



final report

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Teys Australia Collaborative Innovation Strategies Partnership Program Stage 3

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Executive summary

Tey Australia have previously completed Stage 1 and 2 of a Collaborative Innovation Strategies Partnership (CISP)) with MLA – more recently re-badged by MLA as the Co-Innovation Program. The CISP has been hugely successful for Tey Australia and MLA and has resulted in benefits for both entities as well as the industry more broadly as outlined in this report and individually published project reports over the last 3 years. Stage 3 of the CISP was scheduled to run October 2015 – October 2018. Tey Australia has recently completed Stage 3 of the CISP which focused on project execution and increasing value all along the supply chain through strategic projects.

Projects initiated under this stage of the CISP were strategic projects aimed to drive customer expectation through the supply chain with incentives. This has had significant implications for Tey Australia and the entire beef supply chain through research into new technologies whilst building capability for all. Identifying and developing relationships with tertiary institutions and researchers both here and overseas as a means of building capability amongst our next generation of leaders has become a particular focus area for the business.

Stage 3 focused on increasing value through the supply chain, strategic initiatives and project execution. To achieve this, the project portfolio under CISP stage 3 included a smaller number of highly strategic and significant projects and a multi team approach to innovation.

25 projects were co-funded during stage 3 of the CISP with a combined budget of \$7,658,712. The overall success is demonstrated by the comprehensive range of projects completed and the contribution of innovation insights provided to MLA and to the industry.

Table of contents

1	Background	4
2	Project objectives.....	4
3	Methodology.....	5
4	Results.....	5
5	Discussion.....	5
5.1	Success Stories	5
5.1.1	P.PIP.0348 – Design, measurement and verification of abattoir wastewater emissions reduction and biogas capture to offset National Gas/Coal consumption.....	5
5.1.2	P.PIP.0407 - Teys Australia Learning & applying category insights (TAFS-CATMAN).....	7
5.1.3	P.PIP.0431 - Beef DEXA Supply Chain Grading – LMY (Stage 2).....	7
5.1.4	P.PIP.0464 - Collection and reporting of inspection data for continuous improvement and productivity throughout the Beef Supply Chain	7
5.1.5	P.PIP.0471 - Bone Belt DEXA OCM Mass Balance Yield System – Stage 1.....	8
5.1.6	P.PIP.0479 - Teys Australia Business Accelerator: Design.....	9
5.1.7	P.PIP.0481 - Stage 1 – Enhancing capability to understand the relationship between meat colour, pH and retail meat colour	11
5.1.8	P.PIP.0488 - Impacts on consumer acceptance of beef from interactions between pH, meat colour and packaging	11
5.1.9	P.PIP.0489 - Teys Australia Business Accelerator	12
5.2	Innovation Awards.....	Error! Bookmark not defined.
5.3	Lessons Learned	13
5.3.1	Further development of innovation capabilities within Teys Australia	13
5.3.2	The development and implementation of effective innovation metrics	14
5.3.3	Access external resources as required to gain broader understanding and knowledge innovative approached within alternative industries and market	14
5.3.4	Improved and effectively driven innovation practices and processes within the business to ensure organisation embedding of innovation.....	14
5.3.5	A changed service offer / partnership with MLA.....	14
6	Conclusions/recommendations.....	14
7	Key messages	15

1 Background

In September 2007 Meat Livestock Australia (MLA) launched the Collaborative Innovation Strategies Program (CISP). The aim of this program is to facilitate the development of broad innovation capabilities throughout the whole supply chain leading to an accelerated adoption of research and development (R&D) outcomes, a more strategic focus on innovation initiatives, and greater impact derived from investment in innovation by companies. The program involves the co-development of comprehensive innovation strategies with individual enterprises, which meet commercial imperatives in addition to focusing on the implementation of key industry and government innovation priorities.

Tey Australia have previously completed Stage 1 and 2 of a Collaborative Innovation Strategies Partnership (CISP) with MLA. The CISP has been hugely successful for Tey Australia and MLA and has resulted in benefits for both entities as well as the industry more broadly as outlined in this report and individually published project reports over the last 3 years. Stage 3 of the CISP was scheduled to run October 2015- October 2018. Tey Australia has recently completed Stage 3 of the CISP which focused on project execution and increasing value all along the supply chain through strategic projects.

Projects initiated under this stage of the CISP were strategic projects aimed to drive customer expectation through the supply chain with incentives. This has had significant implications for Tey Australia and the entire beef supply chain through research into new technologies whilst building capability for all. Identifying and developing relationships with tertiary institutions and researchers both here and overseas as a means of building capability amongst our next generation of leaders has become a particular focus area for the business.

2 Project objectives

The third phase of the CISP program aimed to enable Tey Australia to achieve the following objectives:

- The further development of value chain innovation capabilities within the Tey Australia team to assist them to meet their organisational goals
- The development and implementation of effective innovation metrics
- Access external resources as required to gain broader understanding and knowledge, and innovative approaches within alternative industries and markets
- Improved and effectively driven innovation practices and processes within the business to ensure organisational embedding of innovation
- A reduction in reliance on MLA.

Engaging in a third phase of the CISP program aimed to enable MLA to achieve the following objectives:

- Continue to build the industry's innovation capability
- Case study demonstrating what makes a firm's innovation capability sustainable
- Incorporate learnings can be incorporated into programs with other partners
- Maintain the close relationship with Tey Australia and have a conduit for the facilitated adoption of its technologies
- Develop capability through the value chain from the producer to the customer
- Partner in transformational changes to benefit the red meat industry.

3 Methodology

Stage 3 focussed on increasing value through the supply chain, strategic initiatives and project execution. Projects were initiated when project ideas aligned with Teys Australia's innovation strategy and in turn the business strategy. Projects were also only initiated if they addressed a business need and/or provided a solution to a current challenge. Project areas included building collaborative supply chain relationships, capability development, learning from data and new product development processes.

4 Results

During Stage 3 of the CISP, 25 projects were co-funded with a combined budget of \$7,658,712 and an investment split of:

- 25% Teys Australia
- 25% Australian Meat Processors Corporation (AMPC)
- 50% Meat and Livestock Australia (MLA)

Stage 3 focussed on increasing value through the supply chain, strategic initiatives and project execution. To achieve this, the project portfolio under CISP stage 3 included a smaller number of highly strategic and significant projects.

The main benefits to Teys Australia arising out of stage 3 of the CISP have included:

- Increased capability and knowledge, including development of project management capabilities
- Increased production efficiencies and identification of areas where reduction in costs may be achieved
- Strengthened relationship with MLA supporting national research priorities such as automation (e.g. DEXA)

5 Discussion

5.1 Success Stories

25 projects were co-funded under stage 3 of the CISP with a combined budget of \$7,658,712. The overall success is demonstrated by the comprehensive range of projects completed and the contribution of innovation insights provided to MLA and to the industry.

5.1.1 P.PIP.0348 – Design, measurement and verification of abattoir wastewater emissions reduction and biogas capture to offset National Gas/Coal consumption (Final report prepared by Louis Fredheim, Dr Mike Johns – Johns Environmental Pty Ltd and Dr Stewart McGlashan – Thixo Pty Ltd)

On 1 July 2012, a carbon pricing scheme (CPM) was introduced in Australia under which large carbon emitters were penalised on Scope 1 emissions above a threshold of 25,000 tonnes CO₂e per year. At the same time, carbon emitters were able to access capital grants to invest in clean technologies under the Federal Government's Clean Technology Investment Program (CTIP).

A number of large meat processing facilities in Australia exceeded the 25,000 tonnes CO₂e per year emissions threshold. This project investigated the suitability of Covered Anaerobic Lagoons (CALs) for use in abattoirs and the challenges and benefits of using the biogas generated by the CALs for steam/heat generation. Use of the biogas displaced fossil fuels such as coal and natural gas (NG) and dramatically reduced CO₂e emissions associated with waste water treatment and steam/heat generation. Meat & Livestock Australia (MLA) and the Australian Meat Processor Corporation (AMPC) partnered with Teys Australia (Tey) to investigate two Teys beef processing facilities. Both facilities are located in Queensland (Beenleigh and Rockhampton) and process around 90,000 tonnes HSCW per year.

Johns Environmental (JEPL) was contracted to characterise wastewater quality and flows at both sites, followed by design of the CALs with third party design of the biogas system. The WWTP at both sites were constructed and commissioned during 2013 - 2015. The year preceding construction of the WWTP was termed the 'baseline year' and the year following the commissioning was termed the 'verification year'. Numerous quantities such as fuel consumption, wastewater flows and quality, biogas flow and methane content were measured. This allowed calculation and comparison between sites of the improvements in energy and carbon intensity due to the investment in the WWTP and biogas use assets.

During the verification year, the CALs performed well, removing 96% and 87% of the incoming biological oxygen demand (BOD) at each of the sites. A total of 2,180,000m³ and 1,390,000m³ of biogas was produced at average methane content of 70% and 67% respectively. Natural gas (NG) usage at Beenleigh was reduced by approximately 30%. Rockhampton reduced coal usage by 18%. Total carbon abatement over the 20 year operational lifetime is estimated to be 603,000 tCO₂e and 655,000 tCO₂e respectively. Wastewater carbon emissions were largely eliminated (98.7%), with total Scope 1 emissions (liable under the now discontinued CPM system) being reduced by 83% at both sites. Total scope 1 emissions at both facilities were reduced under the original CPM threshold of 25,000 tonne CO₂-e.

The NG-burning Beenleigh facility saved approximately \$1.66/head and the coal-fuelled Rockhampton facility \$0.42/head in reduced fuel bills. With the CTIP funding, the investment at Beenleigh had a payback period within 5 years. At Rockhampton, the investment failed to offer payback within the timeframe required. This result is due mainly to the low cost of coal relative to natural gas. Without government funding or a price on CO₂e emissions, investment in CAL technology at Teys Rockhampton would not be financially viable.

A cost benefit analysis (CBA) was performed which revealed the addition of a price on CO₂e emissions at \$23/tonne CO₂e shortened the financial payback considerably. The imposition of an Annual Contract Quantity (ACQ) in existing NG supplier contracts resulted in financial penalties where displacement of NG by biogas triggered the penalty. This created a financial disincentive to invest in biogas usage over the term of the existing NG supply contract. In contrast, coal supply contracts do not have similar penalties.

5.1.2 P.PIP.0407 - Teys Australia Learning & applying category insights (TAFS-CATMAN) (Final report prepared by Hannah Smith – Teys Australia Food Solutions)

This project looked at the extent to which traditional grocery industry data sets, promotional activity, market structure and merchandising location and analysis could be applied to meat products, specifically in the Deli space in a major retailer.

There were a number of different data sources used with varying levels of practical usefulness and costs. Key design parameters were to identify a customer's shopping repertoire for meat within the deli category.

It was found that tools to help convert category information into insights – that is “learning from data” can enable timely trends analysis for decision making with the aim of achieving category growth/value.

5.1.3 P.PIP.0431 - Beef DEXA Supply Chain Grading – LMY (Stage 2) (Final report prepared by G.E. Gardner, J. Peterse – School of Veterinary and Life Sciences, Murdoch University Western Australia and S. Starling, J. Cook, M. Shirazi, A. Williams – Scott Automation and Robotics Pty Ltd)

A prototype DEXA system was purpose-built in a shipping container (DEXA-in-a-box; DIAB) to enable mobility and capacity to seamlessly modify the hardware without interrupting abattoir processing.

The dimensions of this DEXA prototype were modelled on the JBS Bordertown DEXA system. This DEXA system demonstrated good potential for predicting CT composition, describing 93%, 88%, and 73% of the variation in whole carcass CT bone%, fat% and lean%, with RMSE values of 0.81 CT bone% units, 3.21 CT fat% units, and 3.49 CT lean% units. When predicting specifically within the forequarter and hindquarter regions, the precision was similar to whole carcass levels in the forequarter, but reduced in the hindquarter, describing about 10% less of the variation in composition.

The processing factors of spray-chilling or variation in carcass orientation had little impact on the DEXA prediction of composition. This suggests that this measurement will be robust within abattoir environments, and this coupled with its precision indicate that it is highly relevant for adoption by industry for the measurement of lean meat yield.

5.1.4 P.PIP.0464 - Collection and reporting of inspection data for continuous improvement and productivity throughout the Beef Supply Chain (Final report prepared by Food and Veterinary Services Pty Ltd)

This project aimed to develop a method of collecting and reporting meat inspection data for continuous improvement in productivity throughout the supply chain.

Every carcass, head and offal set processed is inspected under legislation for food safety both on an animal health and hygienic dressing basis. Currently the only data that are formally collected and reported back to processors and producers is the condemnation of entire carcasses by government officials. This results in the loss of valuable information on the herd health and dressing process that could be used for continuous productivity improvements.

The change in regulatory requirements to allow the use of third party meat inspectors has provided the opportunity for this project. Third party meat inspectors can collect these data as part of their auxiliary duties.

This project aimed to develop

- a standard data set for the project (that could be used by the wider industry),
- a preliminary collection method through abattoir trials and
- correlation to existing company traceability records, analyse the collected data to develop feedback opportunities to improve productivity throughout the supply chain.

There were a number of major obstacles to the outcomes being achieved. One was the change management of meat inspectors to ensure the collection of data without direct and continual oversight of meat inspectors. The second was the development and integration of the IT system and interface to collect the data. Data has been analysed, identifying significant losses to the supply chain through sub-clinical animal health diseases. This is an approximate \$2.6 million opportunity to the single Teys Australia abattoir in which the system was trialled across a number of sub-clinical conditions and approximately \$1.8 million for liver fluke alone in the cattle supply. Further extension work was also undertaken with the producers as Teys Australia acknowledged the importance of a successful roll out and the change management process that would have to be worked through with producers to use the feedback to reduce these losses. This resulted in a Phase 2 project proposal to MLA to continue the work including further extension work and cost benefit analysis of the findings, with roll out of this process across the Teys Australia plants.

5.1.5 P.PIP.0471 - Bone Belt DEXA OCM Mass Balance Yield System – Stage 1 (Final report prepared by Jonathan Cook, Merv Shirazi – Scott Automation and Robotics)

Waste stream monitoring is an application which presents a significant value proposition to the industry through yield recovery and potentially increased efficiency. Dual-energy x-ray absorptiometry (DEXA) is a technology widely used for composition analysis by observing the attenuation of x-rays at two different energy levels.

An existing single-energy x-ray inspection machine was upgraded to dual-energy by installing a sandwich-style dual-energy detector. The initial approach to the application was to quantify the amount of bone, fat and lean for the entire x-ray image, to quantify the amount of each tissue passing down the belt.

Another approach was then implemented which is currently used in the medical industry for human composition analysis. A number of scans were then taken of bone belt material. While the concept was implemented successfully, a number of issues presented with the accuracy obtained. A key issue is the presence of tissues such as bone marrow, tendons, ligaments and cartilage.

Factory acceptance testing was performed on the machine with a set of different bones obtained from a bone belt. These were scanned twice – raw and then with bits of meat placed over them to simulate recoverable lean meat. The results of these trials were then presented to the customer,

with the machine's strengths and limitations discussed. Acknowledging the limitation of being confined to areas of the image where no bone is present, they still felt that the machine presented value to the company by being able to identify large saleable primals. The identification of large pieces of red meat still attached to bone where possible would serve as a bonus. It was also suggested that a second sensing technology may augment well with the DEXA data to improve performance.

The machine was then sent to the customer's site. It was installed close to the bone belt to enable easy access to product. A large number of scans were then conducted to further evaluate the system's ability to identify lean meat. The data collected also provided an opportunity to refine the vision processing algorithms.

The trials were successful and further reinforced the system's capability in identifying small chunks of lean meat on bone belt material if the amount of overlap is minimised. Thus, identification of primals would be possible along with significant chunks of recoverable lean on bone under some circumstances.

Moving forward, a mechanical intervention on the bone belt would be required upstream of the DEXA machine to control product presentation.

5.1.6 P.PIP.0479 - Teys Business Accelerator: Design (Final report prepared by Vulture Street Pty Ltd)

Tey Australia Food Solutions (TAFS) has developed a set of strategic growth goals in the context of the broader Teys Australia (TA) strategy to become a leading provider of innovative red meat supply chain solutions linking Australian producers to global customers. As part of this growth strategy, TAFS had previously undertaken a Strategic Portfolio Review to develop and refine a process for identifying, analysing and recommending new growth options for the TAFS business, with associated governance and reporting activities. A key strategic reason for developing a portfolio of growth initiatives is to 'future proof' the business, in particular to extend the value of the current business model/technological trajectory and to simultaneously drive and shape the development of new growth paths, often linked to new technologies or business model paradigms. The Strategic Portfolio Review project produced a 'short list' of twelve opportunity areas as promising sources of growth for the TAFS business.

The key operational question remaining for Teys was how to best organise resources and management attention to ensure that appropriate development efforts and investment occur to respond appropriately to these opportunities, by taking advantage of immediate growth options and also positioning the company well for continued strength in the future. The current project has been undertaken to explore the concept of an Accelerator, as a potential solution to this operational challenge.

Modern day accelerators are designed to provide an intensive and usually time-limited focus on speeding the transition of ideas from concept to commercial viability, with a dedicated team and structured program of work. This can be achieved through internal resourcing, external partnerships, investment in start-ups, or a hybrid of these. In Australia at the present time, most corporate accelerators are focused on investment in start-up companies whose technologies may provide a

future source of competitive advantage for the investing company. The primary objective of this project has been to establish a recommended design, including operating structure, success criteria and budget, for a potential Teys Business Accelerator.

A key overarching aim of the Teys Accelerator is to achieve a demand-pull approach to new business development, contrasting with the supply-push approach, which has characterised much of Teys' recent growth as a dominant player in mature markets. The proposed Teys Accelerator is differentiated in two ways from existing corporate Accelerator models: (i) it is based on partnership with an external innovation services provider and University Business School; and (ii) its core is a dedicated team following a structured commercialisation framework (Lean Launch Pad) over a twelve month period. The Accelerator requires a small team of highly skilled and experienced people. Four key full time roles have been identified and scoped to ensure the correct balance of industry knowledge and innovation skill exists.

The core team's impact will be expanded through engagement with the University of Queensland Business School MBA cohort. The current project undertook a trial engagement with two MBA student groups, facilitated to work through the Lean Start Up framework over an intensive five week period. The projects defined to support this trial engagement are described in appendices to this report.

The proposed twelve-month program will use the Lean Launchpad commercialisation framework and an agile project management approach to develop 4-6 concepts. Each concept will initially progress through a 6 week intensive learning stage in a sequential manner followed by a 2 week review and debrief. At the conclusion of this first stage a go/no-go program review will be held to assess the program against interim goals and determine whether the overall project is creating value and if so, which concepts will be further matured during the subsequent stage.

The first iteration of the Business Accelerator will focus on program-level commercial outcomes plus learning about the model itself. Specifically, Teys' goal is for the development of 1-2 commercially viable new products or services, ideally with an identified customer who has demonstrated a willingness to pay for the product or service. In addition, Teys' focus is on the learnings that emerge from the first twelve months of the program, in terms of:

- The effectiveness of the commercialisation framework;
- The suitability of the partners;
- The optimal scope of concepts to be developed in this way;
- Effective mechanisms for engagement of existing Teys and TAFS employees;
- Customer perceptions of the initiative;
- The potential for return on investment.

Over time, Teys will consider implementation of a set of metrics for the Accelerator linked to innovation and performance metrics that have been implemented within the wider Teys Australia business. The Teys Business Accelerator design presents a detailed plan for setting up a separate entity with the specific goal of identifying new products, services and associated business models for

future commercialisation. Without the constraints of existing business processes and pressure to execute the current business model, the development process will move at a much faster pace while identifying new strategic growth opportunities. The benefits of separation from the existing business combined with the scientific approach of the Lean Launchpad framework has the potential to increase the returns from innovation while at the same time reducing financial risk to the red meat industry.

5.1.7 P.PIP.0481 - Stage 1 – Enhancing capability to understand the relationship between meat colour, pH and retail meat colour (Final report prepared by Dr E Wilcock – Food and Veterinary Services Pty Ltd)

Meat colour and pH, has a significant impact on increasing or decreasing value both up and down the value chain from producers to customers. Recent observations have shown a condition where carcasses have a pH <5.7 however may have a meat colour of 4 or 5. These carcasses are non-compliant with MSA on meat colour but pass on pH. This means that the whole carcass is classified as ungraded and as a result producer returns decrease. Teys Australia hosted Dr Melvin Hunt, a world renowned scientist in the area of meat colour, to review typical Australian processing practices and to provide recommendations. The visit included a seminar with leading Australian Meat Scientists, the MSA Pathways Committee, Teys Australia and MLA representatives to discuss his findings and recommendations. These included the need to understand meat colour science to be able to address concerns through the supply chain with meat colour, the need to allow meat to 'bloom' prior to packaging, the opportunity to use the Near-infrared Oximeter to assess cattle at ante-mortem for their potential to dark-cut, and the need for further research in the disconnect identified between pH and meat colour.

5.1.8 P.PIP.0488 - Impacts on consumer acceptance of beef from interactions between pH, meat colour and packaging (Final report prepared by Dr R Polkinghorne, Ms J Philpott, Dr R Watson, Dr G Tarr – Birkenwood Pty Ltd)

There is a recognised lack of scientific understanding of consumer colour preferences for retail beef products; a lack of scientific detail on ageing and colour stability; consistent observations of a mismatch between meat colour and pH, a desire for an objective instrumental colour measure linked to consumer responses and growing scientific evidence of a detrimental effect on eating quality of MAP packaging.

This trial was designed to improve understanding of the mechanisms involved in the above, their interaction and management approaches to overcome or prevent problems at a plant and retail level.

The design called for striploin, rump and tenderloins aged 5, 12 or 40 days in vacuum packaging to be packed into three retail packaging formats: Overwrap (OWP), Modified Atmosphere (MAP) and Vacuum Skin Pack (VSP). All retail packages were viewed and rated for colour appeal by beef consumers then fabricated into MSA consumer samples and sensory tested using MSA protocols. Further samples were put aside for flavour chemistry evaluation.

Scores from a 'Consumer Meat Colour Score' (CMC) developed from the 20,140 consumer observations from the trial showed results directly contrary to some accepted beliefs. The colour of

the striploin surface at grading was found to relate poorly to the other cuts and to change with ageing. Furthermore, consumer preference discounted light coloured 1C beef but did not discount darker meat colour 4 samples. Ultimate pH was found to be more aligned with ultimate retail colour acceptability than the grading assessment. Meat colour did not differ across dentition categories from 2 to 6.

The sensory results were also instructive confirming a 12 MQ4 point eating quality penalty for 80:20 MAP relative to OWP and VSP, which were similar. The penalty for MAP was consistent across the three cuts and all prior primal ageing periods. Meat colour was again confirmed as having no eating quality relationship. Flavour volatiles differed for each packaging type.

After evaluation of the data, the MSA Pathways Committee recommended meat colour be removed as an MSA grading criteria; a pH limit of 5.7 be retained and that a 12 MQ4 point deduction be applied to beef sold in MAP. These recommendations were presented to the MSA Taskforce and AUS-MEAT Language and Standards Committee. Subsequently meat colour has been removed as an MSA grading requirement.

This research has delivered significant industry value through improved understanding of meat colour and packaging relationships from both visual and sensory perspectives. The removal of meat colour as an MSA grading requirement will significantly increase the number of carcasses grading MSA and redress a current anomaly, common in grass fed groups, where carcasses with acceptable pH are excluded by slow developing meat colour at the time of grading.

The substantial negative effect of 80:20 MAP is of concern to retailers and raises substantial issues. Further research has been proposed to test how quickly eating quality deteriorates after packing and the potential to overcome the effect by utilising a different gas mix.

5.1.9 P.PIP.0489 - Teys Australia Business Accelerator (Final report prepared by Kate Morrison – Era Innovation)

In the context of the Teys Australia strategy, Teys Australia Food Solutions (TAFS) developed a set of strategic growth goals to become a leading provider of innovative red meat supply chain solutions, linking Australian producers to global customers. As part of these growth goals, TAFS undertook a Strategic Portfolio Review to develop and refine a process for identifying, analysing and recommending new growth options, with associated governance and reporting activities. The review produced a shortlist of twelve opportunity areas of growth, a set of recommended portfolio management and governance processes, and a program of projects for further exploration.

The Accelerator project was established, in conjunction with MLA's Collaborative Innovation Strategies Partnership program, to achieve a demand-pull approach to new business development, contrasting the supply-push approach which has characterised much of Teys' recent growth as a dominant player in mature markets. The twelve-month program explored four concepts: 'Snacking', 'Healthy Ageing', 'Mince & Sauce', and 'Deli 2.0'.

The project model was derived from the 'skunkworks' concept pioneered at Lockheed Martin, and the Lean Launchpad program developed by Steve Blank, and educators from Stanford University and

the University of California – Berkeley. The benefits of separation from the existing business combined with the scientific approach of the Lean Launchpad framework has the potential to increase the returns from innovation while at the same time reducing financial risk to the red meat industry.

Each concept was successively developed over a dedicated eight-week cycle, including two trials involving MBA students from The University of Queensland Business School. During a cycle, the team ran weekly sprints to test hypotheses conducting interviews with prospective customers and partners, as well as running a range of experiments to prototype offerings and business models. Agility and fast learning was paramount to the overall success of the project as it allowed the team to build on learnings and to leverage them in the following cycle.

At the conclusion of the first stage, a review was held to assess the program against interim goals, and to determine which concept or concepts would continue during the second stage. The remaining period of the twelve month program was used to continue the Lean Launchpad development process with a greater focus on commercialisation options including potential joint ventures, contract manufacturing, exploring capex requirements and integration with the existing Teys business. Following the completion of the twelve-month project, a legacy program of work has been developed to allow Teys to continue developing their innovation capabilities. Examples of legacy projects includes: developing a comprehensive marketing strategy, developing a new, agile new product development process and the establishment of a talent and resourcing strategy.

5.2 Innovation Awards

The work undertaken in the projects completed during stage 3 of the CISP has also been acknowledged, with Teys Australia being the recipient of the following awards.

- 2015 - Premier's Award (QLD)– Major multi-site renewable energy development and wastewater upgrade
- 2015 - Business Eco-efficiency Award (QLD) – Major multi-site renewable energy development and wastewater upgrade
- 2018 – Teys Business Accelerator (P.PIP.0489) was featured at Parliament House, Canberra for multi-sector agrifood Rural R&D for Profit Round 1 – Insights2Innovation presentation and youtube shoot – see: https://youtu.be/8gDNVsp_C_8?t=412 as a value chain flagship project participant

5.3 Lessons Learned

An independent review of stage 3 of the CISP was conducted against the objectives of this project. The review process highlighted a number of lessons learned.

5.3.1 Further development of innovation capabilities within Teys Australia

Over the course of the stage 3 of the CISP, Teys Australia project leads have been identified/recruited from multiples areas of the business. This has built research and development

capability (including project management and design skills) within the business. However, it is important that these project leads are adequately resourced (time, training etc), are aware of the commitment involved and that projects are scheduled accordingly to accommodate competing priorities between core duties and R&D management.

Projects under the CISP are operated across multiple sites and business areas. There is the potential for siloing of knowledge on projects (e.g. staff at one site may not be aware of projects at another site). Teys Australia recognise the need to ensure projects undertaken and the outcomes of these projects are communicated across the business and across sites.

5.3.2 The development and implementation of effective innovation metrics

Developing meaningful/measurable innovation metrics can be difficult where projects are aimed at more tangible areas such as increases in capability, communication and engagement through the supply chain. Matrix metrics (i.e. multiple measures across a number of areas) may give a more defined measure but can be cost prohibitive commercial especially when potential for growth in personnel is identified which also leads to increases in the individuals increased capability.

5.3.3 Access external resources as required to gain broader understanding and knowledge innovative approached within alternative industries and market

External experts, including world leaders, in areas of meat science, meat quality (flavour), animal health, food safety, robotics and automation have been engaged and consulted on a number of projects completed under stage 3 of the CISP. This has increased Teys Australia's exposure to a broader range of external resources and experts, including internationally and in other industries, through the relationships developed and conferences that Teys Australia is now invited to speak at given their research experiences.

5.3.4 Improved and effectively driven innovation practices and processes within the business to ensure organisation embedding of innovation

Following completion of the Accelerator projects (stage 1 & 2) and the benefits outlined, Teys Australia have engaged the leading consult of these project Kate Morrison in a role that includes strategy and innovation.

5.3.5 A changed service offer / partnership with MLA

In recent projects, Teys Australia staff have taken on project management leads on projects with terms up to 3 years. These projects include areas such as producer engagement, data integration and imaging to automation. Indirectly, this has led to a lesser reliance on MLA to play an active role here, particularly compared to CISP stage 1 time period. This increased innovation capability within Teys Australia (and our networks) is a good measure of success of the CISP stage 3 outcomes.

6 Conclusions/recommendations

Stage 3 focused on increasing value through the supply chain, strategic initiatives and project execution. To achieve this, the project portfolio under CISP stage 3 included a smaller number of highly strategic and significant projects in partnership with MDC.

25 projects were co-funded under stage 3 of the CISP with a combined budget of \$7,658,712. The overall success is demonstrated by the comprehensive range of projects completed and the contribution of innovation insights and lessons learned provided to MLA and to wider industry from these TA led activities.

7 Key messages

- Building of capability of staff is of paramount importance. Teys Australia are investing in projects that build capability, including identifying and developing relationships with tertiary institutions and researchers both here and overseas as a means of building capability amongst our next generation of leaders which has become a particular focus area for the business. This has included exploring innovation methodologies such as corporate accelerators and transforming information into insights into innovation and action, including new business models. Teys' Business Accelerator was part of MLA's Rural R&D for Profit Insights2Innovation flagship project – see: https://youtu.be/8gDNVsp_C_8?t=412
- Alignment of projects with innovation strategy and business strategy is key. Stage 3 focussed on increasing value through the supply chain, strategic initiatives and project execution. Projects were initiated when project ideas aligned with Teys Australia's innovation strategy and in turn the business strategy. Projects were also only initiated if they addressed a business need and/or provided a solution to a current challenge – this included key inputs from consumer insights. Project areas included building collaborative supply chain relationships, capability development, learning from data and new product development processes.
- Collaboration throughout the value chain and especially with producers is a key focus of Teys Australia innovation strategy. The extension of accurate data feedback about the animal and carcasses is essential to drive productivity and profitability for the entire industry.