final report

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Development and commercial proving of linerless cartons for production of chilled and frozen meat product

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Executive summary

Significant losses to the red meat industry result from polyethylene entrapment of chilled and / or frozen boxed product. Polythene entrapment creates high monetary claims and rejections. This current proposed work proposed to evaluate and obtain DAFF approval on commercial proving of a newly developed and approved linerless carton design. However, due to unforeseen issues related to ownership of background intellectual properties and ownership and control of project outcomes, it was mutually agreed by the industry partner and provider that the project be terminated prior to the commencement of any meaningful research.

This project provides cost benefit services via Meat and Livestock Australia Ltd (MLA) for a project at a beef processing operation on “COST BENEFIT ANALYSIS - DEVELOPMENT AND COMMERCIAL PROVING OF LINERLESS CARTONS FOR PRODUCTION OF CHILLED AND FROZEN MEAT PRODUCT”.

This report summarises the findings of a cost benefit analysis for linerless cartons based on “enterprise level - processor” data, that is from the perspective of a beef processing enterprise including capital costs, environmental costs, labour saving, cost of packaging materials changes.

Also provided is a punch list of advantages that could be realised by grinders should the linerless cartons be implemented into their supply chain.

This report summarises the data review and analytical works completed by Lycopodium as part of the cost benefit analysis. Unfortunately due to unresolved issues relating to intellectual property, the project was agreed to be terminated prior to the commencement of any research and development.

Contents

1. Background

A beef processor in conjunction with a packaging company have been working on the development of a new linerless carton as a potential solution to polythene entrapment in chilled and/or frozen boxed product for the past two years. This extensive trial work that has been overseen by Department of Agriculture, Fisheries and Forestry (DAFF) has resulted in the successful development of a new approved carton design with an internal coating which serves as a non-stick barrier between the raw meat and the cardboard fibres. This proposed option has been assessed by the beef processor to provide the optimal solution to replace the polythene liner with an alternative safer and more cost-effective product handling option for grinding boxed product.

Approval from DAFF now exists to conduct the commercial proving trials, however several earlier attempts to develop commercial on-site carton forming and lidding processes to support the new linerless carton design have had limited success. Existing plant carton forming and lidding machinery are not compatible with the new carton design. Currently there are no commercial linerless carton erecting and lidding options available. This current proposed work was to evaluate and obtain DAFF approval on commercial proving of a newly developed and approved linerless carton design. This trial also proposed to modify the existing mechanical base erector and mechanical lidding components which neither has been achieve in the past, making this a first for the red meat industry.

The primary objective of this work was to obtain approval from DAFF and the relevant export licence authorities for the application of the new linerless carton design to be used for chilled and/or frozen grinding meat in Australia and through a major US supply chain. This project proposed to provide the appropriate equipment specifications and detailed drawings on carton base erecters and lidding machinery. The associated benefits will be validated to assist with reporting to the wider industry.

2. Project Objectives

The primary objective of this work will be to obtain approval from DAFF and the relevant export licence authorities for the application of the new linerless carton design to be used for chilled and/or frozen grinding meat in Australia and through a major US supply chain.

The proposed outcomes of the project were expected to be :

1) Validation of a new cost-effective carton design that delivers zero polythene entrapment.
2) Commercial proving of a linerless carton design that is approved by DAFF and relevant export requirements for Australian and US grinders.
3) Reduction of cost of production with fully automated carton erection and eliminates the costs associated with high grade polythene liners.
4) Development of a green solution and eliminates the need to dispose waste polythene to landfill.
5) Reduction of carbon footprint with enhanced green credentials with supply chains and customers.
6) Improved food safety with elimination of plastic foreign matter in chilled and/or frozen boxed product.

3. Project Outline

The expected outcome of the project was a final report detailing the detailed specifications and drawings of modified carton erecting (ie specific for different cartons) and lidding machinery. This modification was intended to be relevant to all red meat processors utilising the plant carton base-erecting and lidding systems. Note the general process of modifying the erector kit is likely to be the same for each individual carton specification. Nevertheless, the carton size selected to work on this project will be a standard chilled carton and consistent with other meat businesses. The associated benefits were to be validated as part of the project to assist with reporting to the wider industry. A cost benefit and impact analyses was undertaken by an independent in consultation with the beef processor, its supply chain and the packaging company. A public report will be available at the conclusion of the project.

4. Methodology

The components of the project were proposed as follows:

4.1 Pilot Implementation (Phase 1) *(i.e. Milestone 1-5)*

1. Pre-planning meeting to design modifications to existing carton forming machinery. Detailed plans, drawings and specifications required to upgrade carton forming machinery at the beef processing operation.
2. Build and install modifications Report of drawings and specifications required to upgrade carton forming machinery at the beef processing operation
3. Commercial trial planning Detailed plan scoped in consultation with the packaging company & DAFF. Trial cartons manufactured
4. Pack and dispatch samples for commercial trials Samples *dispatched to agreed domestic and US supply chains*
5. Collect data – inspect cartons from several Australian & US grinding companies working with US supply chain QA technical specialist to monitor and report outcomes. Preliminary internal report as required.

4.2 Cost Benefit Analyses *(Milestone 6a-6b)*

6a. Reporting including cost benefit analysis. Prepare summary of findings & final report including drawings and specifications. Provide a facts sheet to facilitate a press release for trade shows, industry magazines and to government agencies. An exit meeting between beef processor and/or packaging company and MLA to review project outcomes, future processors' priorities and review capability monitoring framework.
6b. Ex-post Cost Benefit Analysis and validation Milestone report to be submitted to the beef processor and MLA for review and approval.

The document used to guide the cost benefit analysis (CBA) was the MLA document: "MLA guide to value propositions and cost/benefit analysis", v 1.1, 28th Sept 2009. As stated in this

document, “CBA’s are important mechanisms to demonstrate that MLA is delivering value to the Australian meat industry”.

This specific project is required to meet the CBA requirements of commercial validation at the “facilitated adoption stage” for trial in a commercial environment from the perspective of the “enterprise level – processor”. An “ex ante” or R&D stage CBA has not been completed.

A key aspect of the method is that the base case is considered the current operations with the linerless carton project only considering the incremental changes due to the implementation of the linerless carton project.

The following Key Performance Indicators (KPIs) of the MLA AOP relate to the linerless carton project:

> [1] 2.3 Developing new products. The CBA calls for the development of technologies and capabilities along the supply chain capable of the carcass by $5/head from value added meat products.
>
> [2] 3.2: Increasing cost efficiency and productivity – off farm. The CBA calls for a technology capable of increasing the net worth of carcase by $3.50 / head (beef).
>
> [3] 3.2: Increasing cost efficiency and productivity – off farm. Develop technologies and systems capable of reducing occupational health and safety risks.

The basis of the economic analysis is a proprietary estimating spreadsheet developed by Dr Gareth Forde specifically for industrial scale manufacturing facilities. The cost estimation method was in accordance with standard industry cost estimation techniques, such as the AACE International Recommended Practice No. 18R-97, “Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries”. Cost estimation for construction works, where appropriate, was made in accordance with Rawlinsons Construction Handbook (2011, indexed to 2014).

6. Findings

5.1 Pilot Implementation (Phase 1) *(i.e. Milestone 1-5)*

The current trial was proposed to modify the existing mechanical base erector and mechanical lidding operations which neither has been achieve in the past, making this a first for the red meat industry. The primary objective was to obtain approval from DAFF and the relevant export licence authorities for the application of the new linerless carton design to be used for frozen grinding meat in Australia and through a major US supply chain. The outcome was proposed to roll out the technology to the wider industry by commercial proving a DAFF approved process and providing the appropriate equipment specifications and drawings on carton erecting and lidding machinery.

Due to the project being terminated prior to commencement of any R&D, there are no findings relating to implementing pilot trials to report on the pilot trials.

5.2 Cost Benefit Analyses *(Milestone 5-6b)*

The associated benefits were validated by a third party to assist with reporting to the wider industry. This report was completed in accordance with the document "MLA Guide to Value Propositions and Cost/Benefit Analysis v1.0".

Where it is assumed that a project requires a discounted payback period of 24 months, the base case was found to provide an acceptable discounted payback period of considerably less than that prescribed amount.

For the range of values considered in the sensitivity analysis, the project maintains a payback of less than 2 years.

A "Goal Seek" analysis was run on a range of parameters to determine the thresholds for parameter values for a less than 24 month payback.

7. Progress against Milestones

The project was terminated prior to the commencement of any research and development related to implementing the pilot trials. As such, the scope of completed work is limited to a commercial in confidence cost benefit analysis which is not able to be reported in detail due to commercial sensitivities related to the value chain being evaluated. The current report includes general assumptions and observations made in relation to the CBA.

8. Commercialisation of findings

This report summarises the findings of a cost-benefit analysis (CBA) for an energy efficiency project proposed for the chilling systems located at a beef processors operation. Using data provided by Minus40 as a basis, electricity cost savings were determined and a CBA prepared in accordance with Meat and Livestock Australia's (MLA's) "Guide to Value Propositions and Cost/Benefit Analysis v1.0". The major assumptions made were for an Earnings Before Income Tax (EBIT) scenario, 7% discount rate, 10 year installation life, all start-up costs are expended at the start of the first year of full scale operation, a 5% increase in sales and beef price increases indexed to Australian Bureau of Statistics (ABS) data. Taxation and depreciation are not considered within this model. Additional assumptions are outlined throughout the report.

A base case cost-benefit analysis yielded a discounted payback period (DPP) of considerably less than the assumed acceptable period of 2 years. For the range of the parameters considered, the project retains a payback period of less than 2 years.

Also provided is a punch list of advantages that could be realized by grinders should the linerless cartons be implemented into their supply chain, defined as:

This report summarises the data review and analytical works completed by Lycopodium as part of the cost benefit analysis.

- Savings from less plastic entrapment
- Savings or additional revenue from faster processing / grinding
- Less energy / cost / time for opening and processing compared to air chisel
- Additional cost / time for training on ideal opening method
- Additional cost / time for capturing drip
- Impacts on cost of waste disposal
- Recycling compliant

9. Implications and Conclusions

Significant losses to the red meat industry result from polyethylene (PE) entrapment of chilled and / or frozen boxed product. Polythene entrapment creates high monetary claims and rejections. This proposed work will evaluate and obtain Department of Agriculture, Fisheries and Forestry (DAFF) approval on commercially proving a newly developed and approved linerless carton design. The current trial proposes to modify the existing mechanical base erector and mechanical lidding operations, neither of which have been achieved in the past, making this a first for the red meat industry. The primary objective of this work will be to obtain approval from DAFF and the relevant export licence authorities for the application of the new linerless carton design to be used for frozen grinding meat in Australia and through a major US supply chain.

PE entrapment can create high monetary claims and rejections. Poor PE entrapment performance with high volume markets for grinding product and in some supply chains impacts heavily on an establishment's reward rebates.

If successful, the proposed carton linerless carton option is proposed to provide the following benefits:

- Solve problems associated with current PE liner entrapment.
- Reduce and/or eliminate PE claims and PE rejections.
- Remove associated risk at the patty process.
- Significantly reduce the cost at the patty process.
- No additional cost manufacturing costs at the packing plant.
- Establishment's rewards will increase and enhance loyalty as a preferred supplier of beef.

The additional associated benefits are considered to be increased market access, reduced labour and production costs and enhanced loyalty as a Tier 1 supplier leading to increased sales.