final report

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Executive summary

This is the final report for the Australian Meat Group (AMG) Collaborative Innovation Program (CIP) with Meat & Livestock Australia (MLA). The report covers the development of innovation capability with AMG and R&D projects undertaken throughout the CIP.

MLA's CIP involves the co-development of comprehensive innovation plans with individual enterprises which meet commercial imperatives in addition to focusing on the implementation of key industry and government innovation priorities.

The CIP is a flexible enterprise innovation capability building program that is customised for large and small enterprises throughout the red meat value chain. Enterprise innovation capability within the context of this program is defined as the underlying capacities that enable a firm to be innovative on a sustained basis, rather than producing one-off product innovations from time to time.

Some of the AMG CIP projects are not finished and have been delayed due to recent restrictions imposed due to COVID19. The electrical stunning project is awaiting further work from partners, Carne Technologies, in New Zealand, and the Value Added room will now have to wait before concluding the market investigations and deciding on the correct equipment required then ordering it.

Stage 1 of the Logistics Automation project is now complete and the next stage will begin in a few months. The Digestor project has concluded that a Digestor is the desired solution as opposed to a Biofuel boiler and work will continue on finding the right model and also looking at funding sources.

The purchase of the Cootamundra Meat plant and the work that needs to go into that in the next 18 months is exciting for AMG and the industry in general. There is a great opportunity to develop a modern efficient and effective plant that is at the leading edge of the industry for a plant of its size.

This rebuild, along with other projects that are taking place in Dandenong, will need support from the MLA and other industry bodies to ensure AMG maximise the resources, skills and knowledge that is available and which they may not have in their own business. The innovation process will not end when this initial program is completed and AMG will discuss with MLA how this can carry on in some form in the future.

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1 Background

1.1 Innovation role and Why

The Australian Meat Group (AMG) have not previously had any resources looking at their business from an innovation and development perspective and understanding what areas they can get industry support from.

The Innovation manager is a part time role working with the management team at AMG to try and understand what problems they have identified in the business and whether these can then form projects that not only help solve their problems but can also assist all of the industry.

A number of small to medium sized meat processors do not have the resources to put these projects together and tend to 'just get on with it' without any support either financially or through resources that may be available from industry bodies. Most issues are similar across the industry and by focussing on innovative projects that help the AMG business, these too should assist in the wider industry.

The projects that have been identified can assist any of the following criteria:

- Reduce the need for labour in a particular area
- Improve the accuracy of the information being delivered both up and down the supply chain
- Create better safe work practices and ensure people are not put into positions that may be detrimental to their wellbeing
- Reduction of emissions from the plant and an overall reduction of waste in all areas
- More efficient processes and equipment that ensure long term sustainability in the industry
- Focus on the customers ever changing requirements in regard to food safety, traceability, packaging requirements and consistency

2 Project objectives

2.1 Project plans

The initial project plan covered six innovative projects that AMG wanted to focus on. These were:

1. Adopting electrical stunning to the rotary knocking box
2. Automating the back-end logistics in the plant
3. Digestor renewal
4. Creating a value-added area to meet changing customer needs
5. Automating the carcass chillers for sorting and to allow DEXA to be adopted in the plant
6. Develop a production planning system

As time progressed the focus went on the first 4 projects and projects 5 and 6 were put aside, however, after a workshop with the MLA team in Brisbane and AMG purchasing the Cootamundra Meat plant it was agreed that further projects will develop.

Within a timeframe agreed between MDC and AMG the following project objectives should be achieved by AMG:

1. Have developed an approved co-innovation strategy
2. Have established all four project plans and submitted them to the MDC for approval
3. Developed a timeframe over the next two years when each project will be funded, started and completed
4. Started the first projects that have been approved according to the agreed timeframe.
5. Established a communications regime with MDC to ensure they are kept up to date.

2.2 Individual projects

2.2.1 Project 1 Adopting electrical stunning to the rotary knocking box

The individual objectives for project 1 are as follows:

- To explore the opportunity of using electrical stunning for beef
- To understand what the issues are with using electrical stunning versus percussion stunning
- To understand the impact on the carcass and internal organs by using electrical stunning
- To understand the cost and savings between electrical and percussion stunning
- To keep ahead of any country requirements in the event that percussion stunning will not be permitted on beef in the future

2.2.2 Project 2 Automating the back-end logistics in the plant

The individual objectives for project 2 are as follows:

- To automate the logistics area post the boning room
- To use the state of the art Dematic ASRS system to achieve this
- To reduce the labour cost in the chiller area
- To eliminate waste from product being incorrectly picked out of sequence
- To increase the accuracy of the customers' picks and reduce any miss-picks
- To allow for port marking, automated palletising and wrapping to further reduce labour costs and increase accuracy of customers' picks

2.2.3 Project 3 Digester renewal

The individual objectives for project 3 are as follows:

- Replace the existing digester with a more energy efficient and sustainable option
- To review all of the options of converting waste paunch material into gas and electricity to help run the plant
- To provide a digester that is suitable for the current environment which is industrial land surrounded by non-agricultural businesses and near residential property
- To look at adopting some of the recent work that has been carried out in the industry on digesters and their suitability for the Dandenong plant

2.2.4 Project 4 Creating a value-added area to meet changing customer needs

The individual objectives for project 4 are as follows:

- To establish a state of the art secondary processing operation that complements the primary processing that is currently being performed at the Dandenong plant

- To utilise the area that was previously the mutton processing floor and convert it into a value-added room
- To satisfy current customers' future needs for retail ready products direct from Australia
- To utilise the carcass more efficiently by adding value for all involved in the supply chain
- To eliminate waste in the current facility by creating new products from material that would otherwise have been downgraded or discarded

3 Methodology

3.1 Project 1 Adopting electrical stunning to the rotary knocking box

AMG currently have percussion stunning in the rotary knocking box. The inverted position is used as a buffer to maintain throughput due to possible delays that could occur with loading cattle into the stun box.

AMG contracted Carne Technologies from NZ to do some trials in the plant. Carne Technologies have experience in electrical stunning systems in sheep and beef in New Zealand. AMG were aware of the work that had been done in the past on electrical stunning but none had been done in a plant with a rotating knocking box and a plant that processes primarily grass fed cattle.

When applying a head only electrical stun there needs to be an option to apply immobilisation in the box and carry out the thoracic stick in the inverted position for circumstances where there is a delay in ejecting the animal onto the bleed table. This was not tested in the initial trials but was not expected to be difficult to implement. The initial trials were done using a Head only stun.

Two main problems were identified on the initial trial:

1. Swollen lungs, usually including blood speckling meaning the lungs would no longer be able to be saved as edible and will need to go to pet food. However, there is reasonable expectation of improving on this by changing to head-to-body (H2B) stunning.
2. Stick blood backflowing into the chest cavity. Again, an H2B stun system may assist with this, otherwise an appropriate wash procedure will be needed.

Further trials have been done to verify the process. Mechanically, there are no issues with the change of process from percussion stunning by using a Head to Body stun. The initial issues with swollen lungs has been rectified with the head to body stun as opposed to the head only stun.

The remaining issue is enabling the electrical components to work in the rotating box while maintain an earth on the underside of the body. This has proven more difficult than expected as the earth is lost as the box rotates. The technology providers, Carne Technologies in New Zealand, are working through the options and are confident they will have a solution that can be implemented in the plant.

3.2 Project 2 Automating the back end logistics in the plant

AMG recognised that they had a very manual process in the chiller, picking and dispatch area and needed to improve this.

AMG investigated different automated options available in Australia and visited other sites that utilised automated chillers.

AMG decided that the Dematic ASRS system was the right solution for them and proceeded to design the system for the throughput in their plant and plan the infrastructure required for the system to be installed.

The Dematic system has been ordered and will be fitted for completion in March 2020.

Stage 2 of the project includes online port marking, automated palletisation and wrapping and if possible working with the MLA development team on automatic container loading.
This area still is very manual and can lead to a lot of errors being made so it is important that automation is introduced to improve efficiencies and accuracy.

When AMG met with the MLA in Brisbane in December 2019 there was some discussion around trials being done on automating container loading. This will have a significant impact on layout and design of the stage 2 works if it is successful so any information that can be forwarded in regards to this, could be taken into account when stage 2 starts.

3.3 Project 3 Digester renewal

The investigative work was completed on types of digesters and biogas systems that are available on the market. Some of these were scaled for AMG's plant in Dandenong.

AMG Dandenong is in a built up area with industrial neighbours and residential properties close by. There is therefore a potential issue getting the right EPA approvals for any upgrades and replacements to the existing DAF treatment system.

The plant operates 52 weeks of the year with only minimal closures for maintenance. This may cause some issues when looking at a new digester and ensuring there is minimal disruption.

There is an expectation that the new digester can not only process paunch waste material sustainably, but it can also create energy to reduce the ever increasing costs of electricity and gas.

Biofuel boiler options were also considered as the existing boiler would need to be replaced at some stage in the next 2 years. The main issue with this is the amount of paunch material available to run the boiler all the time to make this worthwhile.

3.4 Project 4 Creating a value-added area to meet changing customer needs

AMG beef plant in Dandenong has an old mutton kill space that is not currently being used. This space is being redesigned to create a value-added processing area. Most of the services required to operate this new room are readily available.

The AMG customers are asking for more retail ready products as they deal with issues in regards to labour, experience and increased waste. They trust the products that are packed in Australia as do their customers, allowing them to focus more on selling rather than manufacturing.

The supply of cattle in Australia will become tighter over the next few years after the drought has broken and the herd rebuilds. It is important for AMG to obtain more value from the beef that it processes in these circumstances, rather than traditionally processing more cattle. The addition of a value-added processing area will allow them to do this.

There is a large cost in converting the existing room to stage one of the value-added project. This is done with an understanding of what the customers will want going forward but the equipment required to be efficient will not be fully utilised for some time.

Each customer has a different requirement on specifications and shelf life. It is important to understand all of these needs and how they can be met before the room is built and fitted out.

There is an expectation that products will be produced in sustainable packaging, shipped and sold to the customers at a cheaper price than they can produce it themselves. Whilst this should be achievable in the long run with economies of scale, there is an investment required at the start to get the products to market at the right price.

4 Results

The project has examined a range of options for consideration in each project area. These are discussed in the following sections of this report. Much of the implementation will be part of the next innovation program as well as concluding the trials that have somewhat been delayed by the outbreak of COVID19 and the travel restrictions currently imposed.

5 Discussion

5.1 Project 1 – Electrical stunning in the Rotating Knocking box

This project was established to find a viable alternative option to percussion stunning should the overseas markets deem that percussion stunning is no longer appropriate (i.e. NZ are not allowed to percussion stun cattle destined for the UAE market). There have been a number of trials done over the past 15 years in Australia but none have come up with a commercial model.

AMG have a rotating knocking box which makes this project a little more difficult. They have engaged Carne Technologies from New Zealand to work on the project as they have a lot of experience in this area. The initial trials were using a head only stun and an immobiliser in the box to ensure the thoracic stick was done in a safe way however the results were not as good as expected. There was some swollen lungs and some blood splash issues which is consistent with other trials that have been done in the past.

The next trials were done using a Head to Body stun and the results were much better. There were no swollen lungs and no issues with blood splash. The immobiliser didn't have to be used and the normal thoracic stick procedure was adequate as there was less convulsive activity

The remaining issue is still electrical and maintaining an earth on the underside of the body as the box rotates. Carne technologies believe they can address this issue but the knocking box will also have to be modified to ensure the earth is maintained at all times. Unfortunately there has not been any further work done on this project since early March due to the closing of international borders

and imposed isolation with COVID19. The project was meant to be completed by the end of April 2020 however this will now be extended by a few months and will depend on the restrictions being lifted.

The previous trials at other plants have shown a number of issues on Grain Fed cattle. AMG processes over 90% grass fed cattle and there has been no issues. This trial, once complete, will also be conducted on grain fed cattle to see if the results differ. AMG believe that if the trials are successful then the Australian beef industry will have a viable alternative option to percussion stunning should any international markets insist on it.

5.2 Project 2 – Automating the back end logistics in the plant

AMG has recognised that the existing Cold Store at the Dandenong plant is very manual from chilling / freezing, to picking and also in dispatch. This process is time consuming, costly, has potential safety issues and can lead to inaccuracy in picking and documentation.

This project has been broken into 2 stages.
The first stage is installing and implementing a Dematic ASRS system. The plant infrastructure had to be built to house the system and trials commenced to ensure it was working as planned. This first stage has now been completed as planned and is in the commissioning stage.

Stage 2 of the project includes online port marking, automated palletisation and wrapping. This stage will commence in July 2020 and should be completed by January 2021.
The initial part of this stage is to automate the palletising area and convert some of the existing working area into more pallet storage. This will give the plant an extra 700 pallet spaces when completed and reduce the workforce in the area considerably.

The next part is to introduce port marking and if possible work with the MLA on the development of automatic container loading. The trial dates for the container loading still have to be set but it is hoped they will be able to be worked around the rest of this project.

AMG look forward to working with MLA on Stage 2 of this project and looking at any other trials and innovations they may have that will assist in improving the palletising and dispatch area further.

5.3 Project 3 – Digestor renewal project

This project has always been about finding a suitable replacement for the current system that is very old and not as efficient as it needs to be. The loading in the plant has gone up considerable in the past 2 years and this has put a lot of pressure on the system. The plant is currently processing 900 – 1000 cattle per day and that is the projected volume in the future.

The Digestor cost is very high and will take some time to implement in the plant so alternatives were being considered. The main boiler at the Dandenong plant was also very old and in need of being replaced.

A consideration was given to replacing the existing boiler with a Bio Fuel Boiler that could be run off the paunch material and negate the need for a Digestor. By burning the majority of the paunch material the existing screens and DAF system that is in place would then be able to manage the waste effectively. The main issue with this approach was that even with up to 1000 cattle being processed each day, there was not enough paunch material to run the boiler at all times.

AMG have now decided to replace the boiler with a similar boiler that they currently use, not a Bio Fuel boiler. The need for keeping things simple and consistent across the plant has outweighed the potential benefits that would come from this change.

Having made the decision to run conventional boilers the decision to move to a Digestor has also been confirmed. A location on the site in Dandenong has been established for the Digestor to be located and some preliminary diagrams have been drawn up with HydroScience to establish the layout and flow for the proposed Digestor and biogas system (see Milestone 3 report).
This is not necessarily the system that will be implemented as the budget still needs to be locked down, funding decided and a timeline established.

5.4 Project 4 – Creating a Value Added area to meet the changing customer needs

This project was about utilising some space in the existing facility to create more added value products for both new and existing customers. The Dandenong plant was originally a multi species abattoir prior to AMG taking it over. AMG will only process beef in the plant and therefore the old mutton slaughter floor will not be used for what it was set up for. The floor has the potential to be gutted and re built as a Retail Ready and added value room. There are some constraints as far as space and height are concerned but it is also located on the side of the existing plant which allows for expansion in the future if need be.

The original plan has been to create enough space for 3 lines – mince, stir fry / diced, and boneless sliced meat. The initial insights from existing and potential new customers confirmed that these 3 lines will meet the majority of their current needs. What was not clear at the time (and is still not that conclusive) was the packaging formats and size that the customers required these products in.

There is a significant cost in the packaging machinery and making sure the format that has been chosen meets the customer requirements, ensures the integrity of the product from a quality and eating perspective, and ensures enough shelf life to get the product to the market, through their supply chains and to the customer.

The target markets are both North Asia and South East Asia. This excludes China at this stage as the Dandenong plant does not hold a Chinese export license. AMG have had some market insights from the MLA curtesy of Natalie Isaacs team and from this the following has been deducted that will help form a strategy for these markets.

- Australian beef is expensive compared with local beef, some USA beef and beef from Brazil however the higher retail prices will not be as much of an obstacle as long as the premium is justified. Customers in most markets will pay a premium if the beef is of consistent quality, guaranteed safe to eat, nutritious, tender and convenient to purchase.
- Customers also want to know where the beef is from and although animal welfare is not as big a big driver except with affluent customers, it is still important. Some claims like Hormone free and Antibiotic free are seen more as marketing gimmicks in less sophisticated markets and are not top of mind with most Asian customers.
- Grass fed beef is perceived as better than Grain Fed for both the animal and consumers but purchasing decisions are made on flavour and tenderness where high marbled beef is the preference. Wagyu and Angus are seen as premium and are really the only recognised breeds. Wagyu is associated with Japanese beef which is recognised as the best beef in the markets where it is available. A combination of grass fed, marbled, Angus or Wagyu beef would therefore be the premium cut.

- Packaging above all needs to be functional with a preference for refillable / recyclable packs that are easy to transport and store. Packaging that is sustainable and plastic free is becoming more important and outweighs the design characteristics. Products are generally on display in stores for 2-3 days max so cheap packaging like foam trays for product produced instore is acceptable. (It is interesting to note that foam trays are recycled in some Japanese supermarkets.)
- Packet size is very small in most Asian countries compared with Australia. There is a growing number of 1 person and 2 person households in countries like Japan and Korea and other affluent markets. Most of these people are shopping every day and the pack size of beef is less than 500g and there is a growing trend of moving away from buying protein to buying a home meal replacement. Even in the less affluent markets with bigger households over 60% of pack sizes are less than 1kg and again these households are shopping most days.

From the insights above, the information we have from our current contacts, and, customers in the market, we will be able to do some more specific market and product trials to ensure the equipment, layout and packaging is correct.

These trials and further in market investigations have been put on hold due to the outbreak of COVID19 and the consequent international travel restrictions. Whilst there will be some developments with domestic market customers this is not the main focus for the Added Value facility.

There are a number of things that were discussed with the MLA in Brisbane in December 2019 that need to be explored further. These include developing bone broth, and extracting more collagen from hides. Whilst they may not be part of the added value room above they are areas that AMG are interested in to get more return from the animal.

6 Conclusions/recommendations

As pointed out above there are some projects that are incomplete and there is an opportunity to continue working with the MLA to ensure any learnings that come from them are able to be shared across the industry as well as the opportunity for AMG to use the knowledge of the MLA to get the best outcome for their business.

There is on-going stages in the Automation of logistics, Digestor, and Value Added projects that will form part of the Innovation pipeline in the future. AMG are happy to be involved in any other programs that the MLA staff think is appropriate from the discussions that were had in Brisbane in December 2019 such as the trials for Exo suits.

The purchase of the Cootamundra Meat plant will have challenges and opportunities and will be a great opportunity for AMG and MLA to work together in the Innovation space. The plant is planning to be ready to process up to 1000 cattle per day by Spring 2021 but will need some infrastructure changes to fit a new slaughter chain, expand and rebuild the beef boning room, expand the chillers and logistics areas and ensure the correct processes and equipment are put in place. There is a real opportunity to ensure this is the most modern, efficient and sustainable processing plant in Australia for its size.

There were 6 projects identified at the start of this process but due to the delays and reassessing the priorities in the business only 4 have been followed through on.

The projects will add a considerable amount of value to AMG in the long term and they may assist the broader processing and red meat industry understand some of the opportunities and challenges that face the industry.

Not all projects have been concluded on time or met their objectives but that also reflects the red meat industry and the challenges that affect the businesses involved in it.

7 Key messages

There are always plenty of challenges in running a processing business that is dependent on livestock being ready and in ideal condition when they are programmed in. We have seen a number of issues over the past few years with droughts and floods that have impacted supply and put pressure on the plant and servicing the customers that have been established around the world.

In 2020 the challenges so far have been much more difficult to predict and plan for. The increased demand through the end of 2019 due to a shortage of pork protein in Asia due to African Swine fever was followed by unprecedented bushfires in the lower part of Australia which caused both surpluses and shortages at the same time as plants did what they could to support their producers that were affected.

This was then followed by the drought being broken in many parts of the country this putting pressure on stock and prices as internal competition between processors and re-stockers drove unexpected demand. The last challenge is the changes that have swept the world with the COVID19 pandemic which is something no one has seen before and could have predicted. Markets both domestically and internationally, have closed down overnight while others have had unprecedented demand. The balance of the carcass has changed and values have had to be re-established over the cuts as the demand for high value cuts dropped and lower valued cuts rises.

Some of these challenges are still with us and will be for some time to come. The reason this is relevant to the projects above is that the unpredictable nature of our industry and what happens in the world has a real impact on the projects we do, the relevance they have and the ability to fund them. The Value added project is a good example where less packaging and in store processing in supermarkets has been widely acceptable in the Asian markets we were looking at. Will that now be the case or will customers require more packaging and assurances from their suppliers that they have been packed in facility that has the strictest hygiene procedures.

The MLA has a lot to offer in skills, resources, knowledge, and support for companies like AMG. The MLA CIP supports the development of innovation capability within red meat businesses and also provides expert advice and direction.

The MLA resources are not well known in small to medium sized processors and by working more closely with them they will be able to support the red meat industry for the benefit of all involved in the supply chain.