

final report

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Open innovation invention solution trial for Objective Carcase Measurement

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Purpose: A pilot partnership project using open innovation, based on Intellectual Venture's Request for Invention (RFI) process seeks invention solutions to the industry challenge of Objective Carcase Measurement (OCM) of beef cattle.

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Abstract

Objective Carcase Measurement is an approach used to characterise and differentiate beef and sheep carcasses in sufficient detail to allow a processing solution whether it be manual, manually assisted by machine, or fully automated, to be applied in a way to be more efficient and effective while maximising the value of the carcase. Currently processed meat is characterised and graded for markets subjectively; that is individual graders assess the carcase meat quality and make subjective decisions.

Objective Carcase Measurement also presents significant potential for objective grading of carcasses, leading to increased efficiencies, improved food safety due to disease detection prior to boning, and earlier decisions regarding the processing of carcasses to meet appropriate market specifications.

Intellectual Ventures and Meat & Livestock Australia collaborated to generate invention solutions, using an open innovation model that addressed the major challenge of Objective Carcase Measurement. This pilot project was based on Intellectual Ventures' Request for Invention (RFI) process and resulted in the generation of fourteen invention solutions to the Objective Carcase Measurement challenge, of which two were selected for development.

Executive summary

Objective Carcase Measurement is an approach used to characterise and differentiate beef and sheep carcasses in sufficient detail to allow a processing solution whether it be manual, manually assisted by machine, or fully automated, to be applied in a way to be more efficient and effective while maximising the value of the carcase. Currently processed meat is characterised and graded for markets subjectively; that is individual graders assess the carcase meat quality and make subjective decisions.

Objective Carcase Measurement also presents significant potential for objective grading of carcasses, leading to increased efficiencies, improved food safety due to disease detection prior to boning, and earlier decisions regarding the processing of carcasses to meet appropriate market specifications.

A new approach in meat processing is envisaged with a more integrated 'customised' supply chain, which better meets customer requirements while maximising capacity utilisation and minimising waste. The benefits of Objective Carcase Measurement are related to how objectively measured carcase characteristics are used to more efficiently process carcasses by overcoming the inefficiencies related to the wide variability in carcasses, as well as how those benefits would be monetised up and down the meat processing value chain.

Intellectual Ventures and Meat & Livestock Australia collaborated to generate invention solutions, using an open innovation model that addressed the major challenge of Objective Carcase Measurement. This pilot project was based on Intellectual Ventures' Request for Invention (RFI) process and resulted in the generation of fourteen invention solutions to the Objective Carcase Measurement challenge, of which two were selected for development relating to animal health monitoring. The next stage of the commercialisation pathway is to undertake the proof of concept research for the solutions. Based on the outcomes of this proof-of-concept work, MLA and IV will develop a more comprehensive development pathway. MLA is also considering funding additional proof of concept research of a third solution relating to high speed x-ray imaging of live animals and or carcasses.

An All-star Inventor Workshop was conducted to brainstorm potential solutions. This workshop proved to be a new innovative model for stimulating cross-discipline thinking coupled with industry expertise, to develop new approaches to solving previous intractable problems. This workshop format combined with IV's managed open innovation format and Request for Invention process will allow this model to be the most effective tool for seeking new invention disclosures to industry challenges.

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1 Background

Objective Carcase Measurement is an approach used to characterise and differentiate beef and sheep carcasses in sufficient detail to allow a processing solution whether it be manual, manually assisted by machine, or fully automated, to be applied in a way to be more efficient and effective while maximising the value of the carcase. Currently processed meat is characterised and graded for markets subjectively; that is individual graders assess the carcase meat quality and make subjective decisions.

Objective Carcase Measurement also presents significant potential for objective grading of carcasses, leading to increased efficiencies, improved food safety due to disease detection prior to boning, and earlier decisions regarding the processing of carcasses to meet appropriate market specifications.

Significant inefficiencies in processing Australian beef and lamb carcasses are attributable to the highly variable size, shape, and conformation of carcasses. The current approach involves the objective and subjective assessment of dressed beef and lamb carcasses typically undertaken at the end of the chiller cycle. An experienced operator uses a variety of measurements and visual cues to assess carcasses for further processing in the boning room and for eventual utilisation to fulfil customer processed meat specifications.

Current standardised plant practices process carcasses to an average requirement; however high levels of product variation could lead to more carcase specific processing which would enhance optimisation of product value and productivity.

A new approach in meat processing is envisaged with a more integrated 'customised' supply chain, which better meets customer requirements while maximising capacity utilisation and minimising waste. The benefits of Objective Carcase Measurement are related to how objectively measured carcase characteristics are used to more efficiently process carcasses by overcoming the inefficiencies related to the wide variability in carcasses, as well as how those benefits would be monetised up and down the meat processing value chain.

MLA has been working to develop solutions to the challenges posed by objective carcase measurement for more than 14 years. However to-date solutions have tended to take a 'piecemeal' approach driven more by the immediate priorities of the technology partner than an overall perspective of long term transformational change for the whole industry. The value proposition for the Australian red meat industry in the approach proposed is in accessing a managed open innovation process, developed by an invention organisation, sourcing possible solutions from a global multi-disciplinary inventor network.

2 Project objectives

The objectives of this project were to:

1. Target to develop or identify a minimum of 10 inventions for the objective carcase measurement portfolio. If sufficient significant high quality technical and commercialisation opportunities were identified before the portfolio reaches 10 inventions, delivery of less than 10 inventions would be deemed acceptable by mutual agreement.
2. At least two selected inventions to undergo proof of concept development to support commercialisation strategies.

3 Methodology

This project involved undertaking the following methodology:

1. *Identify and define problem.*

- 1.1. **Information Discovery process:** An Information Discovery activity was conducted to improve the team's understanding of the problem, its value to industry if solved and understand what research had previously been undertaken to address the problem; what didn't work and why. The project team conducted an extensive review of all existing reports and literature relating to Objective Carcase Measurement held by MLA. The IV team also conducted a preliminary review of the intellectual property landscape.
- 1.2. **Problem identification workshop:** A 2-day problem definition workshop was held in March 2013, involving industry experts, some key inventors and MLA staff with knowledge of the challenges associated with OCM. The problem definition workshop provided an opportunity to take a 'deeper dive' into previous work in the area, gain further insights and technical knowledge of the problem and previous solution attempts and identify some technical challenges that would be suitable for a request for invention (RFI).
- 1.3. **RFI Topic identification:** Potential RFI topics from the Information Discovery Process and the Problem Identification Workshop were then reviewed against a series of criteria; IP landscape, technical solutions available, commercial viability, areas of opportunity for technical advancement and others, to select 2 problem topics for development into RFIs.

2. *RFI Development and Release.*

- 2.1. **Validation of preferred topic:** A report of the recommended RFI topics, identified from the *Discovery Process* and *Problem Identification Workshop* was presented to MLA and the industry experts to validate that the suggested RFI topics would have a significant positive impact on the problem associated with objective carcase measurement. Two RFI topics were defined; "Imaging of Livestock" and "Biochemical Assessment of Meat".
- 2.2. **Development of RFIs:** Materials were prepared by IV and MLA for release to IV's inventor network of 4,000 individuals and 400 institutions globally. This material was a summary of the RFI specification presentation, the RFI in Objective Carcase Measurement topic, and other supporting materials.

3. *Solution Sourcing.*

- 3.1. **Review of IV patent assets:** IV's Invention Development Fund (IDF) has 3,500 existing IP assets that have resulted from its invention sourcing activities. The project undertook a systematic review of those assets to identify if any had application to the OCM problem topics.
- 3.2. **RFI release:** The 2 RFIs were developed with input from industry experts, MLA and IV. The RFIs were released to the invention network to seek solutions on 14th and 23rd March 2013 respectively. The RFIs remained open for solution submissions for a 12 month period. MLA and IV agreed on the topics and

details prior to release of RFI-13106 'Imaging of Livestock' and RFI-130107 'Biochemical Assessment of Meat'.

- 3.3. **All-star Inventor Workshop:** A key activity undertaken by the project was an All-star Inventor Workshop, held on 4th and 5th June 2013 in Sydney. The All-star Inventor Workshop brought together inventors from Australia, Asia and the US to 'brainstorm' solutions around the problems associated with OCM. An important feature of the Workshop process was the requirement that each inventor attending brought to the workshop a couple of invention ideas. These ideas didn't have to be developed, but rather were to act as catalysts to further 'brainstorming'.

4. Patent protection.

Invention solutions from the All-star Inventor Workshop and the RFI process underwent a rigorous screening and assessment process.

The IV assessment process considers the following;

- 4.1. Is the invention technically feasible? How would the invention be applied in industry? What is the likely commercial embodiment of the invention? What order of magnitude is the development cost? What are the commercial barriers to adoption?
- 4.2. Review of the patent landscape in the area of the invention topic and assessment of the ability to protect the IP. Possible jurisdictions for protection and the potential strength of any patent protection.

5. Proof of concept

IV has undertaken detailed discussion with the inventors of 4 of the selected solutions to better understand what would be required to conduct bench scale proof-of-concept research and also to estimate the development work required to commercialise the inventions.

6. Commercialisation strategies

IV worked with MLA to develop a preliminary pathway for the commercialisation of the selected inventions. As development of the inventions progresses further detail of a possible commercialisation pathway can be designed. The preliminary commercialisation pathway is shown in Section 5, Commercialisation Strategies.

4 Results and discussion

The problem definition workshop provided an opportunity to take a 'deeper dive' into previous work in the area, gain further insights and technical knowledge of the problem and previous solution attempts and identify some technical challenges that would be suitable for a Request for Invention (RFI).

MLA and IV agreed on the following topics for development into RFIs: 'Imaging of Livestock' and 'Biochemical Assessment of Meat'. These two RFIs were released to the Invention Network to seek solutions on 14th and 23rd March 2013 respectively. The RFIs remained open for solution submissions for a 12 month period. A key activity undertaken by the project was an All-star Inventor Workshop, held on 4th and 5th June 2013 in Sydney. The All-star Inventor Workshop involved industry experts, key inventors and MLA staff with knowledge of the challenges associated with OCM.

The All-star Inventor Workshop has proven to be a new innovative model for stimulating cross-discipline thinking coupled with industry expertise, to develop new approaches to solving previous intractable problems. It was also during this Workshop that it was agreed that new processes need to be invented that could ensure freshly processed red meat would remain tender. Workshop participants and industry experts felt that this challenge was outside the scope of the Objective Carcase Measurement project and that another RFI to seek solutions for 'Techniques and processes to ensuring tender meat' should be developed and released.

The RFI process and the All-star Inventor Workshop successfully sourced 17 formally submitted inventions in Objective Carcase Measurement. Of the 17 disclosures, 14 were presented to MLA and the team selected 9 for patenting.

MLA selected 4 inventions disclosures that were of most interest to the red meat industry and requested proposals from the relevant inventors to undertake 'proof-of-concept' research work. Subsequently, the project team met with Alex Ball and Skye Richmond on 4 November 2014 to discuss proposals related to the four selected inventions, and selected two of the technologies to conduct proof-of-concept development. MLA is currently preparing contracts for the work, which will commence in January 2015.

The solutions identified for proof-of-concept development relate to Animal Health Monitoring, invented by Michael Manion and others of Keon Research. An additional solution considered for proof-of-concept development relates to high speed x-ray imaging of live animals or carcasses, invented by Quentin Adam of Adam Mechanica Pty Ltd.

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Patent applications relating the invention submissions will become publically available during November 2015. For legal reasons, the details of these inventions will not be publically disclosed prior to that time.

5 Commercialisation Strategies

Following the successful completion of 'Proof-of-Concept' work, MLA and IV can develop more detailed strategies for commercialisation and licensing activities. This will include consideration of appropriate equipment manufacturers and end users.

Commercialisation of OCM will involve:

- Identifying a suitable technology provider/manufacturer with which the technology can be licensed for manufacture and supplied to the market; and
- Creating a market demand for the technology through awareness of the competitive advantage provided by the OCM technology.

Commercialisation of any OCM invention will require further development work of the core technology and development of possible ancillary technologies that are required to support the platform invention.

1. Prototype core technology development

- Identify relevant capability and undertake discussions with technology development provider to undertake prototype development of OCM invention solution.
- Develop in consultation with technology development provider a project scope, plan and indicative budget to undertake development work.
- Design and construct prototype for trialing.
- Commission and trial prototype to collect performance and operating specifications for design of commercial prototype.

2. Technology transfer red meat industry

- Identify potential commercialisation partners to license OCM technology (Equipment manufacturers).
- Identify market segments and companies in the red meat industry (End users) for OCM technology.
- Undertake targeted engagement and licensing discussions with potential OCM development companies.
- Undertake targeted engagement and application discussions with potential OCM end users.

3. Technology transfer non-meat industry applications

- Investigate potential non-meat applications for the technology.
- Determine market segmentation for non-meat applications for OCM technology.
- Identify comparative advantages of OCM against existing processes and technologies.
- Determine engagement strategies for non-meat applications.

6 Conclusions and Recommendations

The conclusion to this project is that MLA have selected 2 invention solutions for follow-up proof-of-concept development. MLA and IV may then develop a more comprehensive development pathway based on the outcome of the proof-of-concept.

This report makes the following recommendations:

1. Michael Manion of Keon Research conducts proof-of-concept work on the selected two invention solutions;
2. Quentin Adam of Adam Mechanica Pty Ltd conducts proof-of-concept on the high speed x-ray imaging of live animals and/or carcasses. [NB: MLA's commissioning of this development work will depend on other existing commitments.]

Finally this project recommends that utilisation of IV's capability and seeking solutions through their managed open innovation process, should always include an All-star Inventor Workshop. This has proven to be a new innovative model for stimulating cross-discipline thinking coupled with industry expertise, to develop new approaches to solving previous intractable problems.