169-178.

10. Sparrow, A.M., Dambergs, R.G., Bindon, K.A., Smith, P.A. and Close, D.C. (2015). ‘Interaction of grape skin, seed, and pulp on tannin and anthocyanin extraction in Pinot noir wines’, American Journal of Enology and Viticulture, 66(4), 472-481.

Additional impact indicator information

Additional impact indicator information

(Provide information about any indicators not captured above that are relevant to the impact study, for example return on investment, jobs created, improvements in quality of life years (QALYs). Additional indicators should be quantitative in nature and include:
- name of indicator (100 characters)
- data for indicator (200 characters)
- brief description of indicator and how it is calculated (300 characters).)