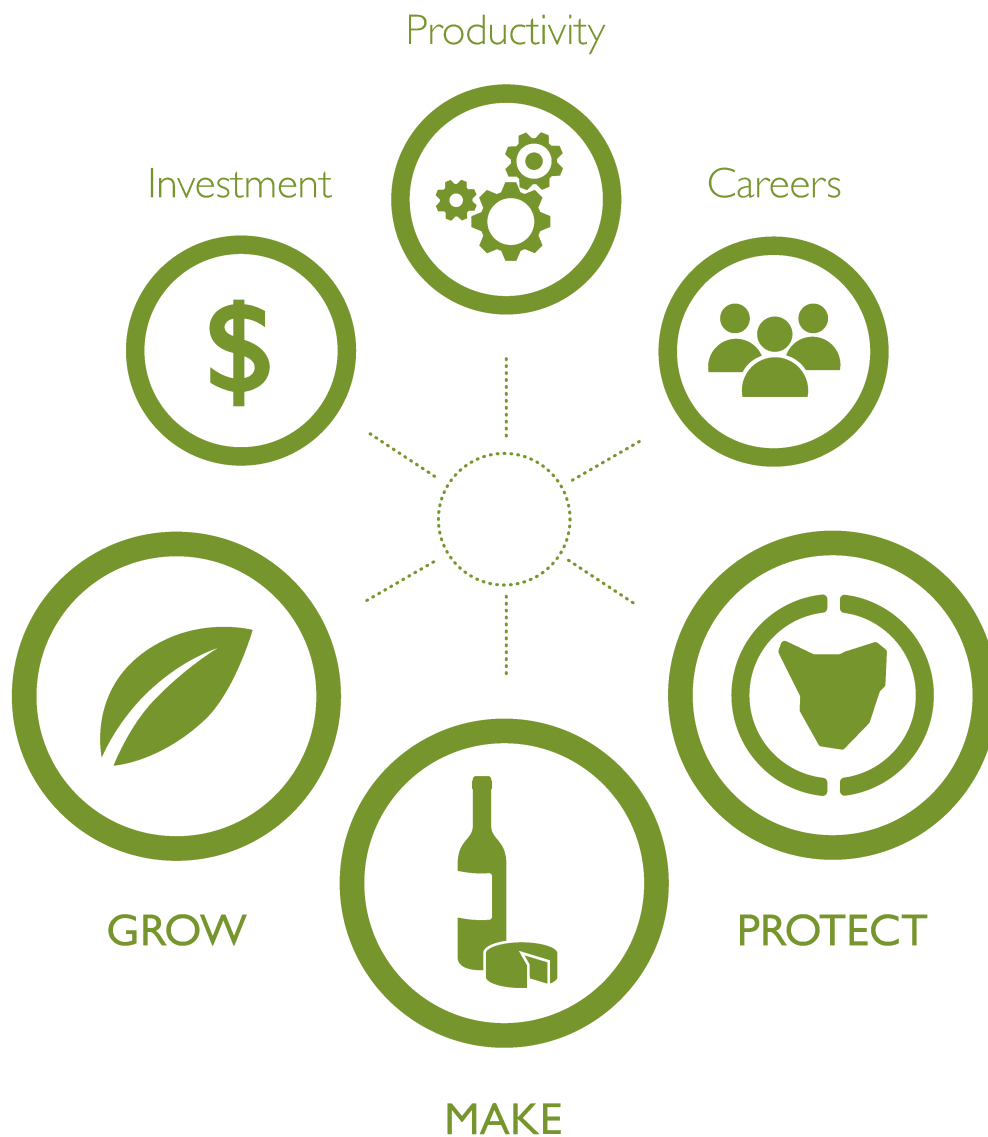


# GROWING TASMANIAN AGRICULTURE

Research, Development and Extension for 2050

*White Paper*



# Growing Tasmanian Agriculture –

## Research, Development and Extension for 2050



### Minister's Foreword

The Tasmanian Government has an ambitious goal to increase the annual value of the agricultural sector to \$10 billion by 2050. To reach \$10 billion, the sector will need to grow at more than double the growth rate experienced over the past 20 years. To ensure that State Government resources are applied to best effect in supporting farmers and the overall Tasmanian agricultural sector to reach its potential, we initiated a review of the investment the Tasmanian Government makes into agricultural research, development and extension (RD&E) and how the services provided meet industry needs.

This White Paper sets out the Government's future direction for agricultural RD&E and is the product of a thorough investigation into our investment. It has involved consultations with a range of Tasmanian agricultural stakeholders and analysis of Tasmania's RD&E system. This White Paper was in part prompted by farmers and agribusinesses themselves who came to Government seeking to actively participate in developing strategies for achieving productivity improvements in agriculture to attain our shared growth targets. I acknowledge their very constructive involvement and input.

Stakeholder feedback is clear: Tasmania has a sound framework for RD&E led by a world class Tasmanian Institute of Agriculture (TIA) and there is considerable support for making it better through being even more responsive to industry needs, contemporary challenges and potential private sector partners.

The Government aims to ensure that our investment in RD&E is supporting Tasmanian farmers and processors to improve their productivity, making their businesses sustainable for the longer term. It is about ensuring that the investment in RD&E is targeted to get the right outcomes for Tasmania and that the governance arrangements for RD&E funded by Tasmanian taxpayers are best practice.

The primary principle for State Government investment in RD&E is that it should directly lead to productivity improvements for Tasmanian farmers and agri-businesses. The aim is sustainable growth supporting better returns at the farm gate and a competitive Tasmanian agricultural sector into the future.

TIA is unique within Australia and is the envy of many other jurisdictions. With its Statewide focus and connectivity with the broader University of Tasmania (UTAS) community, TIA offers our agricultural sector unparalleled opportunities for meaningful engagement with the RD&E system, to support adoption of the best available technologies and practices on-farm.

The Government will now work with farmers, agribusinesses, TIA and the private sector to implement the directions set in this White Paper.

Jeremy Rockliff

Deputy Premier

Minister for Primary Industries and Water

## **FUTURE DIRECTIONS:**

### **RD&E focused on increasing the sustainable growth and productivity of Tasmanian agriculture and food sectors**

TIA remains the Government's preferred supplier of publicly-funded agricultural RD&E services. The actions identified in this White Paper will be achieved by the State Government and TIA working in partnership with private and non-government organisations.

#### **Supporting actions:**

1. Principles will be developed to prioritise and allocate the Tasmanian Government's investment in RD&E activities to ensure they lead to sustainable productivity improvements and sustainable growth for Tasmanian farmers and agribusinesses. The principles will be reviewed every five years.
2. A five-year RD&E Investment Strategy will be developed by December 2018 to determine the proportion of State Government investment across the four recognised areas of RD&E being: industry development and sustainable production; capacity building; innovation; and international linkages. Thereafter new investment strategies will be developed every five years.
3. Research project proposals and assessments will explicitly focus on the expected farm-level impacts of a proposed RD&E project and include extension and outreach activities.
4. A range of standard performance and impact metrics on the effectiveness of RD&E activities in supporting Tasmanian agriculture and food producers will be developed and subsequently reported on an annual basis. Specific metrics will be developed by June 2018 to guide and assess extension efforts.
5. An Agricultural Innovation Fund will be established to address emerging opportunities and issues, which will directly impact Tasmanian agriculture.
6. The State Government will work with TIA to increase the State's RD&E capacity in biosecurity risk mitigation, across all relevant sectors of Tasmanian agriculture to maintain and build our comparative advantage in relative pest and disease freedom and support the Tasmanian Brand.
7. An Extension Outreach Program will be developed in partnership with key stakeholders to support the on farm adoption of R&D by farmers.
8. A new pilot Agricultural Graduate (or Internship) Partnership Program will be established operating within the Agricultural Systems Centre in TIA and with a specific focus on extension. This Program will provide Agricultural and Agricultural Science Graduates with practical experience through placements within TIA and the commercial agriculture sector.

#### **Connecting industry and TIA**

9. New 'Industry Advisory Groups' will be formalised for Centres within TIA connected to the overarching Advisory Board to provide consistent and transparent pathways for industry input.
10. TIA will consider how to better engage with Tasmanian farmers, food and fibre producers and introduce new performance targets by December 2018 to further build engagement and partnerships with the private sector across its RD&E agenda.

## Investment in Crown and TIA farm assets

11. The Government will continue to seek both public and private partnerships to maximise the use of our research farm capacity, including providing access to land and associated infrastructure.
12. The Government and TIA will jointly commission a Research Farm Portfolio Plan to determine how to most strategically utilise research farm assets to support RD&E including the potential to establish “Centres of Excellence”. The Plan is to be finalised by March 2019.
13. The Government will also work through TasTAFE to further develop the role of Freer Farm in delivering agricultural education, skills and training.
14. The Government with TIA will consider any industry led proposals received for establishing commercially-focused demonstration farms on Crown assets.

## Improved evaluation of impact and performance

15. A review of the effectiveness of TIA RD&E in supporting productivity improvements for Tasmanian farmers and agribusinesses will be undertaken in three years (by December 2020), and every five years thereafter.

## THE PROCESS

The *Growing Tasmanian Agriculture – Research, Development and Extension for 2050 Green Paper* was released in May 2017.

Development of the Green Paper involved consultations with a range of Tasmanian agricultural stakeholders, and two leading agricultural economists consulting with industry to scope and analyse Tasmania’s current RD&E system.

While the Green Paper posed a series of questions, the two key issues being explored were:

1. How RD&E programs and projects funded by the taxpayer are chosen; and
2. How physical assets ultimately owned by the taxpayer, such as research farms, are best utilised as part of the delivery of agricultural RD&E.

*This review related only to RD&E pertaining to land-based agriculture. Aquaculture, fisheries and forestry RD&E matters were out of scope. The tertiary educational services of UTAS/TIA in agriculture were also identified as out of scope.*

Twenty-one submissions from a range of stakeholders were received in response to the Green Paper. This included peak industry bodies, major processors, Natural Resource Management organisations and some of Tasmania’s leading farmers.

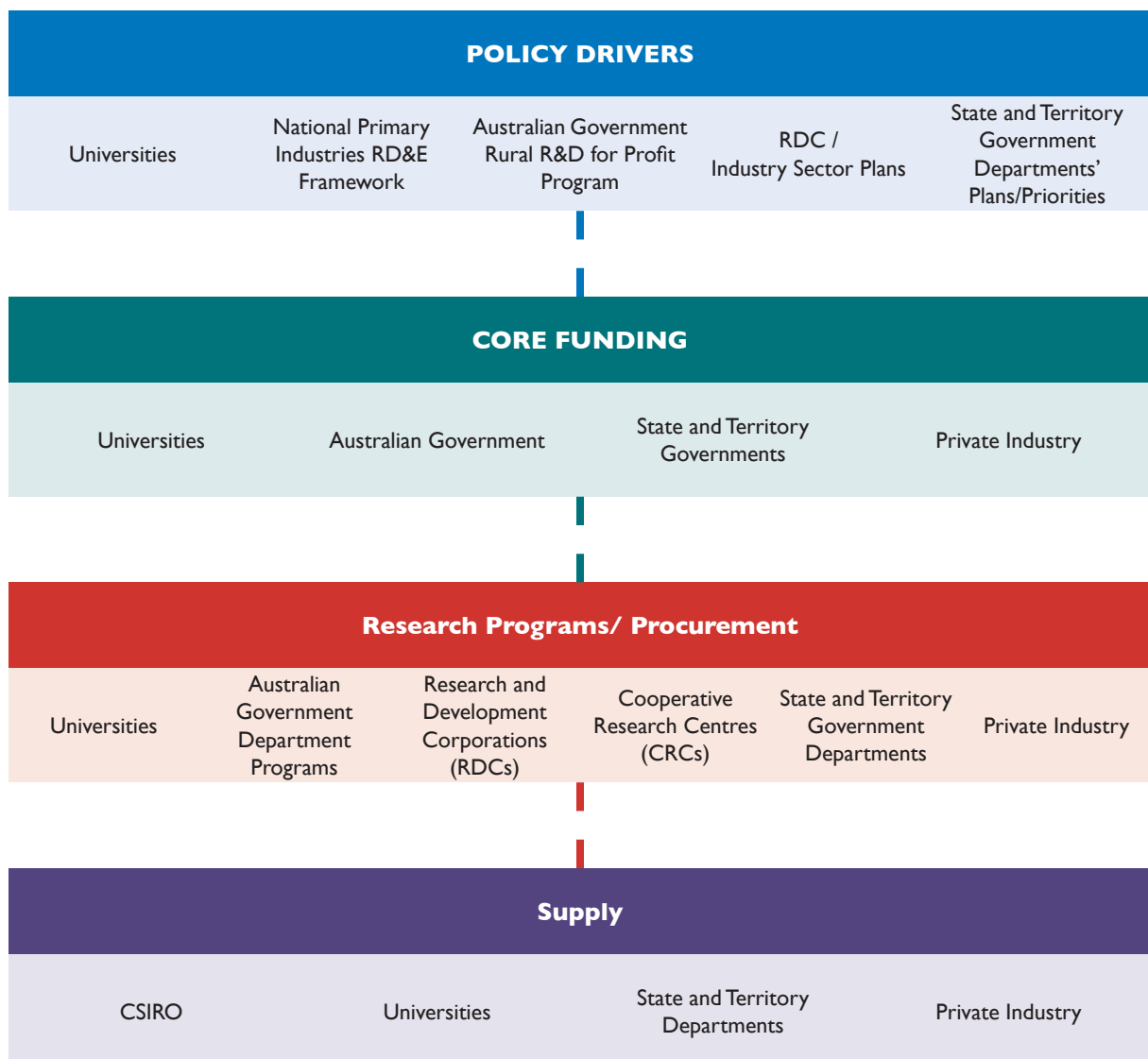
## BACKGROUND

### THE RESEARCH, DEVELOPMENT AND EXTENSION SYSTEM

Development of Australian agriculture and its ability to remain world competitive is largely due to investment in RD&E, which has delivered technological advances, and their adoption on-farm by Australia’s agricultural producers.

Historically, RD&E support to agriculture was managed on an individual State basis through appropriation of significant public funds to Government Departments, complemented by industry and Commonwealth Government investment through the Research and Development Corporation system.

In recent times, the need to direct public funds towards RD&E of best impact saw the development of the National RD&E Framework to catalyse greater cooperation between States and investors in providing RD&E support, thereby avoiding duplication and encouraging the creation of national centres of excellence with appropriate critical mass. The following diagram illustrates how the national RD&E framework operates.



Tasmania is unique in that it has one University, which together with the State Government funds TIA as the public provider of RD&E, and a number of private sector RD&E providers. The latter are commercially competitive, with some industries (such as dairy) being more intensively serviced than others, such as red meat production.

The real opportunity lies in taking a whole of Tasmanian agriculture approach to providing RD&E in a way that is timely, responsive, avoids duplication, and most importantly, provides clear benefits to Tasmanian farmers and agribusinesses.

## **STATE GOVERNMENT: AGRIFOOD PLAN**

*Tasmania's Sustainable Agri-Food Plan 2016-2018* is the Government's system for sustainably growing the agriculture and food sectors in Tasmania, including seafood. It recognises that we can impact Tasmania's capacity to grow, make and protect through focusing on investment, productivity and careers.

This impact cannot be delivered by Government acting alone, so the central strategy of the Agri-Food Plan is developing and sustaining partnerships between Government and a diverse mix of private sector stakeholders to achieve outcomes which support growth in Tasmanian agriculture and the whole economy.

The Tasmanian Government is investing with the Australian Government and private businesses to deliver community scale irrigation infrastructure, which will provide long-term enduring benefits. Similarly, such partnerships support State investment in biosecurity, management of the natural resources that underpin agriculture, and the marketing of our produce to the world.

Delivery of RD&E at the local level also requires a partnership approach, and this has been established through the State Government partnering with UTAS to form TIA. The State Government also encourages delivery of RD&E through partnerships between TIA and peak groups and / or private sector consultants.

The Agri-Food Plan provides a framework for how Government supports the sustainable growth of the agricultural and food sectors. It identifies Government investment into RD&E as a key component of productivity and growth through the total investment made into TIA and also specific initiatives.

## Tasmanian Agri-Food Plan 2016-2018 – Some current RD&E Activities

\$20M into the TIA Joint Venture Agreement over four years. This investment is leveraged to attract additional funding. In 2015 TIA attracted a further \$8.1 million in competitive industry and research funds.

Additional projects include:

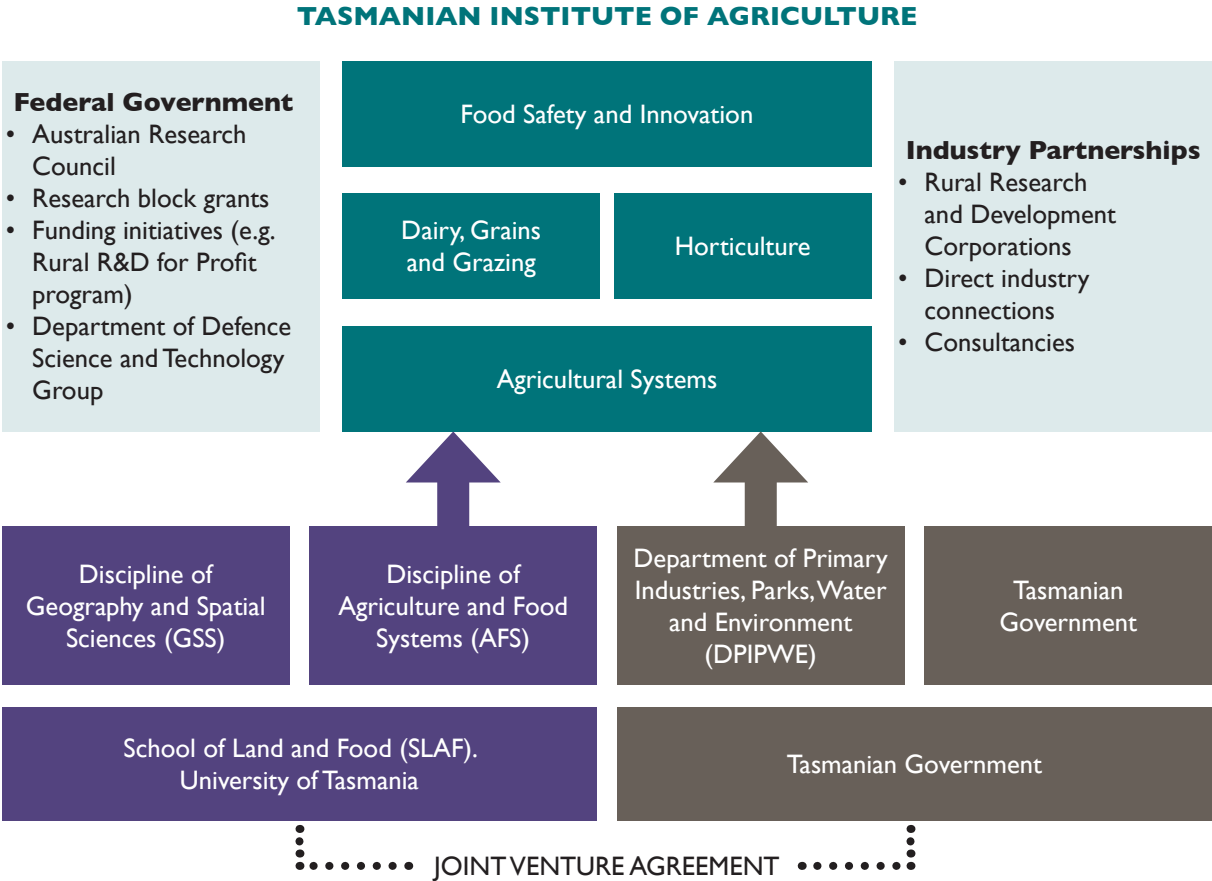
- Research and development collaboration – Poppy Downy Mildew Projects - \$360 000 was secured from the Australian Government's Australian Research Council (ARC) Linkage Projects Scheme to implement a follow-on project investigating the epidemiology of poppy downy mildew. This project is a collaboration between TIA, Poppy Growers Tasmania, poppy processors and DPIPW. E.
- Research and development collaboration – Improving the Productivity of Tasmanian Vineyards Project - a \$570 000 collaborative project between Wine Tasmania and TIA (including \$381 000 from the State Government) is delivering a three-year project aimed at boosting productivity through reducing grape yield variability whilst improving wine quality.
- On-farm productivity - Biofumigation and Vegetable Productivity Project - With \$150 000 in State funding this collaborative project with the vegetable industry and TIA is investigating the benefits of using brassica crops to manage disease, pests and weeds to boost productivity in annual vegetable crops including potatoes.
- On-farm productivity - Precision Agriculture Project - Launched in 2015, State funding of \$370 000 to this \$530 000 collaborative project undertaken by the Tasmanian Agricultural Productivity Group (TAPG), TIA and a range of other stakeholders is demonstrating the benefits of adopting precision agriculture technologies to improve farming practices and performance.
- Improving processing vegetable yields through improved production practices - A \$235,000 TIA project aims to ensure the future viability of Tasmania's vegetable processing industry by increasing yields of key crops and decreasing input costs.
- In addition, the Government has identified two priority areas for RD&E in the 2017-18 Budget to which TIA will contribute:
  - Pastures and Livestock Productivity - Working with farmers on practical strategies to improve pasture and livestock productivity to underpin grazing and meat processing sectors; and
  - Crop and Pasture Seed Industry Plan - A Plan to be developed in consultation with farmers and agribusiness to grow Tasmania's place in this potentially high value market.

For further information see: <http://dpiwwe.tas.gov.au/agriculture/tasmanias-agri-food-plan-2016-2018>

# THE TASMANIAN INSTITUTE OF AGRICULTURE (TIA)

TIA was established in 1996 as a joint venture between the Tasmanian Government and UTAS. Since 2009, agricultural RD&E funded by the Tasmanian Government has been delivered primarily by TIA.

Since the release of the Green Paper, TIA has re-structured into four centres: Food Safety and Innovation; Dairy, Grains and Grazing; Horticulture; and Agricultural Systems.



The TIA Food Safety and Innovation Centre (FSIC) is recognised as an important contributor to whole value chain RD&E however, in the context of RD&E within this review and White Paper, the key focus areas are the Dairy, Grains and Grazing, Horticulture and Agricultural Systems Centres. The FSIC activities support improved production and management practices, improving post-harvest handling techniques and enhancing product shelf-life innovations.

TIA is a successful research and academic institution focused on delivering excellence in Tasmanian agricultural RD&E and tertiary education. As the Green Paper noted, the 2015 Excellence in Research for Australia (ERA) Report awarded TIA its highest possible rankings in two areas: Horticultural Production, and Agriculture, Land and Farm Management. The 2016 QS World University Ranking by Subject also ranks UTAS in the top 100 universities in the world for agriculture. More recently UTAS, through its agriculture research institute TIA, has been acknowledged as the 44th best university in the world and 4th in Australia for agricultural science (2017 Shanghai Global Ranking of Academic Subjects).



The key measure set by the Government for TIA has been leveraging off State Government funds, i.e. how much TIA can attract in external funds. On this measure, TIA has been extremely successful. In 2015, TIA attracted a further \$8.1 million in competitive industry and research grants. TIA competes strongly on the national stage for Australian Government and RDC funds to invest in agricultural research in Tasmania. It leverages a \$5 million per annum investment from the State Government to attract additional funding and has a research portfolio valued at approximately \$72 million.

## FEEDBACK ON THE GREEN PAPER

As noted, 21 submissions from a range of stakeholders were received in response to the Green Paper.

Submissions were received from peak industry bodies, major processors, NRM organisations, and some of Tasmania's leading farmers.

All submissions are published on the DPIPWE website at: [www.dpipwe.tas.gov.au](http://www.dpipwe.tas.gov.au)

### Summary of the feedback

All submissions were either explicitly or implicitly supportive of the investment by the State Government in RD&E that supports productivity improvements for primary producers and the food sector. Comments included: "this focus on RD&E is not only appropriate but essential if the growth targets encapsulated in the [2050] Vision are to be realised." Further that "public investment in RD&E enables important work to be undertaken where it would not be rational for the private sector to undertake. These investments provide significant benefits for the business and the community..."

There was broad support for the current RD&E approach in Tasmania. The partnership approach between the State Government and UTAS, which sees delivery of RD&E primarily through TIA, was held up by many submitters as a model for emulation.

The peak body representing the professions of agricultural science and natural resource management, stated that "Tasmania's current model can and is working and shouldn't be replaced." Further that "the RD&E model in Tasmania for which TIA is the lead is appreciated ... and has been considered in its policy development as a model approach for other States and Territories with some improvements ..."

The unique nature of the TIA model was identified as a particular strength. "The TIA model is seen as an effective model by many interstate and national contemporaries. The fact that there is only one university in Tasmania and the size of the State assists with streamlining the arrangements between the Government and the university. This investment is extremely well leveraged ..."

Some processors identified that they engage with TIA as did some farmer contributors. One processor noted that it "broadly agrees that the structure of TIA meets the needs of the Tasmanian agricultural community by providing an "interface between the university research, other sources of knowledge and those who can benefit from the research""

The majority of submissions, however, identified areas for reform in how the Tasmanian RD&E model is implemented so that it better supports agricultural producers and the food sectors. Proposals for improvements have been grouped for the purposes of this Paper as follows:

- The need for clear principles for RD&E investment;
- Extension;

- Engagement by TIA with other service providers, including NRM groups;
- Private forestry; and
- Research farms.

## Principles for RD&E

While the RD&E model in Tasmania is seen as appropriate, many of the submissions identified that the “outcomes from the RD&E spend need to be clearly defined, be presented to producers in a relevant package and the results measured with practice change the ultimate goal. TIA has a role as an integral part of the University of Tasmania, including conducting ‘blue sky’ research and enhancing the exposure students have to industry and understanding of specific challenges and opportunities.”

One peak body identified that “the research direction of TIA requires more direct engagement from, and accountability to, industry, in all phases of formation, monitoring, and project completion.”

It was observed that “the industry/RD&E connect is vital and needs to be more clearly demonstrated and strengthened into the future.” Further the productivity directions need to be determined according to sectors and across individual industries and then compared. One submitter noted that a clear forward-looking operational plan to deliver on activities was lacking.

Another submission advocates the development of a strategic plan by the Tasmanian Government for accelerated agricultural growth focused on what success looks like and the goals to achieve the plan, with a strategy for how the plan will be achieved. At the same time, the submission notes that “To date, monitoring and evaluating impact of agricultural RD&E in Tasmania [has been] minimal.”

Feedback did note, however, the difficulties in linking specific benefits with specific RD&E investments, given that the growth in output of particular farming businesses is the result of many factors. It was suggested that the “impact of RD&E can be increased by focusing on the industries in the state where there is greatest potential for growth.”

In summary, submissions supported that the key focus on direct outcomes for the benefits for the local sector needs to be maintained and/or be made transparent.

## Extension

Many submissions focused on the need for improved extension. A peak body proposed that “new skills need to be developed in the field of Extension. There is a need to integrate new Extension techniques that adopt elements of current and emerging technologies in order to connect with the younger, innovative and progressive farmer cohort.”

Another noted that, “to execute to our potential, it is imperative that productivity gains through our RD&E sector are supported by a strong extension model. Adoption of new technology and techniques needs validation in commercial terms and at a relevant scale. Quality RD&E needs to be taken to the farming community in consumable and relevant terms to ensure the maximum adoption.”

Submitters also noted that a vast body of existing relevant agricultural research knowledge has not yet been adopted by the majority of farmers, making the provision of extension support a key requirement in helping Tasmanian agriculture reach the 2050 target.

A key private sector firm observed that “at a time when funding, resources and producer time are limited, there needs to be a significant improvement in the strategic nature of extension in Tasmania.” The role of the private sector as it increases its capability is also increasing in delivery of extension, as the private sector can have a “closer interface

with industry and understanding of industry needs, as well as the understanding and experience of commercial drivers.”

Of the submissions, it is notable that two peak groups commented that the RD&E model applied in their sectors (dairy and wine) has proven particularly effective. One notes that “the Tasmanian wine sector’s RD&E model has proven to be very effective. The sector drives and leads priorities and each project incorporates extension activities as part of, and at the commencement of, the research. It also directly engages growers in the research, through trial sites, activities and demonstrations on their individual vineyards.” Another indicates that it works closely with TIA to coordinate delivery of extension programs to farmers. This presents an opportunity to consider whether the dairy and wine industries extension models, in full or in part, may be translated successfully to other sectors.

## Engagement by TIA with other service providers

The peak professional body and two submissions from private sector service providers noted that the Agri-Food Collaboration between TIA and the four major service providers has not been active. Fostering a culture of collaboration between TIA staff and private consultants was identified as important, not least to ensure TIA specialists do not become “silo bound.”

The Green Paper did not reference NRM organisations which undertake potentially relevant extension, and how those bodies fit strategically within the delivery of RD&E in Tasmania. This was identified as an issue requiring consideration.

Alliances and partnerships were identified as critically important to increase agricultural productivity. It was noted that “an opportunity exists for TIA to form relationships with partners that can help translate their research into commercial value for the producer.”

## Private forestry

While the Green Paper focused on RD&E pertaining to land-based agriculture, one peak body notes that “Food Production and Fibre Production are often used side by side in contemporary agricultural policy settings. Plantation Forestry should be included within the scope of the 2050 Vision as an agribusiness involved in Fibre Production on >300,000 ha of Tasmania’s productive land. This position reflects the view that Plantation Forestry is simply another integral industry to optimising Tasmania’s productivity capacity.”

While forestry (largely in terms of forestry on public land or industrial-scale private forestry) was outside of the scope of this review, it is also the case that farm forestry is an enterprise which is integrated on many farms in Tasmania. When considering agricultural systems and improving agricultural productivity, farm forestry can form an important component of the enterprise mix on-farm, and can have both economic and environmental benefits. The future directions outlined for RD&E accordingly do accommodate the potential for farm forestry to play an increasing role in Tasmania’s agricultural RD&E system, along with other traditional or emerging agricultural sectors.

## Research farms

Submissions canvassed the value of the research farms. One noted the importance of both research and demonstration farms to assist in on-farm RD&E activities, and suggests that a more cohesive approach to RD&E with direct linkage and profiling of research station facilities is required. Another noted that “all levels of the agricultural supply chain need to be improved, analysed and fully developed, this includes State owned farming assets...” Varied views were expressed on the value of establishment of a demonstration farm in Tasmania.

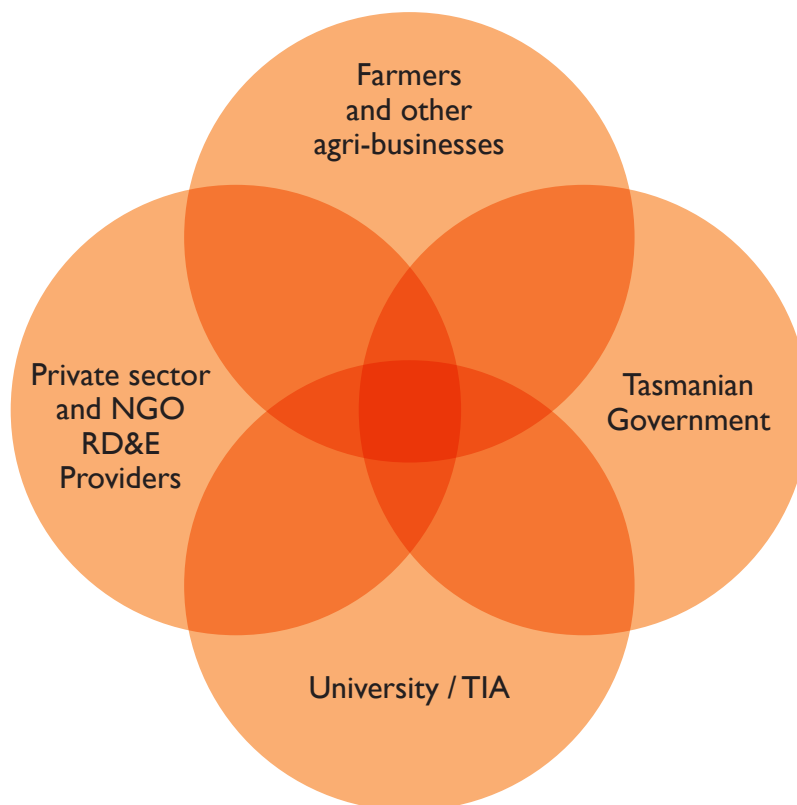
## DEVELOPING AN RD&E SYSTEM IN TASMANIA FOR 2050

Given the success of TIA over an extended period and stakeholder feedback, the State Government supports the continuation of the TIA model with a process of continuous improvement to respond to new challenges and opportunities.

TIA will continue to be the Government's preferred supplier of publicly-funded agricultural RD&E services with opportunities established for working in partnership with the private and non-government organisation (NGO) sectors.

The future directions for RD&E are identified under four broad areas:

- Measures to increase the sustainable growth and productivity of Tasmanian agriculture and food sectors;
- Connecting industry and TIA;
- Maximising the use of our research farm capacity; and
- Improved evaluation of impact and performance.



## SECTION I: INCREASING THE SUSTAINABLE GROWTH AND PRODUCTIVITY OF TASMANIAN AGRICULTURE AND FOOD SECTORS

The agricultural sector is a key pillar of Tasmania's economy, contributing 5.6% of Gross State Product and sustaining jobs and economic activity in our rural and regional areas.

The outlook for both the Tasmanian and Australian primary industries sectors is strong, with the world's demand for food rising, driven by population growth and calls for higher quality and greater variety of food. However, there is strong competition from other producing regions for those markets, and our agricultural sector will have to continue to improve its productivity performance to compete.

At a national level, RD&E has been central to the competitiveness of Australia's agriculture industries. In Australia, slower agricultural R&D investment growth during the 1980s has been linked to a slowdown in agricultural productivity growth during the 2000s.

The story is different in Tasmania. Investment in TIA increased by \$2.9 million since 2014 on top of the core grant. In the 2017-18 budget, \$20 million over four years is allocated to support agricultural RD&E.

TIA operates within a national system, and is responsive to national plans, such as the National Strategy for Dairy RD&E or similar strategies for other sectors. TIA is able to leverage funds from Australian Government funding agencies that bring significant benefit to Tasmanian agriculture.

Based on industry feedback, the key issue is ensuring that State Government funding and projects selected for submission for national funding best support Tasmanian producers to improve their productivity.

### Setting priorities and resource allocation

Achieving the ambitious goal to increase the annual value of the agricultural sector to \$10 billion by 2050 requires a strategic approach. An approach that builds on the partnership between the State Government, TIA and the private sector is required.

Some of the input provided to this review recommended that the Government take a more prescriptive approach to where Government funds are invested, in terms of what specific RD&E should be undertaken. This included suggestions that RD&E efforts should be directed towards sectors that contribute most to the State's agricultural output. Other submissions argued that the Government should further specify how best to undertake RD&E activity, for example by earmarking a fixed percentage of a project budget for landholder extension.

*"The primary principle for State Government investment in RD&E is that it should directly lead to productivity improvements and sustainable growth for Tasmanian farmers and agribusinesses. The aim is sustainable growth supporting better returns at the farm gate and a competitive Tasmanian agricultural sector into the future." Minister Rockliff*

Rather than adopting a prescriptive approach, the State Government will work with TIA, and in consultation with industry sectors, to develop an agreed set of principles to ensure RD&E strategies and activities focus on delivering maximum benefit to Tasmanian primary industries in a way that supports sustainable growth into the future. The principles will be reviewed periodically.

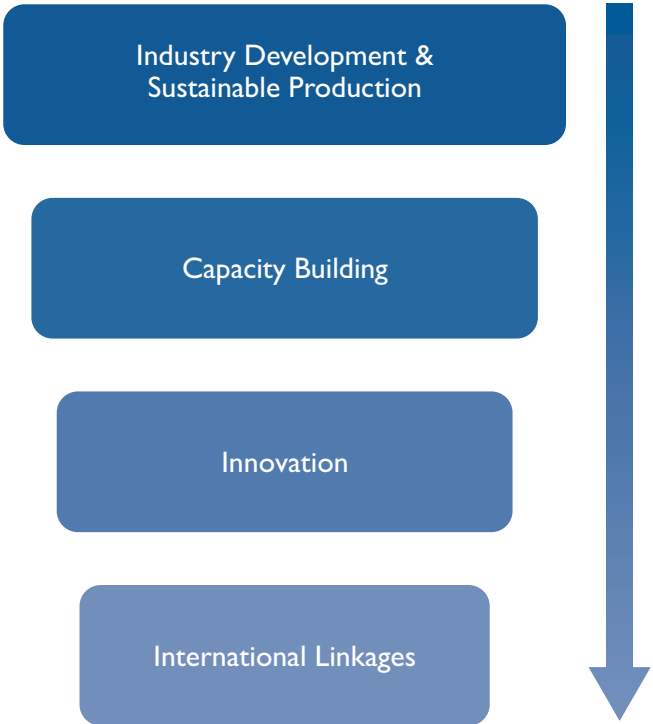
A key principle that will underpin the resource allocation and project prioritisation process is that public investment in RD&E should directly and demonstrably lead to productivity improvements and sustainable growth for Tasmanian farmers and agribusinesses. Other principles adopted may, for example, be in the area of public benefit, consistency with Government policies, and consultation with the private sector at key points during project design, delivery and evaluation.

**ACTION:**

- I. Principles will be developed to prioritise and allocate the Tasmanian Government’s investment in RD&E activities to ensure they lead to productivity improvements and sustainable growth for Tasmanian farmers and agribusinesses. The principles will be reviewed every five years.

To ensure that the RD&E strategies deliver on the 2050 target, in addition to the establishment of principles to guide priorities and resource allocation, a five-year RD&E Investment Strategy will be developed.

The Investment Strategy will target a funding and expenditure profile to cover the four key areas as outlined in the *National Strategic Rural Research and Development Investment Plan*: industry development and sustainable production; capacity building (initiatives to increase the rural sector’s utilisation of technical knowledge, better equipping it for global competitiveness, productivity, adaptability and sustainable development); innovative RD&E (research driven by ideas that stand a reasonable chance of radically changing the understanding of an important existing scientific concept or leading to the creation of a new paradigm or field of science and technology (sometimes identified as blue sky)); and international linkages.



The RD&E Investment Strategy will determine the alignment of expenditure across all four areas, however it is likely in order of priority, and reflecting the focus on productivity improvements, that the greater share of Tasmanian Government expenditure would be targeted to industry development and sustainable production, and capacity building, tapering through to transformational blue sky research and international expenditure receiving less direct investment. The UTAS contribution to the RD&E portfolio will likely have a different investment focus. The totality of the investment spread is one of the strengths of the partnership approach between the State Government and UTAS.

Implementation of a new RD&E Investment Strategy may involve some re-focusing away from existing RD&E investments supported by State Government funding, to concentrate on areas of contemporary relevance and improved value for money to Tasmania.

The process of principles, investment strategy and impact analysis will ensure that there is the opportunity for our RD&E investment to be targeted to maximum effect to address the productivity challenges across a range of traditional broadacre, cropping, grazing, irrigated and intensive agriculture, horticulture, viticulture, emerging industries and also farm forestry enterprises as well as various production systems. The Strategy will include specific guidance on what areas will (or will not) be funded, without being project prescriptive or constraining innovation.

Consultation will occur in development of the RD&E Investment Strategy. Thereafter new Investment Strategies will be developed every five years. The Strategy will be monitored annually by the State Government and UTAS to ensure that it is meeting the agreed goals.

## **ACTION:**

2. **A five-year RD&E Investment Strategy will be developed by December 2018 to determine the proportion of State Government investment across the four recognised areas of RD&E being: industry development and sustainable production, capacity building, innovation and international linkages. Thereafter new investment strategies will be developed every five years.**

## **Ensuring projects deliver for Tasmanian farmers and agribusinesses**

To deliver on the principle that RD&E should directly lead to productivity improvements for Tasmanian farmers and agribusinesses project design and selection will be critical.

As such, an 'impact pathway approach' will be adopted. Project proponents must explicitly focus on the expected farm-level impacts of a project, in addition to the academic outcomes (such as publications) that are likely to result from their work. This will require researchers to describe **plausible** links between the resources used in RD&E activities, and assumptions they make about the economic, environmental and social outcomes of that work for Tasmanian farmers and agribusinesses both now and in the future.

Impact pathways require the development of a clear narrative about the target population for the technology, the rate and extent of adoption, and the resources that will be needed to achieve that adoption. By requiring researchers to identify how research outcomes will be delivered to farmers, extension and other outreach activities must be chosen purposefully during the planning stages. This can later provide evidence at reporting and assessment stages that scarce research funds have been used to best effect.

This approach has already been adopted by a number of leading RD&E organisations across Australia. The Australian Centre for International Agricultural Research (Australian Government) applies an Impact Pathway framework to assessing and evaluating the projects it funds, as do some of the Rural Research and Development Corporations such as the Grains Research and Development Corporation and the Australian Wine Institute. Variations of the framework have also been used by various State Government Departments, with Victoria and New South Wales currently using an Impact Pathway framework to evaluate their RD&E investment.

## **ACTION:**

3. Research project development proposals and assessments will explicitly focus on the expected farm-level impacts of a proposed RD&E project and include extension and outreach activities.

## **Improved reporting – ensure RD&E supports Tasmanian agricultural productivity**

TIA is unquestionably a successful academic and research institution. It is well-ranked internationally and attracts a significant amount of competitive grant funding. TIA's academic achievements are also prominently highlighted to the stakeholder community. TIA's academic performance and reputation is strongly attributed to collaboration with industry.

TIA's reputation helps to open doors into important relationships with global universities such as Netherlands Wageningen University (the top agriculture university in the world) and UC Davis College of Agricultural and Environmental Sciences in California. Translating the benefit of this reputation to the Tasmanian agricultural sector can be difficult to measure, however it adds significant value.

The feedback on the Green Paper identified that TIA is well able to demonstrate success as an academic institution but is less able to articulate how its research portfolio explicitly aligns with Tasmania's priorities.

DPIPWE and UTAS, in consultation with the TIA Advisory Board, will thus develop a range of standard performance and impact metrics. Once agreed these will be embedded in the Joint Venture Agreement that governs TIA, with reporting in future Annual Reports of TIA and/or DPIPWE.

DPIPWE will work closely with TIA to develop the performance and impact metrics, as well to assist with the implementation of the new project selection processes.

## **ACTION:**

4. A range of standard performance and impact metrics on the effectiveness of RD&E activities in supporting Tasmanian agriculture and food producers will be developed and subsequently reported on an annual basis. Specific metrics will be developed by June 2018 to guide and assess extension efforts.

## **Increasing our capacity to be responsive to industry needs**

The significant funding that the Tasmanian Government and UTAS each commit annually to TIA (as an ongoing joint venture) has allowed TIA to grow and develop with certainty, and to invest in its people and assets for the long-term. However, the funding model does hamper the ability to be agile and react quickly to meet emergent industry needs.

Government needs a capacity to procure RD&E services when an opportunity emerges to enter a strategic partnership in an area of importance to Tasmanian agribusiness or to respond to take advantage of a unique opportunity. Equally, when confronted with a situation that could materially impact one or more of our agricultural



sectors, such as in the case of a new agronomic disease such as occurred with poppy downy mildew, the capacity to respond quickly is critical, especially when management of the situation requires RD&E expertise that TIA does not have in-house.

## Poppy Downy Mildew

In March 2014, a \$320,000 industry-wide research initiative was announced involving the State Government, Poppy Growers Tasmania, the Tasmanian Institute of Agriculture (TIA) and the three poppy processing companies: Tasmanian Alkaloids, GlaxoSmithKline and TPI Enterprises in response to a downy mildew disease outbreak that threatened industry productivity.

One of the first initiatives was to bring Dr Hermann Voglmayr from the University of Vienna, one of the world's foremost researchers into downy mildew, to Tasmania.

The collaborative research aimed to provide vitally important biological insights to be shared between project partners for the benefit of the industry as a whole.

To help overcome this issue, an Agricultural Innovation Fund will be reserved and held by TIA in a separate account to enable timely and targeted RD&E responses to emerging and emergency issues confronting Tasmanian agriculture. As a guide, the fund could be equivalent to 5-10% of the State Government's core funding in TIA, to be determined through the five-year *RD&E Investment Strategy* and if the Fund is not fully expended in any one financial year, it will roll-over to the following year.

Use of this Fund would be determined by the Minister of the day taking advice of DPIPWE, the TIA Advisory Board and/or industry representatives as appropriate.

The Fund will be appropriated taking into account matters such as: the strategic opportunity; industry co-funding or in-kind contributions; sector or business cluster level impacts or benefits; and how the activity would complement existing programs or projects. The Fund would also be available to respond to a significant current or future threat.

Delivery would be by the most appropriate organisation or partnership to deliver the RD&E. For example TIA, TIA in partnership with the private sector or NGO, or an alternate provider.

In addition there is one compelling area of need within Tasmanian agriculture where an increased focus and research capacity is required in our State: biosecurity risk mitigation. Tasmania's island status and high biosecurity standards provides Tasmanian agriculture a significant comparative advantage, in terms of relative pest and disease freedom. DPIPWE will accordingly work in partnership with TIA to increase its capacity in biosecurity risk mitigation, across all relevant sectors of Tasmanian agriculture.

This aligns with the national *Intergovernmental Agreement on Biosecurity Review Final Report* (July 2017) which found that:

- Research and innovation (R&I) underpin Australia's science-based approach to biosecurity;
- The current mix of national biosecurity RD&E strategies do not reflect the priority needs of the national biosecurity system;
- Cross-sectoral and system-level R&I are significant research gaps; and
- New national biosecurity R&I priorities and new cross-sectoral biosecurity R&I mechanisms are needed to better target investment and enhance national research efforts.

## ACTIONS:

5. An Agricultural Innovation Fund will be established to address emerging opportunities and issues, which will directly impact Tasmanian agriculture.
6. The State Government will work with TIA to increase the State's RD&E capacity in biosecurity risk mitigation, across all relevant sectors of Tasmanian agriculture, to maintain and build our comparative advantage in relative pest and disease freedom and support the Tasmanian Brand.

## Adoption of research and development – improved extension

Productivity improvements in agriculture depend on the effective uptake and adoption of research and development by farmers on their farm or in business improvements generally. Extension is about working with people in industries and communities to achieve change.

*Extension in this context is the application of scientific research and knowledge into practice through communication and education. In the context of the Australian rural sector, extension facilitates the uptake of technologies and innovations to increase productivity growth and generate other benefits such as improved quality and safety.*

**Australian Bureau of Agricultural and Resource Economics and Sciences, September 2017**

Much of the rationale for agricultural science is to integrate knowledge and developments in such a way to increase the productivity and sustainability of farming systems. To do this requires a focus on impact and delivery well beyond that typically seen in other academic disciplines. Investment in research with beneficial outcomes that are not adopted on-farm is arguably wasted.

For this reason, most stakeholders agree that it is preferable if research is kept together with development and extension, to ensure that all three are well integrated and that feedback can freely flow between all three components. This was one important premise behind the initial establishment of TIA.

Under the National RD&E Framework individual Governments nominate for one of three roles in relation to a number of sector-specific and cross-sector topics. They can take a major role if they take on a national leadership role in relation to establishing RD&E priorities for a sector or topic, a support role to another jurisdiction taking the lead research role, or a link role where they focus on local development and extension only, using the outputs from work undertaken in other jurisdictions. Tasmania (through TIA and DPIPW) has accepted a range of *link* roles in a far greater number of sectors than those in which it either leads research, or supports research elsewhere. As such, local extension and adoption in Tasmania is vitally important.

Stakeholder feedback highlights that extension is an important means of contributing to meeting the 2050 target. Extension services have broadened to include providers such as private consultants, agribusiness and input suppliers, NGO's like NRM and Landcare groups, local grower groups and public information networks. In addition, feedback makes it clear that, in order to drive practice change at the farm level, engagement with influencers and value chain partners such as stock agents, processors and agricultural consultants is crucial as they are often the source farmers turn to for advice. This makes for an increasingly complex RD&E system, where effective communication and coordination is crucial. It highlights the need to work with, and through, existing groups to get information out to where it can be applied within production practices. It also means that publicly funded work needs to focus where there is market failure and/or be delivered to benefit the RD&E system, including private sector operators.

## NRM North

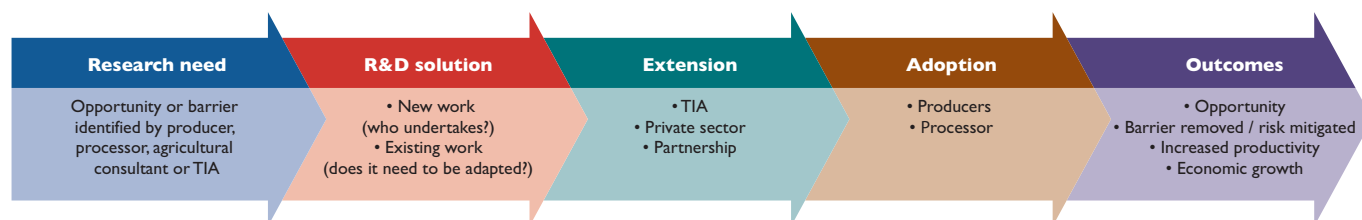
NRM North and Southern Farming Systems Partnership - Broadacre Cropping Soil Health.

Broadacre cropping provides 18% of the gross value of agricultural production in Tasmania, and occurs on a wide range of soil types. Some of these soils are susceptible to issues such as waterlogging or sodicity and present significant challenges for maximising sustainable agricultural production.

Helping broadacre cropping farmers to better understand and manage soils is one of NRM North's priorities. NRM North partnered with the Tasmanian branch of Southern Farming Systems (SFS) to develop an extension based project aimed at building the capacity of broadacre cropping farmers to manage soil health. SFS's expertise and networks in the broadacre cropping sector were drawn upon to develop a project using soil pits to better explain and discuss soil health and the practical implications of different types of soils and their limitations for the local farming system.

NRM North and SFS worked together to deliver four in-paddock events in October 2017. Each event used soil pits and moisture probes to showcase how crops interacted with different soil types, under both dryland and irrigated production. Over 60 farmers attended these field days with feedback indicating that farmers found the information both useful and relevant, with 96% of attendees gaining significant new knowledge and 82% intending to change farm practices as a result.

The project was funded through the National Landcare Program and in-kind contributions were provided by SFS and participating farmers. This partnership project will continue to deliver more extension based activities in 2018.



Accordingly, the State Government will encourage a principles based approach to enhancing delivery of extension services in the State, including:

- Supporting extension delivered using different approaches that optimise the benefits for industry;
- Ensuring a partnership approach is adopted with private sector providers to facilitate and broker information and extension services;
- Supporting the private sector's expansion of extension delivery into areas where there are market opportunities, while continuing to invest directly in extension where market failure is evident;
- Extending the provision of extension beyond the farm-gate, along the supply chain; and
- Establishing metrics to guide and assess extension efforts.

Through the Green Paper process various stakeholders observed that extension is critical to facilitate adoption at the grassroots level. Adoption of R&D can directly lead to productivity gains. Extension, or knowledge brokering, is an integral component in any R&D project delivered across all four TIA Centres. There was very positive industry support for the extension delivered in the horticulture and dairy sectors in particular. It was noted that there were opportunities for this experience to be extended across all agricultural sectors.

Extension capability also exists across other public (e.g. NRM) and private sector organisations which offer opportunities for development of collaborative partnerships. The private agricultural consultants within Tasmania specifically noted the need to renew the relationship with TIA. Coordination and integration would offer significant benefits to Tasmanian producers.

A specific Extension Outreach Program will be developed in consultation with the private sector to drive a renewed focus on the importance of extension delivery services and on-farm adoption of research and development. In developing the Program key consideration will be to:

- Ensure that extension practices comply with Australian and international best practice, and therefore support the highest and fastest possible levels of adoption;
- Explore options in partnership with UTAS to build capacity within TIA and provide professional recognition for the important role of extension alongside research and development roles;
- Work with UTAS to ensure undergraduate agriculture students gain experience in the extension process;
- Consider the development of a professional development program for Tasmanian extension specialists, in partnership with the private sector and NRM organisations; and
- Foster partnerships with processors already undertaking their own RD&E, including consideration of working with their field officers to provide technical assistance to farmers and/ or operate as a referral system into TIA and/or private sector industry consultants. To progress this initiative DPIPW and TIA will look to pilot it in a specific sector.

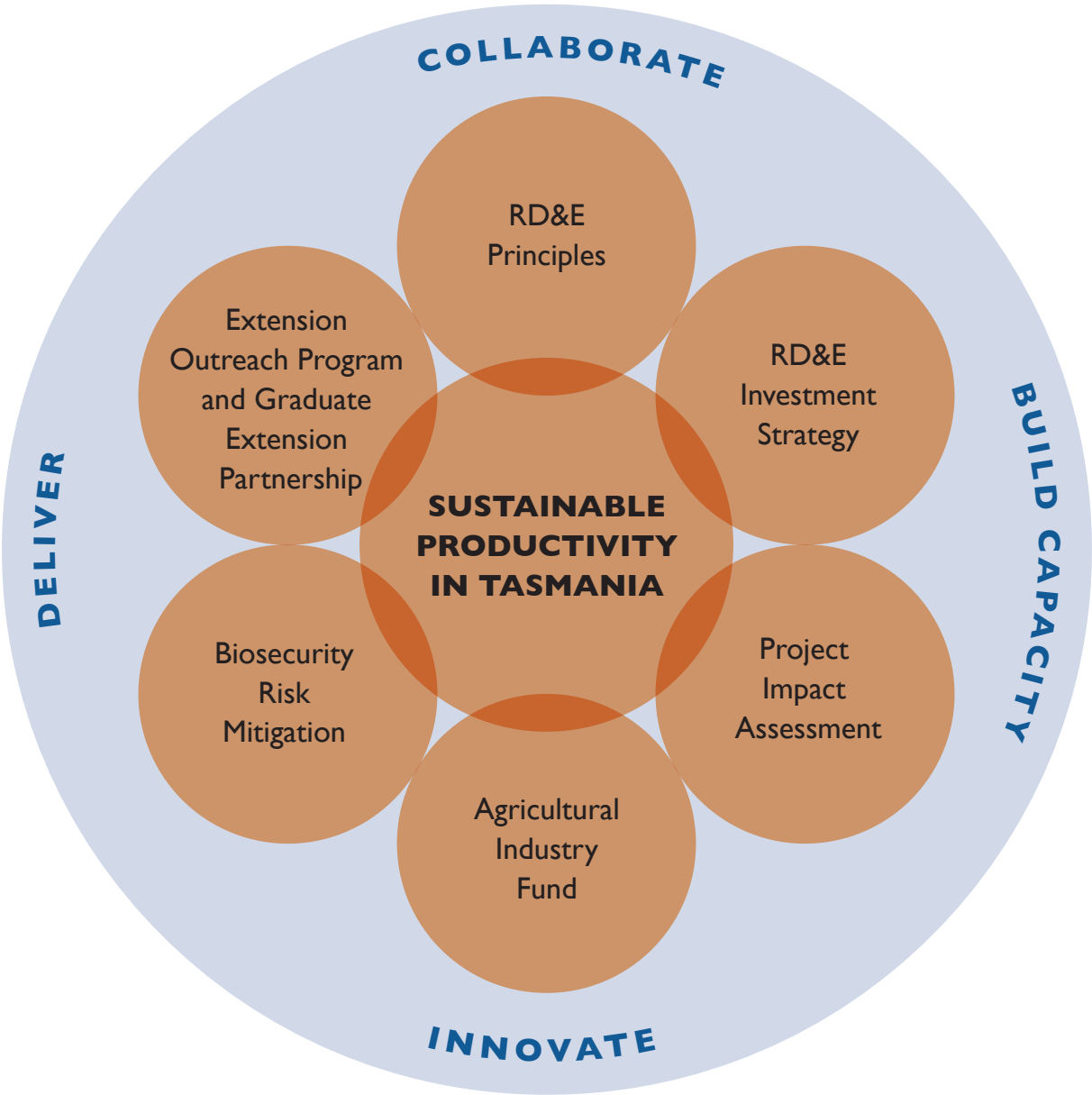
A senior staff position within TIA will support the new Extension Outreach Program, and report annually on extension activities and on how the Program is supporting the development of extension specialists in Tasmania. This will include developing effective, unique and cost efficient interventions for mutual benefit.

To complement the Extension Outreach Program and ensure a pipeline of extension professionals are available to support growth in Tasmania's agricultural sector, a new Graduate (or Internship) Partnership Program will be established as a two year pilot operating within the Agricultural Systems Centre in TIA. This Program will provide Agricultural and Agricultural Science Graduates with practical experience through placements within TIA and the commercial agriculture sector including private sector consulting firms and processors.

## **ACTIONS:**

7. An Extension Outreach Program will be developed in partnership with key stakeholders to support the on-farm adoption of R&D by farmers.
8. A new pilot Agricultural Graduate (or Internship) Partnership Program will be established operating within the Agricultural Systems Centre in TIA with a specific focus on extension. This Program will provide Agricultural and Agricultural Science Graduates with practical experience through placements within TIA and the commercial agriculture sector.

The improved Framework for RD&E in Tasmania:



## SECTION 2:

### CONNECTING INDUSTRY AND TIA

The previous section of this White Paper considered those initiatives to improve the RD&E system to support productivity improvements for agricultural producers and the food sector.

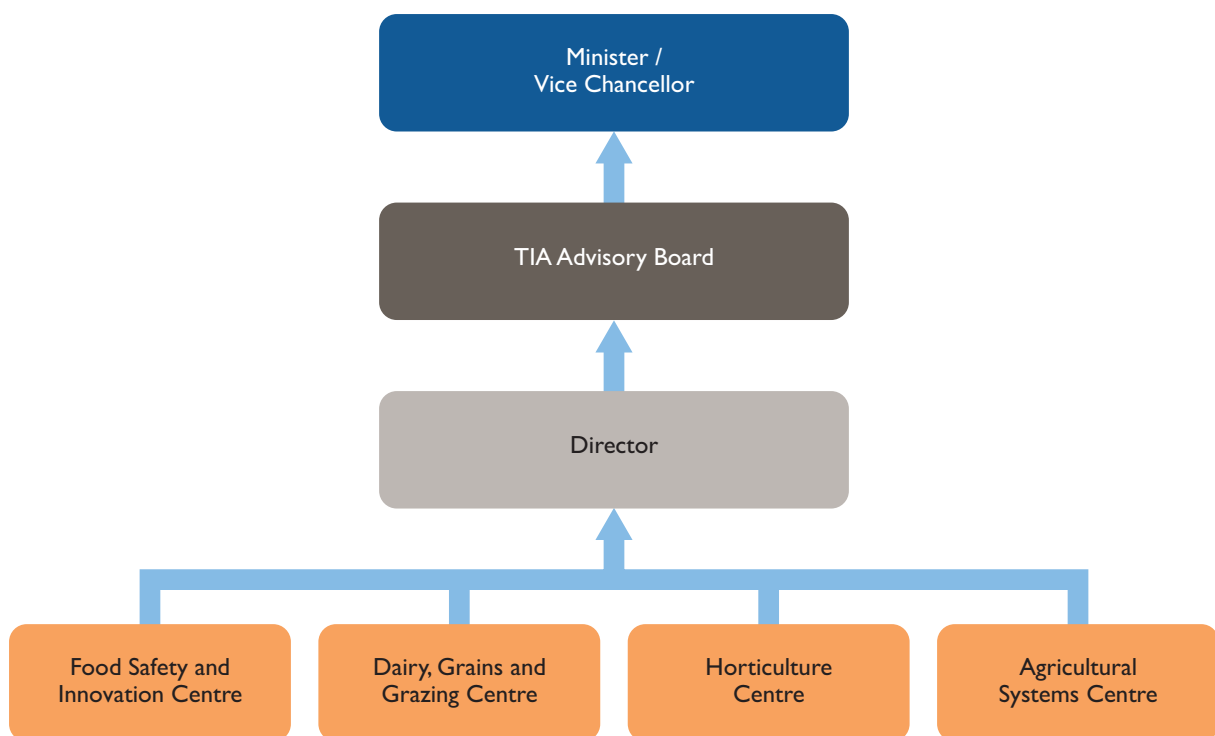
Although stakeholder views on this topic were mixed, some submissions to the Green Paper called for greater engagement between industry and TIA.

Better engagement with industry will enable TIA to gain an understanding of what research activities will directly lead to productivity improvements for Tasmanian farmers.

#### Governance: improving TIA’s linkages with industry

TIA is formed by a Joint Venture Agreement (JVA) between the State Government and UTAS. The JVA will be reviewed post the release of this White Paper.

The JVA that governs TIA makes an Advisory Board the key body in the TIA governance structure. The current governance structure of TIA as described in the JVA is as follows:



The Board comprises three UTAS officials (including the TIA Director), three State Government representatives, and up to six other people. The current TIA Advisory Board has four industry members who have experience in various parts of the Tasmanian agricultural supply chain.

Feedback from stakeholders indicated that there is a need to improve how the Board is integrated within the structure of TIA to ensure that there are appropriate linkages between industry and TIA Centres. Greater linkages would provide another opportunity to improve industry engagement with TIA, and ensure more active and

cooperative relationships with the private agricultural consultancy sector.

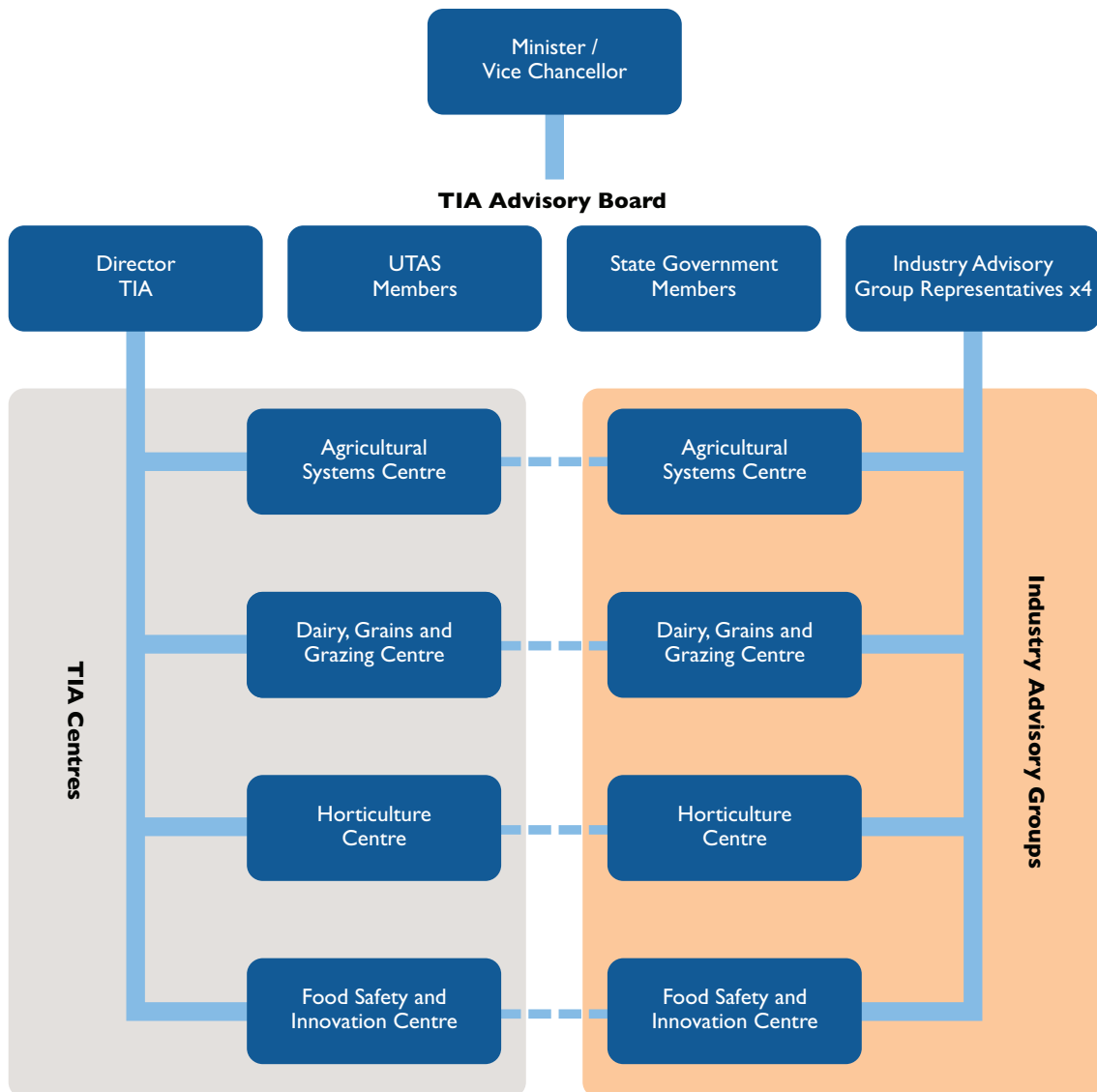
The Government when reviewing the JVA will propose the establishment of new 'Industry Advisory Groups' for each of the four TIA Centres. While Industry Advisory Groups of various compositions have been in place within TIA previously they have not had a direct link to the TIA Advisory Board.

The broad purpose of the Industry Advisory Groups will be to provide each Centre with:

- a **direct** link to industry stakeholders;
- feedback on proposed project proposals for leveraged funding and industry relevance;
- aligning research objectives with industry RD&E priorities; and
- assisting TIA to broker partnerships necessary to provide more effective RD&E.

The Industry Advisory Groups would be required to include at least one private agricultural consultant.

Currently, the TIA Advisory Board industry members are not linked with TIA Centres. Under the new model industry members of the TIA Advisory Board will be drawn from the Advisory Groups. Embedding mechanisms to support integration, improve linkages, facilitate engagement and increase transparency will benefit operation of the RD&E system in Tasmania.



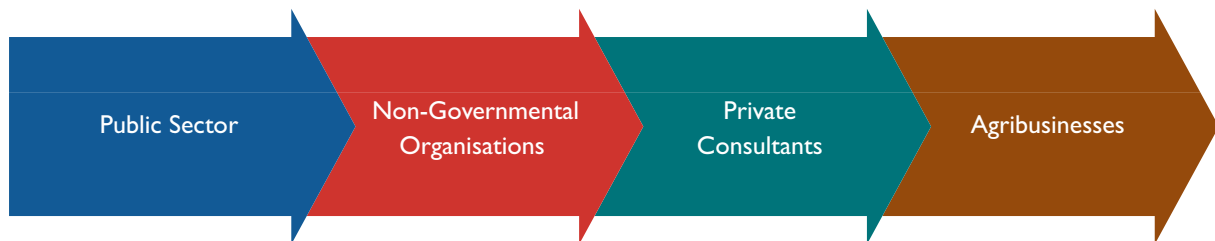
This model would not substitute existing arrangements where TIA representatives engage directly with industry Boards, such as occurs with DairyTas as these opportunities will continue to be actively pursued.

## ACTIONS:

9. New 'Industry Advisory Groups' will be formalised for Centres within TIA connected to the overarching Advisory Board to provide consistent and transparent pathways for industry input.

## Greater connectivity with the private sector

RD&E capability exists across numerous public and private organisations.



Collaborative partnership models, resulting in more integrated and interdependent research and extension could lead to greater efficiencies and reduced duplication. It can also provide greater opportunities for scientists and extension specialists.

TIA is itself a collaboration between the State Government and UTAS. To build on this model, providing clear pathways for engagement with TIA to encourage partnerships and collaborative opportunities so as to leverage co-investment and capabilities could be useful. For example, the public information "Partnering with TIA" on the TIA website could be further enhanced to identify pathway opportunities.

TIA itself is motivated to maintain and strengthen its links to industry. Through the Green Paper process it also identified a need to ensure it is meeting the legitimate expectations of the Tasmania agricultural community.

Specifically, TIA is seeking to better understand what will be needed to build and support profitable food and farming businesses, sustainable practices and vibrant communities. Such knowledge will help TIA target strategic investment of UTAS funds in RD&E, as well as inform the RD&E Investment Strategy and other mechanisms to support food producers and processors. It will also inform how TIA develops capacity and capabilities.

To assist in this effort, TIA is commencing a major project, the Aspirations in Agriculture and Food Project, to consult widely with the Tasmanian food producing community to understand its capacity, aspirations and expectations. This will equip TIA to better target RD&E strategies to support the goals of Tasmanian food producers and processors.

In addition, it is proposed that TIA also consider formal partnerships with the private sector. This may involve reviving the Memorandum of Understanding signed in 2012 between TIA and the four major Tasmanian consulting firms. However, there are various options available to TIA and the private sector to work together.

From a Government perspective rather than be prescriptive or to stifle innovative public-private partnerships,



the focus is on encouraging the outcome. Hence, through the formal agreement between the Government and UTAS, the Government will work with TIA to introduce new performance targets to further build engagement and partnerships with the private sector across its RD&E agenda.

## **ACTION:**

10. TIA will consider how to better engage with Tasmanian farmers, food and fibre producers and TIA will introduce new performance targets by December 2018 to further build engagement and partnerships with the private sector across its RD&E agenda.

## SECTION 3:

# RESEARCH AND DEMONSTRATION FARMS IN TASMANIA

## Government and University owned farms in Tasmania

Between them, UTAS and the Tasmanian Government own six research farms:

- Dairy Research Facility, Vegetable Research Facility – Forthside and Elliott Research Station transferred by the Government to UTAS for use by TIA for RD&E
- Cressy Research and Development Station, privately leased but available for use by TIA for RD&E;
- Grove, privately leased;
- Cambridge, UTAS facility;
- Freer Farm (Burnie), Government facility managed by TasTAFE.

Feedback on the Green Paper demonstrated that there was general support for retaining an effective public research farm capacity, however there is little consensus in the stakeholder community about the current and best future use of each of these assets. It was also noted in submissions that farms that are owned and operated by Governments and/or educational institutions are not the only means to deliver excellence in RD&E for Tasmania's farmers with increasingly research being conducted on private, commercially run farms or "focus farms".

### (I) Research Farms

Research farms are facilities owned by the Government or educational institutions where agricultural research and development can take place, and which are often used for extension purposes as well.

Dedicated research farms by necessity require the investment of significant capital into land, operating machinery, the ongoing costs of maintaining associated infrastructure, and are inherently spatially limited. Further, as employees at these facilities are covered by either Government or UTAS Awards and Conditions, they can be costly to operate, relative to a commercially run farm.

There are a number of ways to undertake agricultural RD&E which do not require freehold ownership of physical assets. In some sectors (such as viticulture) research undertaken on multiple commercial properties is considered to offer a number of important benefits over the provision of a dedicated facility.

Research organisations can also lease land as and when needed, or undertake research on cooperating commercial farms, if supported by commercial arrangements that ensure the landholder is adequately compensated for any cost of taking that land out of normal production.

However, it is generally accepted that there are benefits from properly resourced and operated research farms. Freehold ownership of such assets permits long-term continuity and control, and the benefit of a well-documented site history. Stakeholders also strongly agree that Tasmania needs to retain an effective research farm capacity in some form.

The Tasmanian Government and UTAS will jointly commission a Research Farm Portfolio Plan for all Government owned research farms to ensure that there is appropriate access to land and associated infrastructure for the

efficient and effective conduct of RD&E. Each farm asset will be assessed in terms of its contribution to RD&E and to developing Tasmanian agriculture more broadly. It is also noted that the Government-owned farms can also play a role in supporting education and skills development, for school, vocational and formal higher education and UTAS programs.

The Government will also continue to seek both public and private partnerships to maximise the use of our research farm capacity, including providing access to land and associated infrastructure. The Cressy Research and Development Farm, as well as accommodating TIA and DPIPWE uses, is also leased to private sector partners and this model could potentially be built upon across the portfolio of research farms to maximise the RD&E activity and outcomes.

In managing the research farm portfolio Government will take into account the following principles in relation to research farms:

- Each facility should operate with clear objectives for supporting RD&E;
- Funding from all sources will be adequate to sustain the necessary human and physical resources and ensure the facility is fit for purpose;
- Acknowledge that revenue derived from the farm activities may not fully fund its operating costs;
- As appropriate, opportunities to support education outcomes will also be accommodated.

The Research Farm Portfolio Plan will specifically consider whether Tasmania should consider focusing its future research farm capacity onto one or more 'Centres of Excellence', rather than servicing the research needs of a broad range of sectors at various farms.

The future of Freer Farm in Burnie, which is managed by TasTAFE was specifically raised by stakeholders through the Green Paper feedback. The Government will also work with TasTAFE to further develop the role of Freer Farm in delivering agricultural education, skills and training.

## **ACTIONS:**

11. The Government will continue to seek both public and private partnerships to maximise the use of our research farm capacity, including providing access to land and associated infrastructure.
12. The Government and UTAS will jointly commission a Research Farm Portfolio Plan to determine how to most strategically utilise research farm assets to support RD&E, including the potential to establish "Centres of Excellence". The Plan is to be finalised by March 2019.
13. The Government will also work through TasTAFE to further develop the role of Freer Farm in delivering agricultural education, skills and training.

## **(2) Demonstration Farms**

As distinct from research farms, demonstration farms are used primarily to demonstrate best practice and/or 'cutting-edge' agricultural techniques, or to verify research results in a 'commercial' setting or local area.

Some stakeholders have promoted the potential for Tasmania establishing a commercially focused demonstration farm, for example in the dairy industry. However there was no consistent view that emerged from the Green Paper

process on the feasibility or need for this proposition. As noted in the Green Paper, there appears to be only one broadly accepted example of a successful commercially-focused demonstration farm, which is the Lincoln University Dairy Farm (LUDF) in New Zealand. It is supported by highly engaged producers in a relatively homogenous region which produces almost as much milk as the entire Australian dairy industry. It is not run by the New Zealand Government or Lincoln University. While LUDF operates at a 'profit', industry sources indicate that this is only possible due to the considerable 'in-kind' support that it receives from Lincoln University and its founding industry bodies.

In short, LUDF benefits from circumstances that are difficult to replicate, particularly in a region as small as Tasmania. Victoria is by far the biggest dairy producing jurisdiction in Australia, and it has struggled to support a dairy demonstration farm in one of its most important dairying regions.

There are no known commercial demonstration farms operating in Tasmania. A similar model that has been widely and successfully adopted is the 'focus farm'. 'Focus farms' are well-run commercial and privately owned farm businesses that are engaged in organised extension programs. They are widely considered to be a low-cost and less problematic alternative to stand-alone demonstration farms. Tasmania already successfully utilises the focus farm concept in dairy, for example.

In the right circumstances, it may be appropriate for Crown owned research farm assets to be utilised for a demonstration farm purpose. The Government will consider any industry-led proposals for the establishment of a commercially-focused demonstration farm on Crown assets, with any support being determined by analysis of its business case, opportunity costs, and its prospect of providing a long-term contribution to progressing Tasmanian agriculture.

## **ACTION:**

14. The Government with UTAS will consider any industry led proposals received for establishing commercially-focused demonstration farms on Crown assets.

## SECTION 4:

# IMPROVED EVALUATION OF IMPACT AND PERFORMANCE:

### Measuring success: external evaluation

There is a need to ensure that the RD&E system in Tasmania continues to be best practice, and delivers value to the Tasmanian community.

The Government will therefore assess the effectiveness of the TIA model for provision of RD&E support to Tasmanian agriculture in three years, and every five years thereafter.

This review will use qualitative and quantitative measures to determine the effectiveness and appropriateness of the RD&E provided through TIA in supporting productivity growth in Tasmanian agriculture.

### ACTION:

15. A review of the effectiveness of TIA RD&E in supporting productivity improvements for Tasmanian farmers and agribusinesses will be undertaken in three years (by December 2020), and every five years thereafter.

## GLOSSARY

Pure basic research is research carried out for the advancement of knowledge, without working for long-term economic or social benefits and with no positive efforts being made to apply the results to practical problems or to transfer the results to sectors responsible for its application.

Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.

Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.

<https://stats.oecd.org/glossary/detail.asp?ID=120>

Extension in this context is the application of scientific research and knowledge into practice through communication and education. In the context of the Australian rural sector, extension facilitates the uptake of technologies and innovations to increase productivity growth and generate other benefits such as improved quality and safety. (Australian Bureau of Agricultural and Resource Economics and Sciences, September 2017)



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