



Final Report

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Value chain modelling – a decision support tool for optimising market allocation of red meat products

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Executive Summary

This project is the first research stage in the development of decision support tools that will help companies manage the increasing complexity of product differentiation required to meet new and changing market demands for red-meat supply chains. Current data available for making decisions for supply chain value is not being utilised. Furthermore, MLA have identified a strong desire to support the Australian Red Meat industry by developing capability around objective measurements, supported by digital systems to improve red-meat industry productivity through better alignment of inputs to consumer needs.

Objective measurement data will more accurately describe livestock value and enable reward for higher value carcasses. However, decisions made in carcass fabrication are required to achieve the most profitable mix of cuts and to sustain premiums. Combining these decisions on the supply and demand ends of a supply chain gives a myriad of possible pathways with significant differences in profit. Decision support tools are needed to support existing processes and the need will increase as objective measurements are developed.

This project confirmed most companies do not have the capability to manage these decisions on an ongoing commercial basis although a number recognise the need to develop this capability within their businesses in some form.

14 companies including producers, butcher shops, processors, value adders and retailers engaged in the project across beef and lamb supply chains and recognised the importance of these types of tools to their businesses in the immediate term. Six of these companies expressed a strong desire to develop and implement commercial versions of the prototypes within the next 12 months.

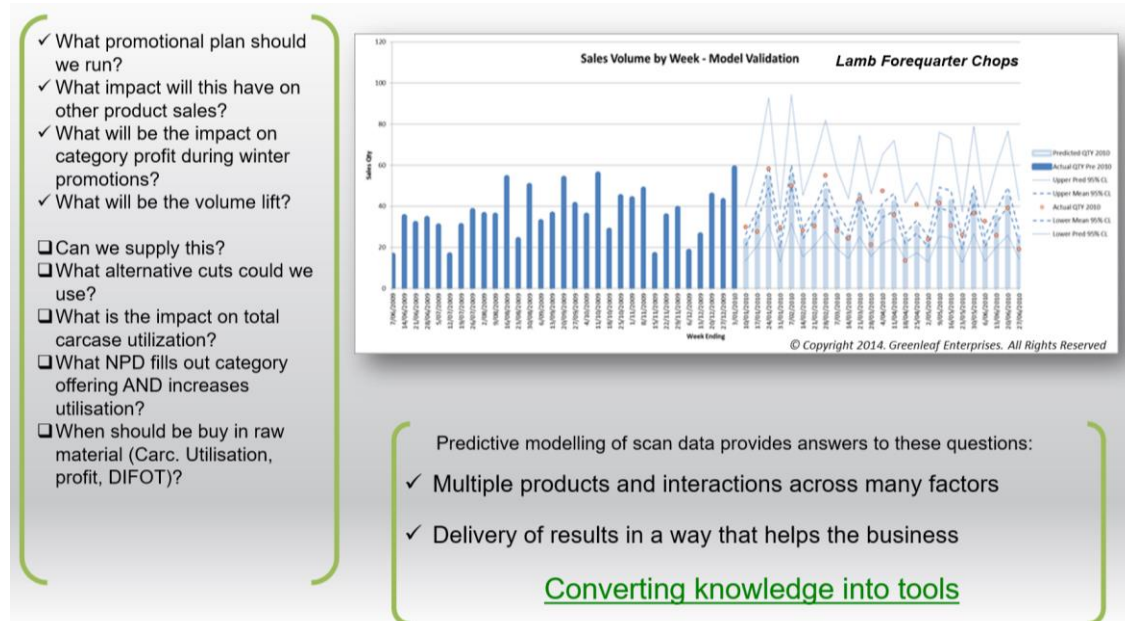
Live animal, carcass, primal, retail scan data and commodity pricing data were used in the modelling development.

Collaboration with 3 software companies during development of optimisation modelling prototypes demonstrated that profit maximisation models can be developed that increase supply chain value. Improved decision making in one retail supply chain example demonstrated a 45% increase in weekly profit as a result of improved cut breakdown and sales uplift.

Nine decision support modules listed below were demonstrated to add value through improved use of data. The four marked with asterisk were proven in trial optimisation modules.

1. Category management
2. *Sales optimization
3. *Disassembly optimisation module
4. *Product development module
5. MSA product packaging module
6. *Livestock supply module
7. Livestock sourcing/pricing module
8. Supply Chain optimisation module
9. Global strategic positioning module

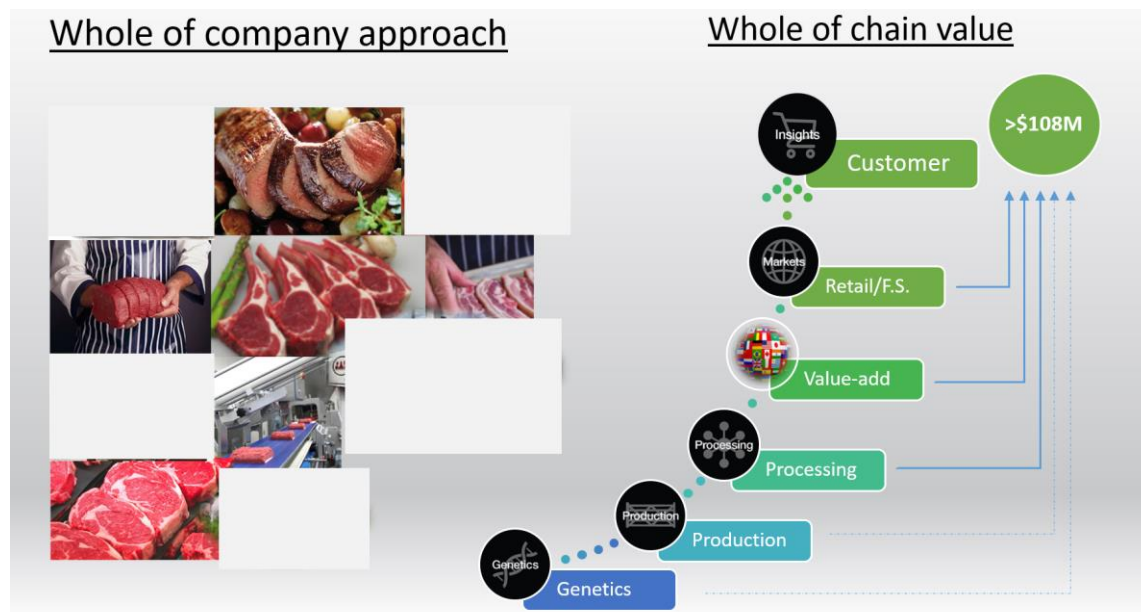
Modelling work demonstrated in the following table that multiple decision points can be forecasted accurately for increased profit.



Insight Innovation Growth

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High level work with one supply chain quantified value opportunities of greater than \$110 million annually through improved decision making with existing data.



Insight Innovation Growth

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Contents

Executive Summary	2
Contents	4
1 Introduction	5
2 Objectives	6
3 Summary activities	6
3.1 Business Analysis with Companies	6
3.2 Data Value.....	7
3.3 Delivery capability	7
3.4 Modules Documented	7
3.5 Data Analysis	8
3.6 User Interface and dashboards.....	8
3.7 Future PIP projects	8
3.8 Supporting OM strategies	8
4 Key findings and recommendations	9
4.1 Future PIP projects	9
5 Appendix.....	11
5.1 List of Tables	11
5.2 List of figures	11

1 Introduction

The Australian red-meat industry has invested time and resources in understanding and leveraging the indicators of meat eating quality to improve the supply chain processes that enhance eating quality. Improvement in the prediction of eating quality through the MSA grading system has enabled more accurate segregation of product into consumer identified levels of quality and value. Price premiums for MSA graded product has increased the incentive to utilize MSA cuts on cook method instead of traditional uses in order to generate higher value returns and promote a tailored meal occasion/consumption solution. As a result, the range of end use options for each sub-primal cuts has increased demand.

Amidst the pressure for responsiveness, there are a wider range of variables to deal with than ever before. A wider range of export customers, more destinations, tailored domestic promotion cycles and value-adding programs add to the increasing complexity of matching supply to market demand while sustaining profitability. Cut usage information can underpin seasonal promotional pricing programs and give more flexibility to adapt cuts to the seasonal demand. The impact on carcass gross profit for the processor, input costs for the value-adder, and total meat cabinet gross profit for the retailer is significant as cut usage mix and volumes change.

Objective measurement data will more accurately describe livestock value and enable reward for higher value carcasses. However, decisions made in carcass fabrication are required to achieve the most profitable mix of cuts and to sustain premiums that will result from OM technology advances.

However, research already conducted by Greenleaf indicates no companies currently have the capability to manage these decisions on an ongoing commercial basis and a number recognise the need to develop this capability within their businesses in some form.

This project is the first research stage in the development of decision support tools that will help companies manage the increasing complexity of product differentiation required to meet new and changing market demands for red-meat supply chains.

More specifically this Phase 1 project looks to:

1. Quantify the value opportunities at key decision points along the supply chain for both fresh and value-added meat products
2. Prioritise the importance of decision points in terms of their potential value to company's profitability
3. Use a combination of costing and pricing data from industry available data to scope the development of a decision support tool in conjunction with collaborating companies that will:
 - a. Assist companies in breaking down carcasses into the most profitable combination of red-meat primal and sub-primal cuts (including MSA cuts mix), and
 - b. Allocating these cuts to the most profitable market channels considering changing pricing signals
 - c. Provide information in the timeliest and structured way to support commercial decisions along the supply chain

2 Objectives

The project objectives were to:

1. Quantify the value opportunities at key decision points along the supply chain for both fresh and value-added meat products
2. Prioritise the importance of decision points in terms of their potential value to company's profitability
3. Use a combination of costing and pricing data from industry available data to scope the development of a decision support tool in conjunction with collaborating companies that will:
 - a. Assist companies in breaking down carcasses into the most profitable combination of red-meat primal and sub-primal cuts (including MSA cuts mix), and
 - b. Allocating these cuts to the most profitable market channels considering changing pricing signals
 - c. Provide information in the timeliest and structured way to support commercial decisions along the supply chain
4. Development of model functionality that considers supply chain design in supporting commercial planning decisions

3 Summary activities

3.1 Business Analysis with Companies

- Met with a range of companies of varying size and from different industries across Beef and Lamb. Many have shown interest in software to help manage their Supply Chains, procurement and sales allocation decisions.
- Investigated standard industry approaches around category management, price elasticity and equilibrium models as well as decision tree models and so called "self-learning" Markov Chain type models. Initial investigation indicates more complex models are required to fully explain all the factors involved in determining volumes and pricing strategy.
- Met with processors to determine industry need and appetite for optimisation and supply chain modelling tools. Needs were identified including monthly decision support tools to construct product mix and prices for the month ahead as well as daily and week to week pricing tools to inform more detailed product price decisions.
 - Looked broadly at decision processes currently in place including workflow through market analysis, customer communication, NPD, sales planning, promotional activity, procurement to plan, make to plan, supply and

procurement and at what point in the business process these decisions take place.

- There is a definite need for tools to help integrate all the areas mentioned as well as input factors such as bill of materials, volume predictions and supplier compliance pricing and management. Some activities are being undertaken by companies large and small to try and address these needs but there is limited implementation at this point.

3.2 Data Value

- Investigated data availability and obtained data samples to assess viability and accuracy of data available currently. SCAN and survey data from a retail supply chain perspective along with producer and processor data via NLIS and MSA were considered to map the supply chains at a detailed level with business reports from companies like BIS Shrapnel, AC Nielsen and AZTEC helping to bridge the gaps to the consumer were considered for integration with companies own live sales and process data feeds.
- Met with MLA staff to review MyMSA and possible synergies for users to integrate this and other data sources to drive decisions. Also considered the value of data integration from other industry projects.

3.3 Delivery capability

- Worked closely with three software companies testing functionality with modelling and reporting tools that will integrate into customised commercial decision tools for specific meat supply chains at an enterprise level.
- A continuous improvement process was defined to work with participating companies to walk them from the “questions to answer stage” through “model delivery” to “process improvements”, company capability development and profit improvement.

3.4 Modules Documented

- Defined a range of modules across a range of sectors (documented below).
- Defined data structure for industry generic Supply Chains and bill of Materials as a first step.
- Begun designing Optimisation model based on Supply Chain and optimised Bill of Materials. Enabled scenario analysis to make preliminary decisions on supply chain allocations.
- Begun reporting and design mapping of supply chain paths, comparing current scenario to optimised scenarios.

3.5 Data Analysis

- Collected existing data from producer through to retail mapping supply chains and bills of materials to model. Data from both public and confidential sources. Further refinement of data in milestone 4 will be required.
- Mapped data and bills of materials with related sector flows.

3.6 User Interface and dashboards

Meet with selected companies to determine how they would need to work with user interfaces and more specifically the sorts of outputs they require. This was important in taking a mathematical and financial idea which has lots of support to an actual interface that people will interact with daily as a support to their existing processes rather than a cumbersome impost.

3.7 Future PIP projects

User interface development has created a higher level of interest in development of PIP projects with a number of red-meat companies to test components of this projects range of decision modules. This was raised as a potential recommendation at the end of the milestone 3 report with one company but interest has grown since then.

Through this engagement, several companies have been identified as potential candidates for such a commercialisation project and discussions are being entered into with several of them at this level.

3.8 Supporting OM strategies

The availability of data required to support these tools has also been considered. Appetite for specific solutions that add value at multiple locations in the chain has been confirmed. Data to deliver a number of these outcomes is readily available. Integration of some of the proposed solutions with other projects around objective measurement capability could facilitate speed of adoption of a wider range of supply chain opportunities such as:

- Enable improved pricing and carcass breakdown decisions that will realise greater carcass value based on objective carcass measurement inputs
- Increased sector collaboration between producers and processors around value based marketing as a result of sharper buy/make/sell market and pricing intelligence
- Sharper customer negotiation and market/product profit based on decision support that is coupled with objective measurements

4 Key findings and recommendations

This project confirmed most companies do not have the capability to manage value decisions optimally on an ongoing commercial basis although a number recognise the need to develop this capability within their businesses in some form.

Nine decision support modules listed below were demonstrated to add value through improved use of data. The four marked with asterix were proven in trial optimisation modules.

1. Category management
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Collaboration with 3 software companies during development of optimisation modelling prototypes demonstrated that profit maximisation models can be developed that increase supply chain value.

Improved decision making in one retail supply chain example demonstrated a 45% increase in weekly profit as a result of improved cut breakdown and sales uplift.

Fourteen companies including producers, butcher shops, processors, value adders and retailers engaged in the project across beef and lamb supply chains and recognised the importance of these types of tools to their businesses in the immediate term (Table 1 below). Six of these companies expressed a strong desire to develop and implement commercial versions of the prototypes within the next 12 months.

4.1 Future PIP projects

User interface development has created a higher level of interest in development of PIP projects with a number of red-meat companies to test decision modules. This was raised as a potential recommendation at the end of the milestone 3 report with one company but interest has grown since then.

Through this engagement, several companies have been identified as potential candidates for such a commercialisation project and discussions are being entered into with several of them at this level. Indicative start times in the table indicate their willingness to proceed.

Table 1: Companies consulted by sector and need

Company	Sector	Value Proposition / modules	Solution Need*	Estimated project start
1	Processing	2, 3, 7, 8.	3	March 2017
2	Processor Vertical	1, 2, 3, 4, 6, 7, 8.	3	Feb 2017
3	Processing	1, 2, 3, 6, 8	4	May 2017
4	Processor Vertical	1, 2, 3, 4, 5, 6, 7, 8	3	More discussion required
5	Retail	1, 3, 4, 5, 7	4	More discussion required
6	Retail	1, 3, 4, 5, 7	4	More discussion required
7	Processing and retail	3, 7	5	More discussion required
8	Processing	2, 3, 7, 8.	2	May 2017
9	Producer Vertical	2, 3, 4, 6, 7, 8.	4	More discussion required
10	Producer Vertical	1, 2, 3, 4, 6, 7, 8.	5	More discussion required
11	Processing	2, 3, 7, 8.	3	More discussion required
12	Processing	1, 2, 3, 4, 6, 7, 8.	1	Unlikely
13	Value adding	1, 2, 4	4	More discussion required

***Solution Need**

- 1 *Have a solution already*
- 2 *Already aware a solution is required – see value in working with Greenleaf*
- 3 *Recognise a solution is required – aware as a result of Greenleaf engagement*
- 4 *Aware a need exists but not clear what the opportunity is*
- 5 *Not aware there is a need*

5 Appendix

5.1 List of Tables

TABLE 1: COMPANIES CONSULTED BY SECTOR AND NEED10

5.2 List of figures

No table of figures entries found.