



final report

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Value Chain Mapping Model

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1 Introduction

Value adding is one of the key ways in which to deliver increased value per head back to processors through diversifying meat based products to increase choices to end-users thus stimulating demand. A successful value added meat product in the market place either 'cannibalizes' market share from other red meat products or other animal products (pork, poultry) or actually increases overall demand for red meat products. These effects and the possible financial benefits do not necessarily impact consistently throughout the value chain. Determination of the *ex-ante* value proposition for a potential product or technology requires a clear understanding of the distribution of benefits both within an operation and between value chain partners. Therefore in attempting to increase value adding within a value chain it is essential to have a detailed understanding of the value transactions (margins and costs) and product changes that occur along it from producer to end user, so realistic opportunities can be identified and developed.

Identifying markets where an opportunity for value added products is likely to be successful often requires looking from a new perspective or a different view point. This is not easy given the limited amount of red meat value adding compared with other industries. The wide range of variables impact on the success of a new product in the market and add to the challenge. Having a tool that assists in identifying these opportunities would be quite valuable, but requires careful consideration to be simple, yet accurate and user friendly.

2 Project Objective

To model the major red meat value chains in order to describe the distribution of profits along the chain and identify opportunities for the red meat industry to increase profitability through value adding.

The model is designed to address needs at an industry and plant specific level that:

- Identify how and where new product development will add value to the supply chain;
- Determine whether the assumptions for value adding are realistic, based on best available comparative data; AND
- Capture and report numerically the direct and associated value adding margins along the chain for a product or groups of products.

3 Activities conducted

The key activities have been completed and include:

1. Model functionality built and completed;
 - a. SQL database with Access user interface (original scope was MS Excel model)
 - b. Excel export function to allow data analysis and reporting
2. Data components managed within the model to the lowest level;
3. Value-adding product groupings confirmed;
4. Bill of material capabilities included in Value-adding section;
 - a. Original scope excluded this component

5. Reporting and analysis capabilities delivered

4 General Approach and Limitations

Three main challenges had to be addressed in creating a useful modelling tool that remains relevant. These include:

- Identifying, obtaining and including accurate data at a detailed enough level in each supply chain sector and including this data within the functionality of the software.
- Building functionality to adjust, change and update both low level and high level data easily without compromising functionality or modelling capability; AND
- Presenting the results of the modelling work easily at both an industry strategic level and at a product specific level within a company specific or industry subsection of the supply chain.

Detailed explanation in the methodology section below indicates how each of these three challenges was addressed.

4.1.1 Limitations of Industry models

Primal prices are taken off specific price quotes for that period in time. The variation in price between companies and branded products within primal groupings makes it irrelevant to establish prices that represent any one companies spread of prices within and across primal types and carcase classifications.

5 Modelling Methodology

5.1 Stepped Approach

1. Before proceeding with development, a one day workshop was conducted with MLA to ensure the model development within this project was complementary to MLA's longer term objectives. A wide range of potential capabilities that could be built into this model capability were considered within the scope of the budget without compromising the immediate deliverables. Subsequent planning and review meetings were held to ensure the final deliverables were achieved.
2. Iterative steps in model development included:
 - a. Data gathering for development of supply chain interactions within a spreadsheet based model
 - b. Confirm design and develop preliminary modelling capabilities
 - c. Validation of data structure and accuracy
 - d. Confirm with MLA the final modelling functionality and reporting deliverables
 - e. Develop front page modelling tool to present the data in a finished easy to use modelling solution

5.2 Whole of industry based approach

Differentiating real value adding opportunities from good ideas is more effective when the product concepts are not considered in isolation but involve impact on supply chain partners both upstream and downstream. Therefore generating an accurate picture of the benefit created by a new value

adding initiative and how that benefit is likely to be distributed across the supply chain requires consideration of each sector of the chain at a detailed level within the modelling tool including cost, profit and volume interactions.

5.3 One Single Integrated Model

The model integrates each section of the supply chain into a single map.

Subsections of the map can be used to model specific markets, products or supply channels as if they were in isolation, but allow modelled results to flow back through to the larger industry map if desired as shown in Figure 1.

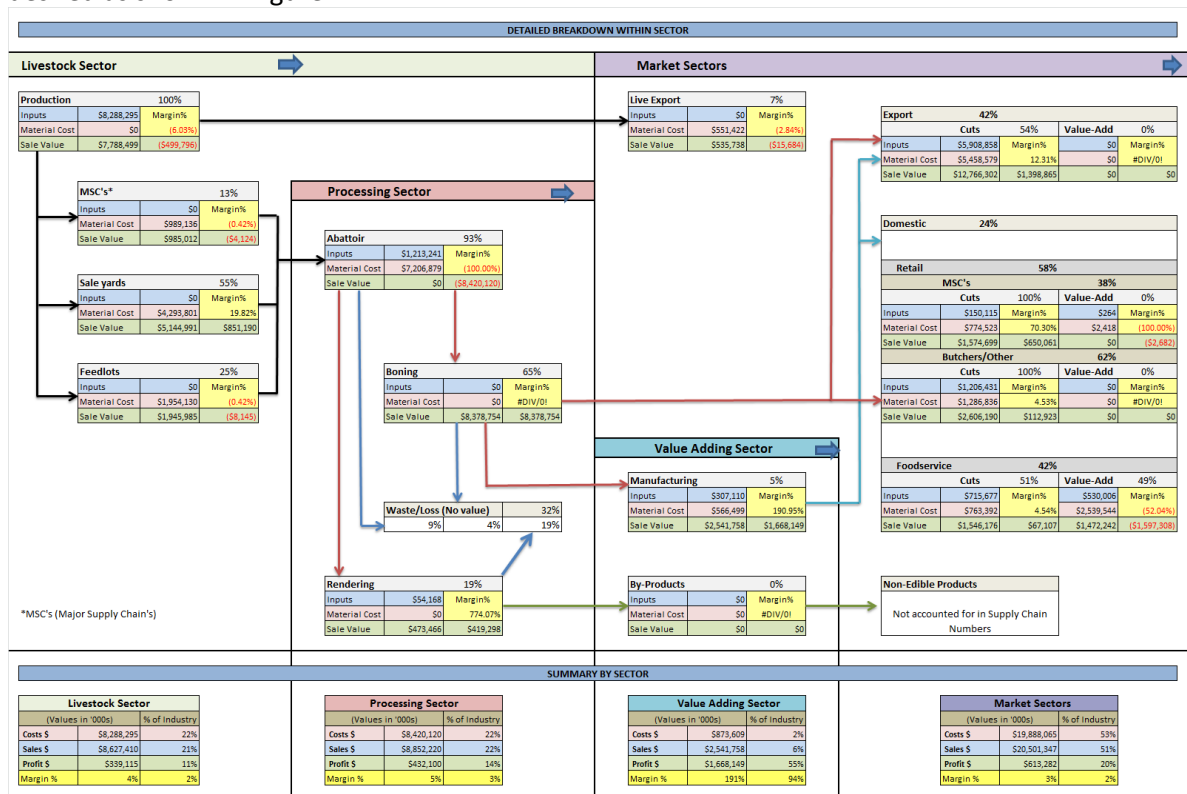


Figure 1: Example supply chain map (Exec Summary Page) – Value created at each sector in the supply chain is mapped and indexed back to a base input (Primary production costs in this scenario). All values are dynamic and adjust automatically as details are adjusted on detailed pages within the model.

5.4 Three Levels of data structure

Figure 3 below outlines in simplistic terms the three levels of detail that are included in the supply chain map:

1. Strategic Industry View (Level 1) – summarizes the combination of costs, sales and value add margin for each sector of the supply chain at a macro level.
 - a. Broad industry trends are reported at this level
 - i. Per capita consumption of red meat in a particular section of the market versus per capita consumption of value added red meat

- ii. The proportion of a market consisting of value added red meat products
 - iii. Return on investment for value adding initiatives.
- b. An industry profit waterfall table similar to the example in Figure 2

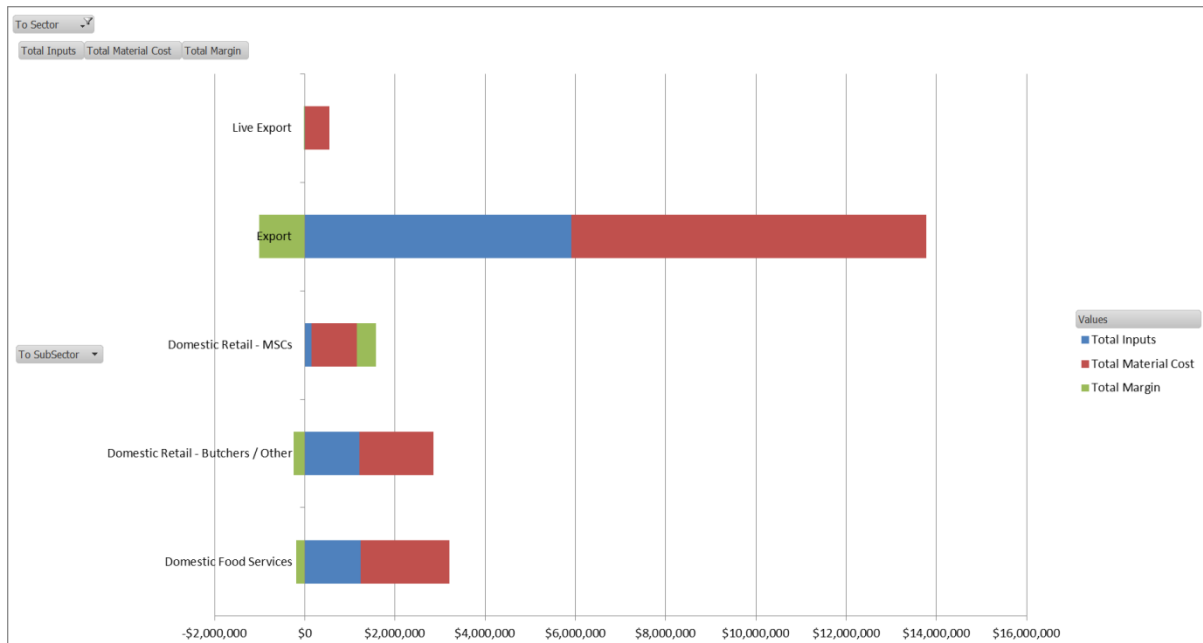


Figure 2: Profit waterfall graph indicating value adding margin for each sector of a particular supply chain

- c. This level does not involve modeling controls but reports the results of modeling inputs in the 2nd and 3rd levels.
2. Supply Chain Sector Summary (Level 2) – Breaks down and itemises the various costs, margins and volumes within each sector of the supply chain by major groupings.
 - a. For example, cost, margin and volume are reported for each value added product type. Values reported at this level are averages of detailed product costings in the third level;
 - b. Modelling different scenarios can be done at this level.
 3. Product Detail Level (Level 3) – This section includes the foundational data on a product by product, market by market, carcass by carcass, cuts yield basis.
 - a. This level links the value added products, their associated bills of materials and value relationships between supply chain sectors.
 - b. Various steps in the value adding process are captured at this level along with their subsequent costs.
 4. Company Specific Modelling (Level 4) – allows individual products or groups of products to be modelled for a specific company or section of the value chain. The section 9.4 “Managing Control Data” on page 29 provides instruction on how to develop a company specific dataset model.

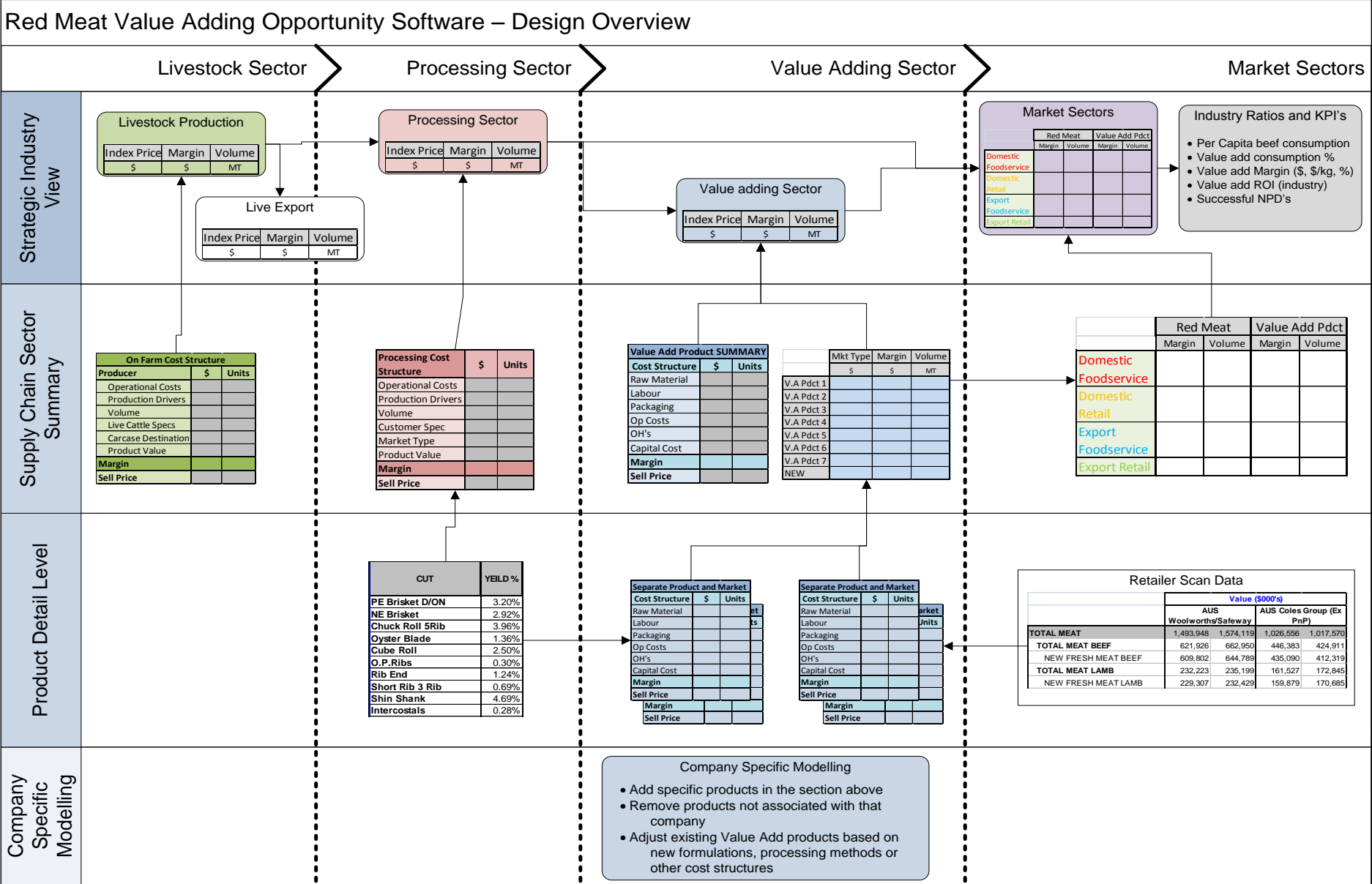


Figure 3: Value adding model design – multiple levels allow more detailed drill down from industry overview to detailed product costs and margin opportunities. Data structure is a representation only of a much larger pool of data types that will be required to address all modelling requirements

5.5 Potential Value Added Product Mapping Scenario

This section communicates the type of modelling functionality the map includes by providing a specific example of how the system could be used.

The scenario below has been broken down line by line. Each sentence represents key but different information accommodated in the model.

Scenario:

A company wants to develop a value added meat product using a particular cut of meat from low quality beef carcasses. For the product to be successful a number of activities would need to be done at the abattoir to supply the product in the appropriate form. Assuming these activities are able to be completed by the processor, the product sales, destined for domestic retail, assume a specific consumer sale price which works back from retail to deliver a value adding product margin on top of value adding costs. The product is a new concept but has similarities to existing products. The retailer is also launching products in other species that will have similar consumer usage so this creates a competitive price benchmark. These other products are placing competitive pressures on the number of SKU's allowed for value added products in the DC and in store. Other competitive forces are at play including seasonal export demand for the raw cut of meat.

Questions:

MLA, the value adder and industry want to know:

1. What is the likelihood the product pricing, cost structure and margins are realistic?
2. What other products/markets will be impacted by this products success?
3. What are the financial barriers to this product being a success?
 - a. For example, the value adder may be able to make a huge margin out of this but if profit is based on obtaining supply at a cheap price, what are the other commercial drivers (like supply) that will limit the products success?
4. If the project is successful, what is the likely benefit of this new product to the value adding company and is there any flow on of benefit to other sections of the meat supply chain?
5. What percentage of the total carcase does this product represent and is the raw material a primary or secondary product?
6. If sales are successful, how much value can this product really add to the beef industry supply chain relative to all other red meat and value added products?

Answers:

The above questions can be modelled on a product by product basis at the "Product Detail Level" in [Figure 3](#) of the model. Outputs of meat from carcase bills of materials can be connected into the model as inputs. Detailed product specific analysis can be developed to address the above questions. Summary answers generated as outputs can then be fed back into the level two and level one sections of the industry model to allow comparison and mapping at a summarised level.

5.6 Specific Modelling Capabilities

Not only does the product concepts have to be appealing to the consumer, but should involve a number of considerations. The following are examples of the types of product capabilities that will need to be achieved:

- Profit margin relative to other product lines in retail
- Comparative margin on existing uses for the raw material
- Price fluctuations on product raw material
- Other competitive values such as increased shelf life, reduced transport costs, less out of stocks, increased consumer value such as increased convenience
- Is the product a new concept or is it a product enhancement?
- What are the existing raw materials being used; what are their price points and quality attributes?
- What are the products existing uses, profits and pressures on supply and demand?
- By using the raw material in the new product concept, what impact will a successful launch have on:
 - The other products within the category
 - The existing market for the raw material
 - Resultant pricing pressure on the new product and subsequent long term demand

NOTE: some of this information such as impact on exiting product pricing through introduction of new lines will not be estimated within the model. That type of forecasting would have to be done externally. But the resultant price changes can be captured and reported in the model with comparative product by product and before and after reporting.

6 Project Challenges

The concept for this model was submitted for contract in June 2010 with a target finish date of October 2010. The project has had significant challenges and as a result has been completed almost 10 months overdue.

6.1 Delay in starting model design

The key output from this project is a model that maps the inputs and outputs in value for the different supply chains and segments within the Australian beef industry. The project proposal included development of a Microsoft Excel based model to capture and report values within the value chain. Although MS Excel has been considered adequate to complete the project objectives, Excel models have some limitations around scalability, flexibility to add additional component and sub-component calculations, sharing model information and updating and managing data across multiple users. Although more complex programming languages provide additional functionality and scalability, the budget was not sufficient to allow this.

Another project around analysis of the Western Australian Beef Industry was being discussed around the time of commencing this project. Although that project has very different requirements and end

objectives, the components, data and some of the calculations were similar across the two projects. A presentation was given to the CIS Management team identifying the potential synergies between the two projects. The feedback was to continue with each project and optimise synergies between the projects where possible. If the other project were able to be developed in conjunction a different programming language could be used giving more functionality to this Value Chain Mapping project than outlined in the scope of works.

The Western Australian project took longer than expected to eventuate due to delays outside MLA's control in finalising strategies within W.A. government.

At an interim review meeting with MLA in October it was agreed to proceed with development of an excel model as originally planned. So the commencement date on this project was delayed for 10 weeks (5 weeks on contract sign-off delays, plus an additional 5 weeks while determining whether to build in conjunction with the other project).

6.2 Data Collection Challenges

Collection of appropriate data to establish input costs and profit margins for each supply chain sector has been a significantly greater challenge than expected. The collection and assembly of appropriate data has continued to be a challenge resulting in extra cost and project delays.

It was expected that 80% of the data required to develop the models would be available through MLA. Work with the market analyst team at MLA has been helpful in gathering volume data and livestock pricing. However, lack of pricing data for cuts from processing through to end markets made it impossible to achieve the project objective of mapping profitability. Costs of production within each sector other than on-farm production were also missing. Discussions within CIS and Market Reporting departments confirmed prices are not collected for individual meat cuts. MLA's data gathering requirements are for more general purposes and a lot of the information required would be considered commercial in confidence.

This posed a huge gap in the data requirements. Four days' work had been budgeted in the original scope which included gathering data from MLA, sorting and interpreting. Additional resources were invested at Greenleaf's expense and cost 52% of the total budget when data gathering had been budgeted at 8% of the total. Not only was cost an issue but the length of time taken to obtain then decipher and piece together the data took almost the entire length of the original project timeline to achieve.

Developing a clear picture of the Australian red meat industry within each supply chain sector requires data for each sector detailed enough to show distribution of product types (volume and values) along with associated costs of goods created. Balancing volume through the chain is important in validating the robustness of data.

The biggest data gaps are around sales pricing of different meat cuts and operational costs within the processing and marketing sectors. Even after initial data collection began it was assumed some pricing data would be available within MLA market reporting department. In order to fill the gaps Greenleaf market data and cut yield data were used to extrapolate sales pricing and cost of sales across the full range of cuts and carcase types within the model.

6.2.1 Data Availability

The unbudgeted work involved collecting additional market data required to populate the models including:

- State department of Ag research and reporting papers
- ABARE reporting
- Australian Bureau of Statistics reporting
- AC Neilson Scan data for domestic retail
- ALFA, AUS-Meat and Cattle Council reporting
- IBIS industry reports
- International market and pricing reports (via internet)
- On Farm cost of production benchmarking
- Specific product costing sheets for value added products including packaging and labour requirements
- Industry knowledge
- Conversations with sales departments of meat processors
- AUS-Meat cut codes data files
- Other various reports (via internet)

The additional effort required to obtain data, along with a three and half month delay to the start of the project has been the significant delays in delivery of the final milestone.

In addition, management of data within the model had to be rebuilt, contributing further to the delay.

6.2.2 Data Management Platform

The project outlined development of a supply chain model in Microsoft Excel format. As the supply chain frame work was developed the progressively greater breakdown of livestock into livestock categories, then processed carcase categories and subsequently individual cuts of meat tracked by carcase type and cost through the whole chain became too complex for Excel to manage in an effective way. When the excel file reached 28MB the decision was made to redevelop the model in Microsoft Access. It was acknowledged at the time that Access is not a suitable database for enterprise level systems. However, given this project was intended as a prototyping project that may be expanded at a later date after input from other departments within MLA it was decided to progress with Access development.

A further step to improve on the database speed and functionality was taken to convert the database to SQL while maintaining the user interface in Access.

Reporting functionality was maintained in Microsoft excel. A reporting function tab within Access exports the database results into formatted excel reports. A series of formatted pivot tables allow users to query the results, drilling into and comparing different segments of the data in a quite versatile way. Further explanation of reporting functionality is explained in section 10 “Reports” on page 38.

6.2.3 Processing and value adding focus

The primary focus of modelling outputs is to reflect the increase in supply chain value created by development of value-added products. For this reason the provision of data entry points for live animal and primary processing inputs is minimal and at a summarised level within the model.

During the data collection phase a lot of focus was put on the collection of on farm production data to provide livestock production costs as accurately as possible. There is a wide range in variability of production data across the country and across different sized production systems. As this sector of the industry is not the key focus of this project it was agreed at the Milestone 1 review meeting with MLA that average numbers published in existing livestock sector reporting will be used as averages in the modelling work.

The following examples indicate components that have not been included but would be useful inclusions in a revised model:

- Breakdown of on-farm production costs
- Inputs between sectors like freight, tariffs to various markets, importer, trader volumes and margins
- Inclusion of MSA cattle, cuts and prices
- R&D input costs per sector, forecasted improvement in operations (reflected as reduced cost of production or increased sales value) and resultant return on R&D investment.

7 Model Functionality

Screen shots below demonstrate some of the functions built into the model including:

- Tracking of cattle types through abattoirs by broad product grouping
- Tracking cuts through sales channels by primal volume and value by carcass type
 - A range of carcass yields and price options were built into the model for each carcass type aggregating into a total value by carcass type.

		cut_specs										5/12/2010								
Heavy processed/Exp ox		Non-discounted MSCW range 300 - 420 kg										Average Carcass Weight 395 150								
												Average PB fat 14 20								
												SMA 80								
												LMY								
MSCW Lo	180	200	220	240	260	280	300	420				270								
MSCW Distribution	5%	5%	5%	5%	5%	5%	60%	5%				95%								
1% Lo		3	7	23	33	43	50					35								
BMA																				
LMY	60.7%	62.3%	64.0%	65.2%	66.8%	68.5%	69.7%	71.5%	73.0%											1

CUI	YIELD %	KG	YIELD %	KG	YIELD %	KG	YIELD %	KG	YIELD %	KG	YIELD %	KG	YIELD %	KG	YIELD %	KG	YIELD %	KG	YIELD %	KG	
PE Brisket DION	3.20%	5.8	3.20%	6.4	3.20%	7.0	3.20%	7.7	3.20%	8.3	3.20%	9.0	3.20%	9.6	3.20%	10.4	3.20%			3.04%	8.20
NE Brisket	2.92%	5.3	2.92%	5.8	2.92%	6.4	2.92%	7.0	2.92%	7.6	2.92%	8.2	2.92%	8.8	2.92%	12.3	2.92%			2.77%	7.40
1 Rib NE Brisket																					
Brisket Skirt (18K)	0.41%	0.7	0.41%	0.8	0.41%	0.9	0.41%	1.0	0.41%	1.1	0.41%	1.1	0.41%	1.2	0.41%	1.7	0.41%			0.39%	1.05
Thin Flank Meat	1.19%	2.1	1.19%	2.4	1.19%	2.6	1.19%	2.9	1.19%	3.1	1.19%	3.3	1.19%	3.6	1.19%	5.0	1.19%			1.13%	2.98
Chuck Roll 6Rib	3.96%	7.1	3.96%	7.9	3.96%	8.7	3.96%	9.5	3.96%	10.3	3.96%	11.1	3.96%	11.9	3.96%	16.6	3.96%			3.78%	10.18
Chuck Tender																					
Oyster Blade	1.36%	2.4	1.36%	2.7	1.36%	3.0	1.36%	3.3	1.36%	3.6	1.36%	3.8	1.36%	4.1	1.36%	5.7	1.36%			1.29%	3.48
Conical Muscle																					
Cube Roll	2.90%	4.5	2.90%	5.0	2.90%	5.5	2.90%	6.0	2.90%	6.5	2.90%	7.0	2.90%	7.5	2.90%	10.5	2.90%			2.37%	6.41
O.P.Ribs	0.30%	0.6	0.30%	0.6	0.30%	0.6	0.30%	0.7	0.30%	0.8	0.30%	0.8	0.30%	0.9	0.30%	1.2	0.30%			0.28%	0.76
Rib End	1.24%	2.2	1.24%	2.5	1.24%	2.7	1.24%	3.0	1.24%	3.2	1.24%	3.5	1.24%	3.7	1.24%	5.2	1.24%			1.18%	3.18
Short Rib 3 Rib	0.69%	1.2	0.69%	1.4	0.69%	1.5	0.69%	1.6	0.69%	1.8	0.69%	1.9	0.69%	2.1	0.69%	2.9	0.69%			0.65%	1.78
Thin Shank	4.69%	8.4	4.69%	9.4	4.69%	10.3	4.69%	11.3	4.69%	12.2	4.69%	13.1	4.69%	14.1	4.69%	19.7	4.69%			4.46%	12.04
Interosals	0.28%	0.5	0.28%	0.6	0.28%	0.6	0.28%	0.7	0.28%	0.7	0.28%	0.8	0.28%	0.8	0.28%	1.2	0.28%			0.27%	0.72
Inside	3.73%	6.7	3.73%	7.5	3.73%	8.2	3.73%	9.0	3.73%	9.7	3.73%	10.5	3.73%	11.2	3.73%	15.7	3.73%			3.54%	9.57
Tenderloin 3off	1.21%	2.2	1.21%	2.4	1.21%	2.7	1.21%	2.9	1.21%	3.1	1.21%	3.4	1.21%	3.6	1.21%	5.1	1.21%			1.15%	3.11
Striploin	2.65%	4.8	2.65%	5.3	2.65%	5.8	2.65%	6.4	2.65%	6.9	2.65%	7.4	2.65%	7.9	2.65%	11.1	2.65%			2.51%	6.70
Butt Tenderloin	0.12%	0.2	0.12%	0.2	0.12%	0.3	0.12%	0.3	0.12%	0.3	0.12%	0.3	0.12%	0.4	0.12%	0.5	0.12%			0.11%	0.20
Shortloin	0.98%	1.8	0.98%	2.0	0.98%	2.2	0.98%	2.3	0.98%	2.5	0.98%	2.7	0.98%	2.9	0.98%	4.1	0.98%			0.93%	2.51
Outside	2.27%	4.1	2.27%	4.5	2.27%	5.0	2.27%	5.5	2.27%	5.9	2.27%	6.4	2.27%	6.8	2.27%	9.5	2.27%			2.16%	5.83
Outside Flat	0.81%	1.5	0.81%	1.6	0.81%	1.8	0.81%	2.0	0.81%	2.1	0.81%	2.3	0.81%	2.4	0.81%	3.4	0.81%			0.77%	2.09
Eye Round	0.57%	1.0	0.57%	1.1	0.57%	1.3	0.57%	1.4	0.57%	1.5	0.57%	1.6	0.57%	1.7	0.57%	2.4	0.57%			0.55%	1.47
Flank Steak	0.49%	0.9	0.49%	1.0	0.49%	1.1	0.49%	1.2	0.49%	1.3	0.49%	1.4	0.49%	1.5	0.49%	2.0	0.49%			0.46%	1.23
Flank Plate	0.79%	1.4	0.79%	1.6	0.79%	1.7	0.79%	1.9	0.79%	2.0	0.79%	2.2	0.79%	2.4	0.79%	3.3	0.79%			0.75%	2.02
Knuckle	3.43%	6.2	3.43%	6.9	3.43%	7.6	3.43%	8.3	3.43%	9.0	3.43%	9.7	3.43%	10.4	3.43%	14.5	3.43%			3.28%	8.88
D-Rump	3.90%	7.0	3.90%	7.8	3.90%	8.6	3.90%	9.4	3.90%	10.1	3.90%	10.9	3.90%	11.7	3.90%	16.4	3.90%			3.71%	10.01
Tri Tip	0.43%	0.8	0.43%	0.9	0.43%	1.0	0.43%	1.1	0.43%	1.2	0.43%	1.3	0.43%	1.3	0.43%	1.9	0.43%			0.42%	1.15
Cube Roll Po	0.05%	0.1	0.05%	0.1	0.05%	0.1	0.05%	0.1	0.05%	0.1	0.05%	0.1	0.05%	0.1	0.05%	0.2	0.05%			0.05%	0.12
HEEL Muscle																					
TOTAL PRIMALS	44.12%	79.59	44.19%	85.43	44.19%	97.26	44.19%	108.10	44.19%	114.94	44.19%	123.78	44.19%	132.61	44.19%	185.54	44.19%			42.0%	113.39
SCRAI*																					
Leg Bones FQ	2.71%	4.9	2.71%	5.4	2.71%	6.0	2.71%	6.5	2.71%	7.1	2.71%	7.6	2.71%	8.1	2.71%	11.4	2.71%			2.55%	7.0

Figure 4: Cut yield breakdowns by carcass type

- Tracking value-added products through sales channels by value-added product type including broad breakdown of cost of goods sold (COGS)
 - This break down of COGS allows value-add created by development of new packaging or value-adding processes to be captured in the transfer of value along the supply chain
 - Although the models under development are “steady state” or static point in time models, various scenarios can be run to show the impact of cost and price variations on value-adding margin.
 - A complete range of value-added product types has been included in the model.
 - New value added products are then added within each value adding sector.
 - The product below (value-added cooked Halal Striploin) would be inputted to the model at current raw primal prices. Margin created through this value adding process is recorded in the model and reported as an increase over existing channel gross margin.

Halal Striploin (WHOLE)					
Kilograms produced/day			1600		
Injection Cost/litre(Kg)	\$ 0.20	Kg	Utilizatio	80%	
Raw Cost/kg					\$ 4.25
Trimming loss pre-cooking	0%	loss			\$ 4.25 Kg
Raw Meat portion of ingredients		1 Kg			\$ 4.25
Injection	20%		@ \$ 0.25	Kg	\$ 0.05
Addition of marinade	0%	@	\$ 0.30	Kg	\$ -
Pre-cooked cost of raw material	120.0%				\$ 3.58
Cook loss	25%	@	\$ 3.58	Kg	\$ 0.90
Trimming loss post-cooking	0%	@	\$ 3.58	Kg	\$ -
Packaging					
CN 530 bag (Cooking)	1.40	Kg pack	\$ 0.30	bag	\$ 0.21
CN 530 bag (Portion packed)	0.00	Kg pack	\$ 0.30	bag	-
Carton and wraps					\$ 0.15
Direct Labour					
Packer	3	430.04	602.06	361.23	\$ 0.23
Machine operator	1	445.15	623.21	124.64	\$ 0.08
Inspection		\$ 100.00	day		\$ 0.06
Plant O/H (w/o equipment and plant)	\$ 0.96	@		80%	\$ 0.77
Selling expense (FOB)					\$ 0.15
Administration					\$ 0.37
Equipent Costs					
					\$ 0.06
Profit	14% ROS				\$ 1.52
			Total		\$ 8.13
Freight expenses					
		\$ 1,190.00			
Total freight costs					\$ 2.98
Total C&F price					\$ 11.10

Figure 5: Bill of Material product costing capabilities within the model

- Value added products include the appropriate combination of ingredients and operational costs in each of the product costing tables.

Hamburger Patty Formulaton			
Component	Cost/Kg	Usage	Product Cost
Target Chemical Lean	68.30		
Meat Cost		101.60%	\$ 1.75
Meat used	\$ 1.75	66.00%	1.16
Supro Granules	\$ 1.07	3.00%	0.03
Supro 500E	\$ 4.80	3.00%	0.14
TVP	\$ 1.62	2.00%	0.03
Premix	\$ 1.28	5.40%	0.07
Water	\$ -	20.60%	0.00
Total Ingredients		100.00%	\$ 1.282
Nitrogen			0.1157
Plastic Liners	.081/liner	4.8 kg	0.019
Labels and Tape			0.011
Outer Cartons	\$0.428/ctn	4.8kg	0.090
Packaging			0.148
Direct Material Cost			\$ 1.55

Figure 6: Bill of Material product costing capabilities within the model

- Supply chain logistics costs have been considered a part of total overhead costs by product on a per kilogram basis.

7.1 Model functionality – User interface

Although the model is being developed as an industry wide model, the functionality required by the CIS Value-adding team needed to support individual companies on a case by case basis is its primary capability.

One of the biggest challenges is assembling data in a user-friendly way while maintaining enough complexity to answer specific questions at a product drill down level. The inclusion of detailed product costings at a sub primal level for both value-added and none value added cuts are critical areas for processing companies to address and contribute significantly to whether a new value-added product is worth pursuing or not. Including every possible combination of raw materials from different carcass types, then added to packaging, labour and other processing fees adds cumbersome complexity to a model that also needs to report difference in profit margin between a producer and a retailer is a challenge.

A key decision was made in consultation with MLA to provide this low level modelling on a series of independent files but allow for the summary data to input directly in to the total industry model.

7.1.1 Project Scope Creep

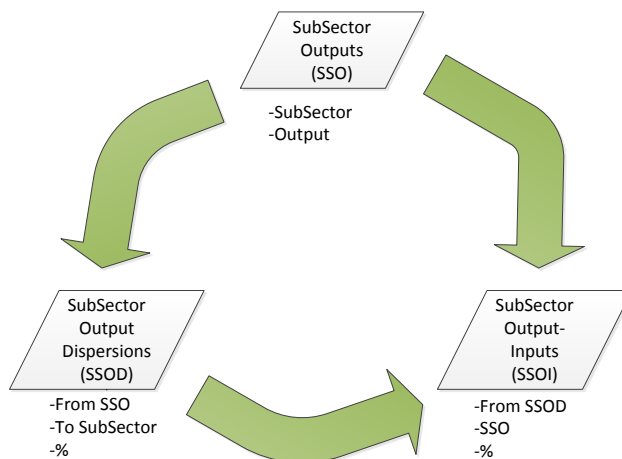
Given the model was to be developed in excel separate files with Bill of Material costing sheets were to be used to develop costings (see examples in Figure 5 & Figure 6 on page 16). The summary percentages and cost were then to be entered in one line in the model. As the model grew in size and was converted to a database the request was to build the BOM's as an integrated component including multiply configurable line items for each type of ingredient and packaging. A number of revisions of the structure with subsequent changes to the database were required to achieve this.

7.2 Model Structure and design

A significant change in the structural design of the model occurred as a result of the data gathering delays but the outcome of this is an additional benefit to the project. The intention was to develop a model in Microsoft Excel as a stand-alone model. Rather than build model functionality around unknown data sources it was easier to put the model development to one side and collect data into a simple data base. From there a data structure was developed that could then be exported into an excel model. As additional information was added to the database it was exported to generate a new improved excel model. The benefit for the CIS department was the ability to easily improve on the excel framework as we progressively gathered more data.

It should be noted here that the focus of this project is a supply chain model that services the CIS Value-adding department. There are other wider needs within other sections of the supply chain that won't be met in the existing model. The benefit for the greater MLA group in this new approach is a base platform on which to build other functionality over time.

Given the varied ways in which inputs in one sector are transferred to another sector, the model structure had to account for multiple channels but not be constrained where an entire sector was



bypassed. The following refers to tables within the database structure and explains model design. This terminology is not visible in the user interface so does not concern the general user.

Transfer from farm to live export (possibly via saleyards or direct) or from farm to processing to market with the option to pass through value adding is the example used in the data structure diagrams in Figure 7 and Figure 8.

Figure 7: Data structure terminology and explanation

Subsector Outputs (SSO) refer to products created within that Subsector. The user designates what is produced in the sector in appropriate percentage with appropriate costs. The Subsector "Farm" in Figure 8 produces an output "Cow".

The user then designates in relevant data entry tables where "Cow" is dispersed to, referred to as "SubSector Output Dispersions (SSOD)". The example in Figure 8 shows 30% of "Cows" going to the processing sector with the remainder going to Export. The 30% of "Cow" going to processing is broken into meat and offal (80%) and waste (20%) in the far right section of Figure 8. These percentages are the preliminary breakdown of the outputs from the previous SubSector and become the inputs into the next SubSector. Note the 70% of "Cow" going to export remains intact at 100% in the SSOI because it is then dispersed to Live Export as the output from Live Export. The alternative scenario for Cow is that 80% of the SSOI (meat) goes into the next Processing (Boning) SubSector and is broken into various cuts that become the outputs from that SubSector. Export Cuts are then dispersed out of Export Processing SubSector in the middle column. At that point they have not been designated a SubSector to be inputted into. The far right column designates 100% of these "trimming cuts" (SSOI) as inputs into Export "Meat Pattie" in the value adding sector. So the flow in Figure 7 moves from output in one SubSector (SSO) to Dispersion (SSOD) from that sector in various percentages, and becomes an input (SSOI) into another SubSector to begin the process of further breaking down, value adding and dispersion.

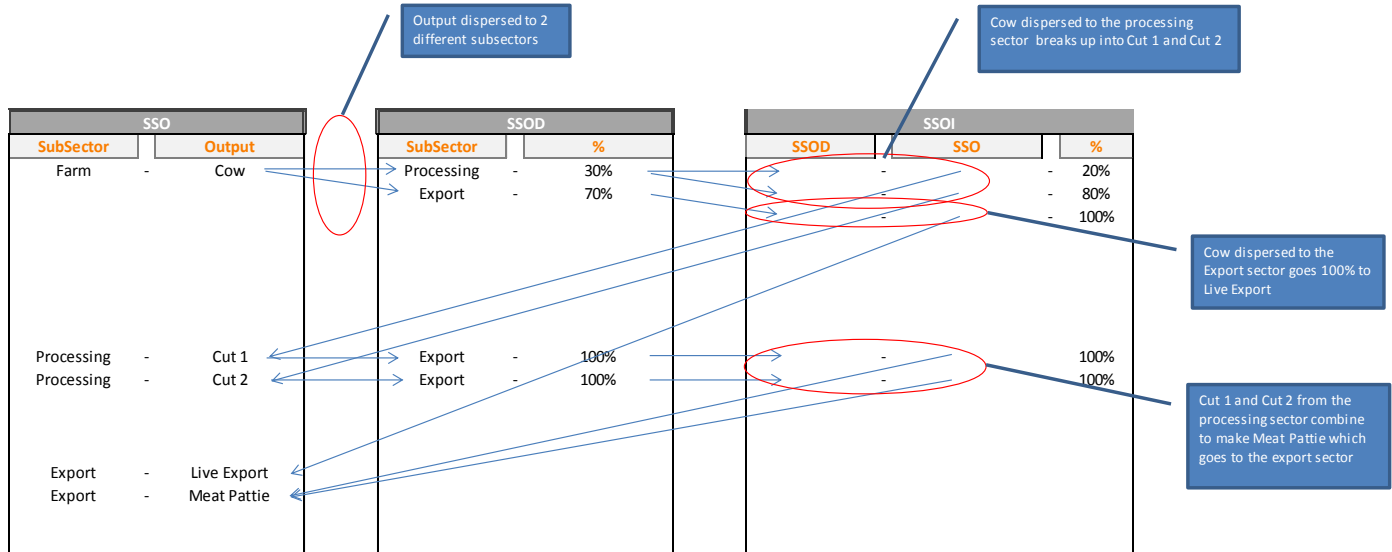


Figure 8: Data structure explaining output, dispersion and input logic

7.3 Data Assumptions

1. Conversion of multiple units of trade to consistent units
 - a. A range of volume units are used across the industry including Live Weight, Hot carcass weight, cold carcass weight, Average kilograms per head, retail sales weight, primal sales weight. Cost and sales values are then applied across these various units to give rules of thumb within each sector of the industry.
 - b. The challenge in developing a model that seamlessly converts from one unit to the other while maintaining track of all kilograms and value per kilogram within the supply chain is complex.
 - c. To enable this within the budget, all volumes including production on farm are included in the model as kilograms. This creates some limitations in referencing external data that uses one or more of the units in point a. above. See 8.1.1 "Conversion of multiple units of measure" for more detail.
 - d. Percentages are used to calculate changes in kilograms back up the chain. The user models different scenarios by changing percentages rather than on a per head basis. The total model is driven off the volume of cattle (LW kgs) inputted into the chain.
2. The total kilograms of livestock in the model refers to the total volume of meat processed for the year or period being modelled. This does not include breeding cattle or offspring that are to be sold into processing or live export within the period.

7.4 Livestock Categories

MLA Database Description	Aus-Meat Cipher	VCM grouping
BEEF	A	A
BEEFALO		
BULL	B	B
BULL AND BEEF	B	B
COW	C	C
GFED PRIME BEEF	GFPR	GF
GFED PRM STEER	GFPRS	GF
GFED YEARLING B	GFY	GFYG
GFED YNG PRM B	GFYP	GF
GFED YNG PRM ST	GFYPS	GF
GFED YOUNG BEEF	GFYG	GFYG
GRAINFED BEEF		GF
GRAINFED COW	C	C
GRAINFED OX		GF
GRAINFED STEER		S/SS
LFED YOUNG BEEF		S/SS
LOTFED BEEF	S	S/SS
LOTFED OX	S	S/SS
OX	S	S/SS
PINK VEAL		V
PRIME BEEF	PR	PR
PRIME STEER	PRS	PR
STEER	SS	S/SS
VEAL	V	V
YEARLING BEEF	Y	Y/YS
YEARLING STEER	YS	Y/YS
YOUNG BEEF	YG	YG
YOUNG BULL	BYG	B
YOUNG PRIMEBEEF	YP	YP
YOUNG PRM STEER	YPS	YP
YOUNG STEER	YGS	YG

Table 1: Livestock cipher assumptions

The MLA database reports livestock numbers using the descriptions in the left hand column. AUS-Meat ciphers are used in the market place to classify all primal cuts depending on which livestock type they come from. This

Table 1 groups the wider range of ciphers into the most commonly used ones. This allows correlation of the current MLA reporting terminology to the database for easy updating and data dumps. There is an ability to join multiple SubSectors into one output from one subsector as in this table where Yearling Beef (Y) and Yearling Steer (YS) are grouped together downstream in the model.

Output From SubSector	Total (000's)	Dispersed (000's)
A	1,576,444	1,576,442
V	44,148	44,146
B	77,052	77,050
GFYG	38,734	38,733
C	465,228	465,226
GF	946,699	946,697
S/SS	813,420	813,419
PR/PRS	27,072	27,070
Y/YS	0	0
YP/YPS	67,056	67,055
YG	108,705	108,704
BYG	416	414
YGS	0	0

Table 2: Livestock types within model

7.5 Livestock Costs

Output From SubSector	Variable O'Heads (\$/Kg)	Sale Price (\$/Kg)
BEEF	\$1.78	\$1.67
BULL	\$1.70	\$1.60
BULL AND BEEF	\$1.70	\$1.60
COW	\$1.38	\$1.29
GFED PRIME BEEF	\$1.79	\$1.68
GFED PRM STEER	\$1.79	\$1.68
GFED YEARLING B	\$1.79	\$1.68
GFED YNG PRM B	\$1.79	\$1.68
GFED YNG PRM ST	\$1.96	\$1.84
GFED YOUNG BEEF	\$1.96	\$1.84
GRAINFED BEEF	\$1.79	\$1.68
GRAINFED COW	\$1.38	\$1.29
GRAINFED OX	\$1.79	\$1.68
GRAINFED STEER	\$1.79	\$1.68
LFED YOUNG BEEF	\$1.93	\$1.81
LOTFED BEEF	\$1.75	\$1.65
LOTFED OX	\$1.75	\$1.65
OX	\$1.75	\$1.65
PINK VEAL	\$2.62	\$2.46
PRIME BEEF	\$1.75	\$1.65
PRIME STEER	\$1.75	\$1.65
STEER	\$1.75	\$1.65
VEAL	\$2.62	\$2.46
YEARLING BEEF	\$1.93	\$1.81
YEARLING STEER	\$1.93	\$1.81
YOUNG BEEF	\$1.93	\$1.81
YOUNG BULL	\$1.70	\$1.60
YOUNG PRIMEBEEF	\$1.93	\$1.81
YOUNG PRM STEER	\$1.93	\$1.81
YOUNG STEER	\$1.93	\$1.81

Table 3: Livestock Variable Overhead Costs

7.6 Processing and Boning Costs

IBIS and other industry reports indicate the average processing sector profit in 2010 was 2.7%. This does not differentiate between domestic and export processing facilities.

The breakdown of costs and margins within the processing sector as established by the following backwards elimination process:

- Livestock sales prices (live weight and over the hooks) are reported weekly and provide a relatively stable foundation on processor input costs.

Cost of growing livestock in the production sector is reported as a single figure referred to as Variable Overhead Cost \$/kg (live weight) here in Table 3. The livestock sale price is also entered with the difference being the margin generated for that cattle type.

Production		100%
Inputs	\$7,349,583	Margin%
Material Cost	\$0	(6.10%)
Sale Value	\$6,901,160	(\$448,423)

Table 4: Component of Supply chain map summary reporting page

The Inputs section of Table 4 refers to the Variable overheads. The material cost refers to cost of product from the previous sector. As the Production sector is the source Material Cost is blank.

- ABS report volume and type of cattle processed on a weekly basis giving a total input cost.
- Domestic and export sales prices were obtained by cut for both domestic and export product as explained in section 7.7 "Primal Pricing Methodologies" on page 23.
- Carcase yields include breakdown of cuts by percentage of carcase for each carcase type
- HSCW \$/hd = Processor sales value, calculated by multiplying primal cut value by primal cut weight per carcase.
- Carcase Cost is calculated as either a direct OTH input price, multiplied by the carcase weight, OR as a live weight price divided by the carcase dressing percentage to give a carcase cost.
- HSCW sales value – Carcase Cost = Carcase Gross Margin on meat
- Gross margin minus net margin of 2.7% = overhead cost.
- Slaughter and boning, although normally two parts of the same company have been broken up in the model to allow for transfer of carcasses to retail butcher or other. Allocation of overhead cost between slaughter and boning varies greatly from plant to plant. An arbitrary overhead allocation was assumed at 25% slaughter and 75% boning. Net margin was allocated on the same percentage breakdown.

NOTE: this method allocates profit equally across all carcase types. On a plant by plant and carcase by carcase basis this is very inaccurate due to differing processor markets and access to cattle types. Subsequently, actual profit per carcase type will vary significantly between plants.

	A -	B -	BYG -	C -	GF -	GFYG -	PR/PRS -	S/SS -	V -	Y/YS -	YG -	YGS -	YP/YPS -
HSCW \$/hd	\$ 1,059	\$ 1,129	\$ 821	\$ 775	\$ 1,585	\$ 1,453	\$ 1,439	\$ 1,417	\$ 575	\$ 932	\$ 932	\$ 932	\$ 932
HSCW \$/kg	\$ 4.17	\$ 3.60	\$ 3.60	\$ 3.37	\$ 4.89	\$ 4.89	\$ 4.44	\$ 4.37	\$ 4.66	\$ 4.66	\$ 4.66	\$ 4.66	\$ 4.66
Livestock Price	1.67	1.60	1.60	1.29	1.68	1.84	1.65	1.65	2.46	1.81	1.81	1.81	1.81
Live Weight	470	550	400	470	600	550	600	600	220	370	370	370	370
Dressing Percentage	54%	57%	57%	49%	54%	54%	54%	54%	56%	54%	54%	54%	54%
Carcase Weight	254	314	228	230	324	297	324	324	123	200	200	200	200
Carcase Cost	\$ 3.10	\$ 2.80	\$ 2.80	\$ 2.64	\$ 3.11	\$ 3.40	\$ 3.05	\$ 3.05	\$ 4.39	\$ 3.36	\$ 3.36	\$ 3.36	\$ 3.36
Slaughter Cost to Boning cost ratio													
Slaughter	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
Boning	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
OH	\$ 0.24	\$ 0.18	\$ 0.18	\$ 0.16	\$ 0.41	\$ 0.34	\$ 0.32	\$ 0.30	\$ 0.04	\$ 0.29	\$ 0.29	\$ 0.29	\$ 0.29
NM %	0.91%	0.87%	0.87%	0.86%	1.06%	0.97%	0.98%	0.97%	0.72%	0.94%	0.94%	0.94%	0.94%
NM \$	\$ 0.03	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.03	\$ 0.03	\$ 0.03	\$ 0.03	\$ 0.03	\$ 0.03	\$ 0.03	\$ 0.03	\$ 0.03
Carcase Sell	\$ 3.37	\$ 3.00	\$ 3.00	\$ 2.82	\$ 3.56	\$ 3.77	\$ 3.40	\$ 3.38	\$ 4.46	\$ 3.69	\$ 3.69	\$ 3.69	\$ 3.69
GM \$													
GM%													
OH \$	\$ 0.72	\$ 0.53	\$ 0.53	\$ 0.48	\$ 1.24	\$ 1.02	\$ 0.95	\$ 0.90	\$ 0.11	\$ 0.88	\$ 0.88	\$ 0.88	\$ 0.88
NM %	2.5%	2.4%	2.4%	2.4%	2.8%	2.6%	2.6%	2.6%	2.1%	2.6%	2.6%	2.6%	2.6%
NM \$	\$ 0.08	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.10	\$ 0.10	\$ 0.09	\$ 0.09	\$ 0.09	\$ 0.09	\$ 0.09	\$ 0.09	\$ 0.09
Total OH\$	\$ 0.96	\$ 0.70	\$ 0.70	\$ 0.64	\$ 1.65	\$ 1.36	\$ 1.27	\$ 1.20	\$ 0.15	\$ 1.18	\$ 1.18	\$ 1.18	\$ 1.18
Total NM	\$ 0.11	\$ 0.10	\$ 0.10	\$ 0.09	\$ 0.13	\$ 0.13	\$ 0.12	\$ 0.12	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13
Total NM %	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Sell \$	\$ 4.17	\$ 3.60	\$ 3.60	\$ 3.37	\$ 4.89	\$ 4.89	\$ 4.44	\$ 4.37	\$ 4.66	\$ 4.66	\$ 4.66	\$ 4.66	\$ 4.66

Table 5: Estimation of average processing overhead across the industry

7.7 Primal Pricing Methodologies

Cut	A -	B -	BYG -	C -	GF -	GFY -	PR/PRS -	S/SS -	V -	Y/YS -	YG -	YGS -	YP/YPS -		A -	B -	BYG -	C -	GF -	GFY -	PR/PRS -	S/SS -	V -	Y/YS -	YG -	YGS -	YP/YPS -				
1 Rib NE Brisket																															
6ScI Trim	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	\$ 2.45	110.2%	\$ 2.70	\$ 2.62	\$ 2.62	\$ 2.70	\$ 2.70	\$ 2.70	\$ 2.70	\$ 2.70	\$ 2.70	\$ 2.70	\$ 2.70	\$ 2.70	\$ 2.70	\$ 2.70	100.0%		
85 cl Trim	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.39	\$ 3.39	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	107.5%	\$ 3.60	\$ 3.58	\$ 3.58	\$ 3.60	\$ 3.65	\$ 3.65	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	100.0%		
90 cl Trim	\$ 3.47	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	\$ 3.35	108.1%	\$ 3.75	\$ 3.58	\$ 3.58	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	100.0%	
95 cl Trim	\$ 3.75	\$ 3.77	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	\$ 3.75	110.7%	\$ 4.15	\$ 4.03	\$ 4.03	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	\$ 4.15	100.0%	
ATCH BONE															\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	100.0%	
Back Ribs	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	\$ 2.51	105.6%	\$ 2.65	\$ 2.69	\$ 2.69	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	\$ 2.65	100.0%	
Beef Body Fat	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	\$ 1.24	104.8%	\$ 1.30	\$ 1.33	\$ 1.33	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	\$ 1.30	100.0%	
Brisket Bones															\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	100.0%	
Brisket Skirt (ISK)															\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.40	\$ 5.40	\$ 5.10	\$ 5.00	\$ 5.30	\$ 5.30	\$ 5.30	\$ 5.30	\$ 5.30	\$ 5.30	\$ 5.30	106.0%	
Butt Tenderloin	\$ 11.21	\$ 3.77												107.0%	\$ 12.00	\$ 4.03	\$ 4.03	\$ 8.00	\$ 18.00	\$ 18.00	\$ 15.50	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	100.0%	
Chuck & Blade	\$ 3.74	\$ 3.77						\$ 3.72						107.0%	\$ 4.00	\$ 4.03	\$ 4.03	\$ 3.75	\$ 4.40	\$ 4.40	\$ 4.00	\$ 4.00	\$ 4.00	\$ 4.00	\$ 4.00	\$ 4.00	\$ 4.00	\$ 4.00	\$ 4.00	100.0%	
Chuck Roll 5Rib	\$ 3.87	\$ 3.77						\$ 4.02						113.7%	\$ 4.40	\$ 4.03	\$ 4.03	\$ 3.75	\$ 4.80	\$ 4.80	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	100.0%	
Chuck Tender	\$ 4.45	\$ 3.77						\$ 4.39						105.6%	\$ 4.70	\$ 4.03	\$ 4.03	\$ 3.75	\$ 5.10	\$ 5.10	\$ 4.70	\$ 4.70	\$ 4.70	\$ 4.70	\$ 4.70	\$ 4.70	\$ 4.70	\$ 4.70	\$ 4.70	100.0%	
Coli Muscle		\$ 3.35													\$ 3.50	\$ 3.58	\$ 3.58	\$ 3.75													#DIV/0!
Conical Muscle	\$ 5.14	\$ 3.35												107.0%	\$ 5.50	\$ 3.58	\$ 3.58	\$ 3.75	\$ 5.50	\$ 5.50	\$ 5.50	\$ 5.50	\$ 5.50	\$ 5.50	\$ 5.50	\$ 5.50	\$ 5.50	\$ 5.50	\$ 5.50	100.0%	
Cube Roll	\$ 11.68	\$ 3.77												107.0%	\$ 12.50	\$ 4.03	\$ 4.03	\$ 5.00	\$ 17.00	\$ 17.00	\$ 14.75	\$ 14.25	\$ 15.75	\$ 15.75	\$ 15.75	\$ 15.75	\$ 15.75	\$ 15.75	\$ 15.75	110.5%	
D-Rump	\$ 5.05	\$ 3.77												107.0%	\$ 5.40	\$ 4.03	\$ 4.03	\$ 3.75	\$ 7.30	\$ 7.30	\$ 5.80	\$ 5.50	\$ 6.80	\$ 6.80	\$ 6.80	\$ 6.80	\$ 6.80	\$ 6.80	\$ 6.80	123.6%	
Eye Round	\$ 4.62	\$ 3.77						\$ 4.87						103.9%	\$ 4.80	\$ 4.03	\$ 4.03	\$ 3.75	\$ 5.20	\$ 5.20	\$ 4.95	\$ 4.90	\$ 5.10	\$ 5.10	\$ 5.10	\$ 5.10	\$ 5.10	\$ 5.10	\$ 5.10	104.1%	
Flank Plate	\$ 3.83	\$ 3.77						\$ 4.08						107.0%	\$ 4.10	\$ 4.03	\$ 4.03	\$ 3.75	\$ 4.50	\$ 4.50	\$ 4.20	\$ 4.20	\$ 4.30	\$ 4.30	\$ 4.30	\$ 4.30	\$ 4.30	\$ 4.30	\$ 4.30	102.4%	
Flank Steak	\$ 4.83	\$ 3.77						\$ 5.45						105.6%	\$ 5.10	\$ 4.03	\$ 4.03	\$ 3.75	\$ 5.50	\$ 5.50	\$ 5.20	\$ 5.20	\$ 5.30	\$ 5.30	\$ 5.30	\$ 5.30	\$ 5.30	\$ 5.30	\$ 5.30	101.9%	
Inside	\$ 4.07	\$ 3.77						\$ 4.24						113.0%	\$ 4.60	\$ 4.03	\$ 4.03	\$ 3.75	\$ 5.00	\$ 5.00	\$ 4.60	\$ 4.60	\$ 4.60	\$ 4.60	\$ 4.60	\$ 4.60	\$ 4.60	\$ 4.60	\$ 4.60	100.0%	
Intercostals	\$ 4.33													107.4%	\$ 4.65	\$ 3.75	\$ 3.75	\$ 3.75	\$ 4.90	\$ 4.90	\$ 4.70	\$ 4.70	\$ 4.75	\$ 4.75	\$ 4.75	\$ 4.75	\$ 4.75	\$ 4.75	\$ 4.75	101.1%	
Knuckle	\$ 4.60	\$ 3.77						\$ 4.54						106.5%	\$ 4.90	\$ 4.03	\$ 4.03	\$ 3.75	\$ 5.30	\$ 5.30	\$ 4.90	\$ 4.90	\$ 4.90	\$ 4.90	\$ 4.90	\$ 4.90	\$ 4.90	\$ 4.90	\$ 4.90	100.0%	
Leg Bones FQ															\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	\$ 0.75	100.0%	
Leg Bones HQ															\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	\$ 0.90	100.0%	
LOIN BONE															\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	100.0%	
NE Brisket	\$ 3.39	\$ 3.77					\$ 1.15	\$ 3.89	\$ 0.97		\$ 4.02			107.7%	\$ 3.65	\$ 4.03	\$ 4.03	\$ 3.75	\$ 4.20	\$ 4.20	\$ 4.00	\$ 4.00	\$ 4.20	\$ 4.20	\$ 4.20	\$ 4.20	\$ 4.20	\$ 4.20	\$ 4.20	105.0%	
Neck Bones															\$ -	\$ -	\$ -	\$ -													#DIV/0!
O.P.Ribs								\$ 3.83							\$ -	\$ -	\$ -	\$ 14.00	\$ 14.00	\$ -	\$ -	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	\$ 12.00	#DIV/0!
Outside	\$ 3.89	\$ 3.77						\$ 4.10						102.8%	\$ 4.00	\$ 4.03	\$ 4.03	\$ 3.75	\$ 4.65	\$ 4.65	\$ 4.30	\$ 4.25	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	\$ 4.40	103.5%	
Outside Flat	\$ 3.64	\$ 3.77												107.1%	\$ 3.90	\$ 4.03	\$ 4.03	\$ 3.75			\$ 3.90	\$ 3.90	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	105.1%	
Oyster Blade	\$ 4.49	\$ 3.35						\$ 4.52						107.0%	\$ 4.80	\$ 3.58	\$ 3.58	\$ 3.75	\$ 5.50	\$ 5.50	\$ 4.80	\$ 4.75	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	105.3%	
Patella															\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	100.0%	
PE Brisket D/ON	\$ 3.39	\$ 3.35						\$ 3.89			\$ 4.02			107.7%	\$ 3.65	\$ 3.58	\$ 3.58	\$ 3.75	\$ 4.20	\$ 4.20	\$ 4.00	\$ 4.00	\$ 4.20	\$ 4.20	\$ 4.20	\$ 4.20	\$ 4.20	\$ 4.20	\$ 4.20	105.0%	
Rib End	\$ 1.40	\$ 3.35						\$ 1.59						107.1%	\$ 1.50	\$ 3.58	\$ 3.58	\$ 3.75	\$ 1.90	\$ 1.90	\$ 1.70	\$ 1.70	\$ 1.75	\$ 1.75	\$ 1.75	\$ 1.75	\$ 1.75	\$ 1.75	\$ 1.75	102.9%	
Shin Shank	\$ 4.45	\$ 3.77												87.6%	\$ 3.90	\$ 4.03	\$ 4.03	\$ 3.75	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	\$ 4.10	100.0%	
Short Rib 3 Rib	\$ 2.93	\$ 3.35						\$ 4.30						107.5%	\$ 3.15	\$ 3.58	\$ 3.58	\$ 3.75	\$ 5.00	\$ 5.00	\$ 4.80	\$ 4.80	\$ 4.80	\$ 4.80	\$ 4.80	\$ 4.80	\$ 4.80	\$ 4.80	\$ 4.80	100.0%	
Shortloin	\$ 6.45	\$ 3.77												107.0%	\$ 6.90	\$ 4.03	\$ 4.03	\$ 3.75	\$ 9.40	\$ 9.40	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	100.0%	
Striploin	\$ 5.79	\$ 3.77												107.0%	\$ 6.20	\$ 4.03	\$ 4.03	\$ 3.75	\$ 11.50	\$ 11.50	\$ 8.00	\$ 7.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	142.9%	
Tenderloin S/off	\$ 13.27	\$ 3.77			\$ 17.0	\$ 17.0		\$ 15.6						119.1%	\$ 15.80	\$ 12.25	\$ 12.25	\$ 1.10	\$ 21.50	\$ 21.50	\$ 18.90	\$ 18.75	\$ 19.50	\$ 19.50	\$ 19.50	\$ 19.50	\$ 19.50	\$ 19.50	\$ 19.50	\$ 19.50	104.0%
Thin Flank Meat	\$ 2.65	\$ 3.77												113.2%	\$ 3.00	\$ 4.03	\$ 4.03	\$ 3.75	\$ 3.00	\$ 3.00	\$ 3.00	\$ 3.00	\$ 3.00	\$ 3.00	\$ 3.00	\$ 3.00	\$ 3.00	\$ 3.00	\$ 3.00	100.0%	
Tri Tip		\$ 3.77													\$ 4.80	\$ 4.03	\$ 4.03	\$ 3.75	\$ 5.40	\$ 5.40	\$ 4.85	\$ 4.80	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	104.2%	
Vertebrae															\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	100.0%	

Table 6: Pricing matrix used to establish primal prices for missing cuts

A range of primal cut prices across the full carcass were obtained for 3 different carcass types. Additional primal prices were obtained for various cuts of meat from other carcass types. The combination of these market prices on the left of Table 6 were used in conjunction with primal price ratios to extrapolate the prices of primals within other livestock categories. Original market prices were from point in time data (1 month pricing period) and not across an entire year. A point of variance not accounted for is changing primal price ratios over time. This should be considered when using the model for yearly averages.

8 Recommendations arising from the project

Challenges: Level of data available is summarised at a much higher level but modelling of cut value is conducted at a micro level on specific cuts of meat with specific values.

There needs to be a normalising methodology that allows granular data to be combined with samples of micro data and extrapolated to add more value to macro data.

8.1.1 Conversion of multiple units of measure

Balancing volume of product through the chain

8.1.2 Pricing relativity ratios

MLA do not capture primal pricing data on a regular monthly basis.

8.2 Consideration of other functional capabilities

Another important activity will be for Greenleaf to present any opportunities outside the scope of the terms of reference where the modelling Maps can provide additional functionality. For example, there are other industry requirements not directly related to value added products that require the same base modelling structure. Including functionality for these additional features could also be built into the Value-chain mapping software application delivered by Greenleaf in this project.

Functional capabilities:

1. Model R&D investment costs and likely ROI compared with other investment activities at different points along the value chain to determine how much value is created. For example:
 - a. Investment of \$1 for improvement in feedlot efficiency may add \$20 in cost savings over a 5 year period directly to the producer. Investment of \$1 in value-adding may add \$15 in increased profit to a value-adder, but if the product is innovative and increases red meat consumption it may also add an additional \$90 in sales, increasing demand on cattle supplies.
 - b. Prioritisation of value adding opportunities based on magnitude of benefit and likelihood of success could be incorporated as a separate section in the model. [Figure 9](#) is an example of how this has been done successfully before but would need discussing with MLA to determine

363		Easy/ Hard (E/H)	Big \$/ Small \$	Easy/ Hard (E/H)	Activity benefit - % of total over 5					Cost of Activity (\$ m)	ROI on Activity (\$ m)	110,326,728	Year		
					Y1	Y2	Y3	Y4	Y5				Ttl	1	2
364	TOTAL	E	S	ES	100%	100%	100%	100%	100%	500%	-	0%	\$63,444,755	\$63,444,755	\$63,444,755
365	Wholesale Portion Pack Revenue (Retail)	E	S	ES	100%	100%	100%	100%	100%	500%	-	0%	\$63,444,755	\$63,444,755	\$63,444,755
371	OUTPUTS Total Wholesale Portion Pack Revenue (Food Service)	E	S	ES	100%	100%	100%	100%	100%	500%	268,000	386%	\$41,455,288	\$43,528,050	\$43,528,050
372	Increase shelf life - reduce fresh mark downs 12.5%	S	-S	-	10%	10%	10%	10%	10%		\$ 88,000	1178%	\$207,276	\$207,276	\$207,276
373	Improve retail presentation - Sales Volume increase 5%	B	-B	-	90%	90%	90%	90%	90%		\$ 180,000	5182%	\$1,865,488	\$1,865,488	\$1,865,488
374	Other	S	-S	-						500%		0%	\$0	\$0	\$0
375		-	-	-								0%	\$0	\$0	\$0
376		-	-	-								0%	\$0	\$0	\$0
377	Total Wholesale Pre-Cooked Revenue (Retail)	E	B	EB	100%	100%	100%	100%	100%	500%	-	0%	\$131,719,505	\$131,719,505	\$131,719,505
383	Total Wholesale Pre-Cooked Revenue (Food Service)	E	S	ES	100%	100%	100%	100%	100%	500%	-	0%	\$10,530,339	\$10,530,339	\$10,530,339
384		-	-	-	100%	100%	100%	100%	100%			0%	\$0	\$0	\$0
385		-	-	-								0%	\$0	\$0	\$0
386		-	-	-						500%		0%	\$0	\$0	\$0
387		-	-	-								0%	\$0	\$0	\$0

Figure 9: Example of return on investment calculations used in previous models to assist in prioritising investments.

2. Benchmarking capabilities for each sector of the industry:
 - a. On farm production costs – link in with on farm and producer costs. Build in functionality to link into NLIS over time and producers able to benchmark their costs against industry average.
 - b. Meat processors able to identify how much of the industry production volume is traded on wholesale market and what their target market is for value added retail prepack marinated beef cuts.
 - c. MLA can determine before approving a new product development (NPD) that the numbers do match value chain map volumes and realistic market share, pricing and mark-ups. The tool will help in determining whether the value-adding opportunity is real and how it compares to other value-adding opportunities.
3. Retail value adding development has a number of constraints that limit successful implementation
 - a. Inclusion of domestic scan data to the model (if available from MLA) will provide a benchmark of retail product mix and volume per item.
 - b. Growth in category outside of
4. Need to be able to generate a profit waterfall table across the supply chain for different products. To be able to do this the data needs to be assembled as subgroups of products and their associated costings within broader encompassing groups of products. Need to allow functionality to build additional sub groups over time that are incorporated and functional within the overarching groupings.

9 Appendix 1 – Database Operational Instructions

9.1 Description of the Value Chain Map

The primary function of the tool is to assess the financial impact of value added meat products to each sector of the Australian beef supply chain. This is done by creating value added product costings, then “redistributing” specific cuts of meat from existing supply channels in their raw form to the new product and sales channels within the model. The cost, sales price and margin of that meat component is then compared in its various forms and markets. Impact on value across the supply is then quantified. In order to do this a baseline had to be developed that maps the current state for all cattle within Australia through the various sectors of the chain from livestock production to domestic and export markets for individual cuts of meat.

9.2 Data structure

Sector	SubSector	Total From ('000s)	Total To ('000s)	Difference ('000s)	COS ('000s)	O' Heads ('000s)	Sale Price ('000s)	Margin	Outputs	
Inputs	Start of Chain	Start of Chain	4,164,978					0.00%	Outputs	
Inputs	Livestock	Start	Farmgate	4,164,978	4,164,978	\$0	\$7,349,594	\$6,901,170	(6.10)%	Outputs
Inputs	Livestock	①	Farm gate - OUF	4,164,978	4,164,978	\$6,901,170	\$0	\$7,788,508	12.86%	Outputs
Inputs	Livestock	①A	Saleyard	2,296,152	2,296,152	\$4,293,804	\$0	\$5,144,997	19.82%	Outputs
Inputs	Livestock	B	Feedlots	1,044,992	1,044,992	\$1,954,136	\$0	\$1,945,990	(0.42)%	Outputs
Inputs	Livestock	C	MSCs	528,952	528,952	\$989,140	\$0	\$985,016	(0.42)%	Outputs
Inputs	Livestock	②	Livestock - SLAUGHTERED	3,870,097	3,870,097	\$8,076,004	\$0	\$7,206,911	(10.76)%	Outputs
Inputs	Processing	②A	Domestic Abattoirs - Whole Carcasses	1,354,534	1,354,534	\$2,522,418	\$1,459,739	\$3,831,787	(3.78)%	Outputs
Inputs	Processing	③	Domestic Abattoirs - Cuts	947,313	948,173	\$2,903,931	\$963,712	\$3,892,122	0.63%	Outputs
Inputs	Processing	④	Domestic Abattoirs - Offal	270,906	270,906	\$921,083	\$54,181	\$445,685	(54.30)%	Outputs
Inputs	Processing	②B	Export Abattoirs - Whole Carcasses	2,515,563	2,515,563	\$4,684,492	\$673,337	\$7,116,176	32.82%	Outputs
Inputs	Processing	⑤	Export Abattoirs - Cuts	1,760,894	1,760,894	\$5,393,015	\$1,655,422	\$6,916,409	(1.87)%	Outputs
Inputs	Processing	⑥	Export Abattoirs - Offal	503,112	503,112	\$1,710,583	\$0	\$946,929	(44.64)%	Outputs
Inputs	Manufacturing	⑦	Value Adc Manufacturing	201,889	201,889	\$717,750	\$197,851	\$984,562	7.53%	Outputs
Inputs	Manufacturing / Value Adc	⑦A	Domestic - Beef / Cooked / Chill / Manu						0.00%	Outputs
Inputs	Manufacturing / Value Adc		Domestic - Beef / Cooked / Frozen / Mai	0	0	\$0	\$0	\$0	0.00%	Outputs
Inputs	Manufacturing / Value Adc		Domestic - Beef / Raw / Frozen / Manufa	385	386	\$1,355	\$566	\$1,714	(10.82)%	Outputs
Inputs	Manufacturing / Value Adc		Domestic - Beef / Raw / Chill / Portionec	0	0	\$0	\$0	\$0	0.00%	Outputs
Inputs	Manufacturing / Value Adc		Domestic - Beef / Raw / Chill / Portionec	0	0	\$0	\$0	\$0	0.00%	Outputs
Inputs	Manufacturing / Value Adc		Domestic - Beef / Raw / Chill / Whole	0	0	\$0	\$0	\$0	0.00%	Outputs
Inputs	Manufacturing / Value Adc		Domestic - Beef / Raw / Chill / Whole / Ii	424	424	\$1,869	\$41	\$5,527	189.22%	Outputs
Inputs	Manufacturing / Value Adc	⑦B	Domestic Rendering	0	0	\$0	\$0	\$0	0.00%	Outputs
Inputs	Manufacturing / Value Adc	⑦C	Export - Beef / Raw / Frozen / Whole	0	0	\$0	\$0	\$0	0.00%	Outputs
Inputs	Manufacturing / Value Adc	⑦D	Export - Beef / Raw / Frozen / Whole / Ir	0	0	\$0	\$0	\$0	0.00%	Outputs
Inputs	Manufacturing / Value Adc	⑦D	Export Rendering	0	0	\$0	\$0	\$0	0.00%	Outputs
Inputs	Market	⑧	Domestic Retail - MSCs	279,840	279,840	\$1,000,584	\$151,788	\$1,572,830	36.49%	Outputs
Inputs	Market		Domestic Retail - Butchers / Other	462,309	462,309	\$1,645,004	\$1,206,628	\$2,606,380	(8.60)%	Outputs
Inputs	Market		Domestic Food Services	476,068	476,068	\$1,959,667	\$1,242,538	\$3,009,297	(6.02)%	Outputs
Inputs	Market		Export	2,264,007	2,264,007	\$7,863,338	\$5,909,058	\$12,766,484	(7.30)%	Outputs
Inputs	Market	①D & ⑧	Live Export	294,880	294,880	\$551,426	\$0	\$535,738	(2.84)%	Outputs
Inputs	End of Chain	Finish	Whole Post Market		4,164,116	\$20,510,082	\$20,006	\$6,772	(99.97)%	Outputs

Figure 10: Explanation of Data Structure linkage between supply chain sectors

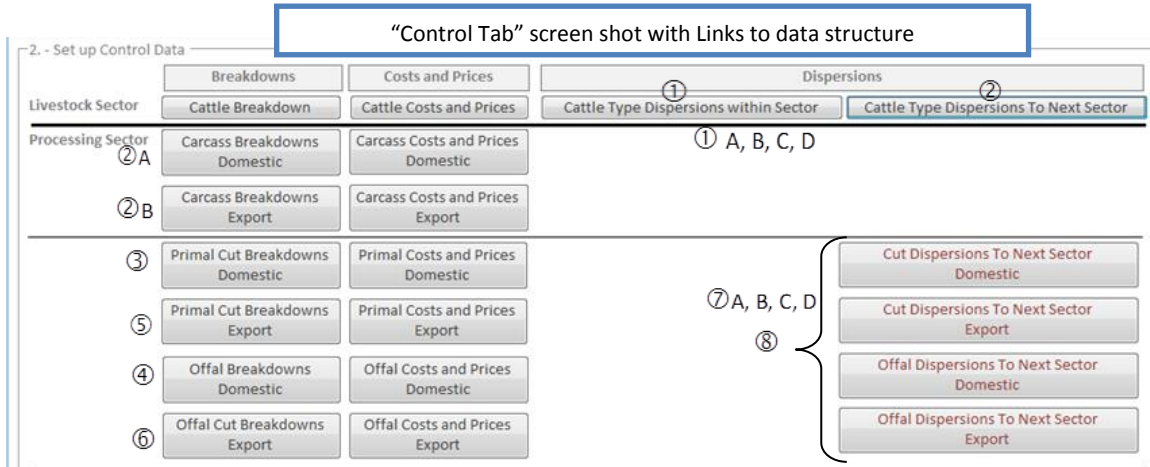
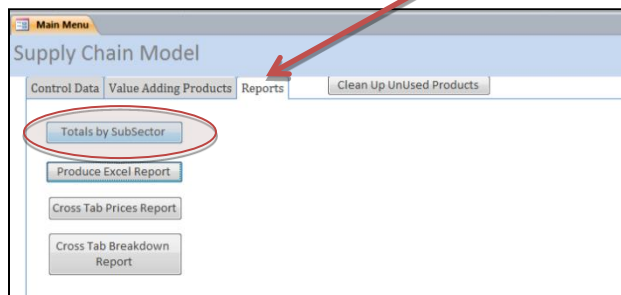


Figure 11: Explanation of “Control Tab” user interface control buttons and data linkage between supply sectors

Figure 10 on the previous page is generated in the reports tab of the model and selecting the “Totals by Subsector” tab. It gives a quick summary of where every kilogram of meat within the model has been distributed to.



The purpose of this section is to show where in the model the user goes to enter or adjust certain types of data and where each section of the chain links to the next ones within the model.

Refer the descriptions below to Figure 10 and Figure 11 on the previous page.

- ❖ Start of Chain – Total kilograms of live weight livestock processed in the chain for the given period of time. In this case it is the full 2010 calendar year.
- ❖ Farm Gate – “Cattle breakdown” Tab takes the total volume within the supply chain and divides it up across the various cattle types at market on a percentage basis. Note in these tabs that total breakdown needs to equal 100%. See ★ on the previous page as an example of where breakdowns don’t equal 100% of total.
 - “Cattle Cost and Prices” tab is where the input cost, overhead cost and sale price of each cattle type is entered. This is the price of cattle leaving the farm gate. Note the ✘ on the previous page is where the Cost and price are reported in total dollars. The difference between COS (raw material cost [sales value from previous sector]), Input cost and Sales Value out of the sector is the margin.
- ❖ ① Product from the farm gate – This tab is where cattle are dispersed (re-distributed) from the farm to markets within the livestock sector (Not the processor). The sub sections below

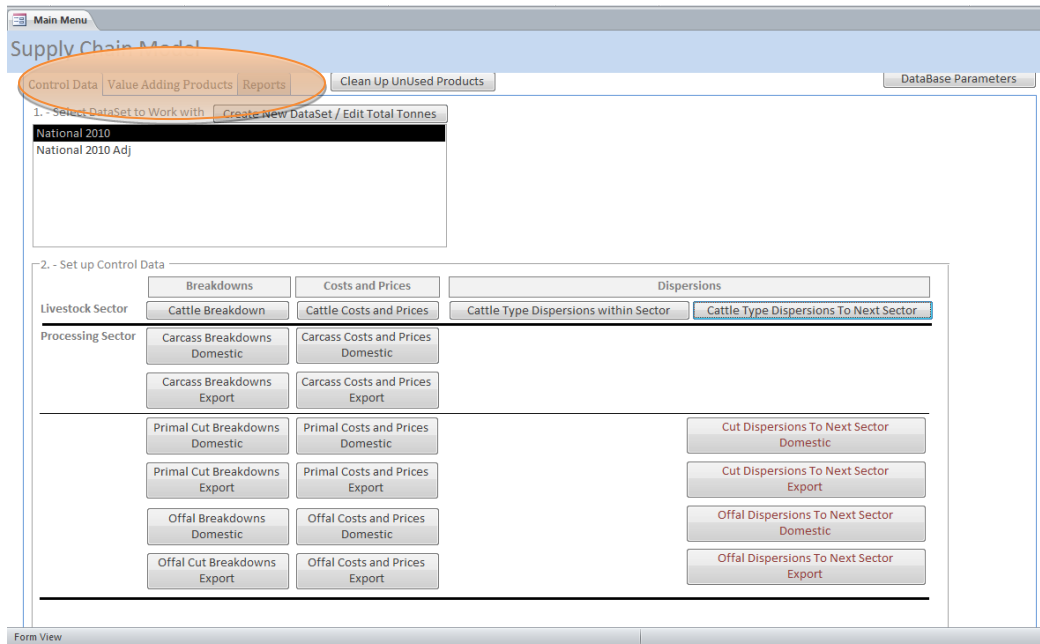
- ① A, B, C & D – Saleyards, Feedlots, MSC’s (Major Supply Chains) usually direct to abattoir, and Live Export.
- - Note live Export is also a final market in ①_D at the bottom of the report
- ❖ ② Here livestock are dispersed into the processing sector as either domestic or export product. This dispersion determines the number and type of cattle going to each market and here controls the volume of each subsequent cut of meat that will go to either domestic or export. The volume going out of the livestock sector into processing is live cattle weight.
 - ②_A & ②_B – Domestic and Export processing receives the volume of live weight dispersed from ②. In each of these tabs the animal is converted to a carcass. Primals, By-Products/Offal’s and Waste are generated on a percentage of total live weight basis.
- ❖ ③, ④, ⑤ & ⑥ - These sections drive the breakdown of each carcass type generated from ②_A & ②_B and include yield of individual meat cuts and offal’s on a percentage basis, then the Cost and Prices are entered in the associated Tabs. These prices are the sale prices leaving the abattoir.
- ❖ ⑦_{A, B, C, D} – Once primals and offal’s have been weighted and costed in the previous tabs they are allocated in these tabs into the various markets on a percentage of product total weight.
- ❖ ⑧ - Sales volumes reported as a result of dispersion from the previous sectors.
- ❖ ①_D – Sales of cattle dispersed to live export markets

The explanations in the above points are supported with screen shots of each step in Section 9.4 Managing Control Data.

9.3 Overview of three functional tabs

When the value chain database is opened the screen below is shown.

The model consists of three main tabs the user can navigate through.



9.3.1 Control Data Tab

The control data tab is used for initial setup of baseline data including on and off farm production volumes, costings and distribution to various sales channels and for making adjustments to all sectors of the supply chain except for value adding.

9.3.2 Value Adding Parameters Tab

This is where value added products are created, bill of materials including non-meat ingredients are added and where specific raw material currently going to other sectors of the chain can be diverted into new value added products.

9.3.3 Reports Tab

A small number of reports allow profitability, product performance and comparative analysis between products and markets within and across sectors.

9.4 Managing Control Data

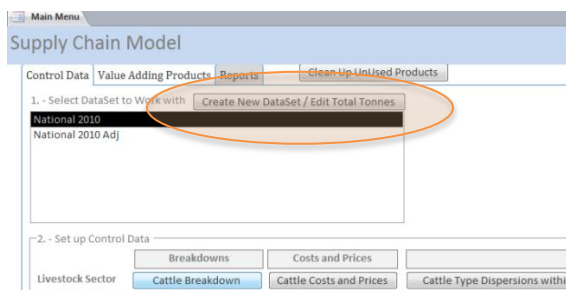
Once control data is established this tab should not be needed for modelling value added products unless abattoir and on-farm adjustments to baseline data are required.

Multiple data sets can be stored. The database has a complete industry data set for 2010.

The following section explains each button within the Control Data tab within the value chain model, what it does and how to input or adjust data.

9.4.1 Selecting a Dataset to work with

The Baseline dataset is the “National 2010” dataset. It is recommended that any modelling is done by creating a copy of this dataset to preserve the original file and for comparison back to the baseline.



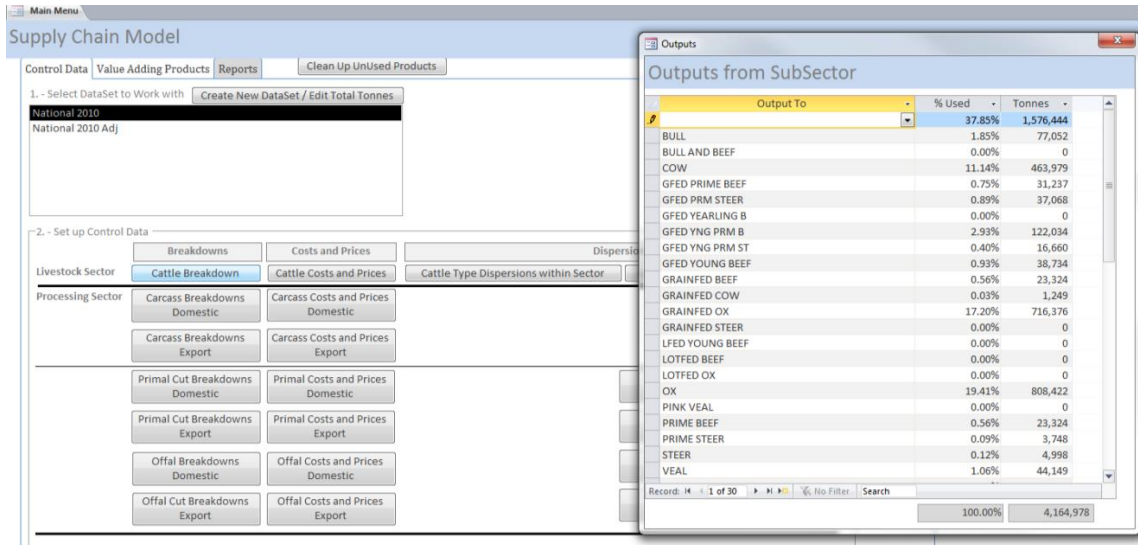
9.4.2 Setting Livestock Sector Control Data

This section manages the volume of livestock distributed between live animal sectors and to domestic and export processing sectors of the value chain. Note that figures contained within the model account for the volume of cattle transferred out of the industry and do not account for total herd size (breeding stock, growing stock processed in future years).

9.4.2.1 Cattle Breakdowns

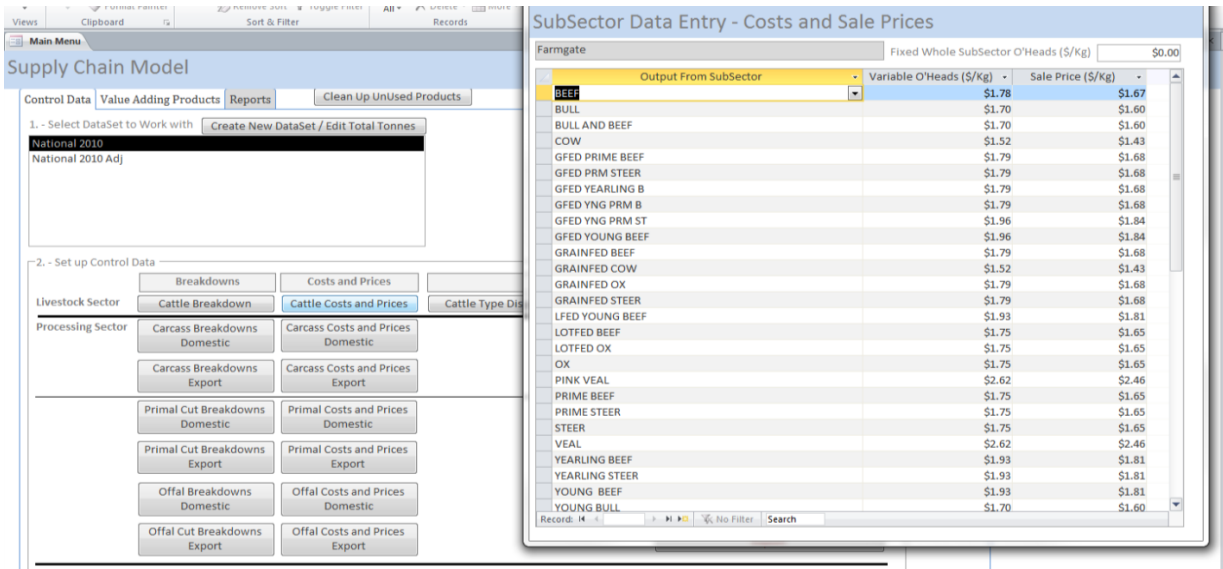
This tab allows the total cattle processed in the period to be allocated across the appropriate cattle types.

Ensure the total distribution equals 100% after making adjustments.



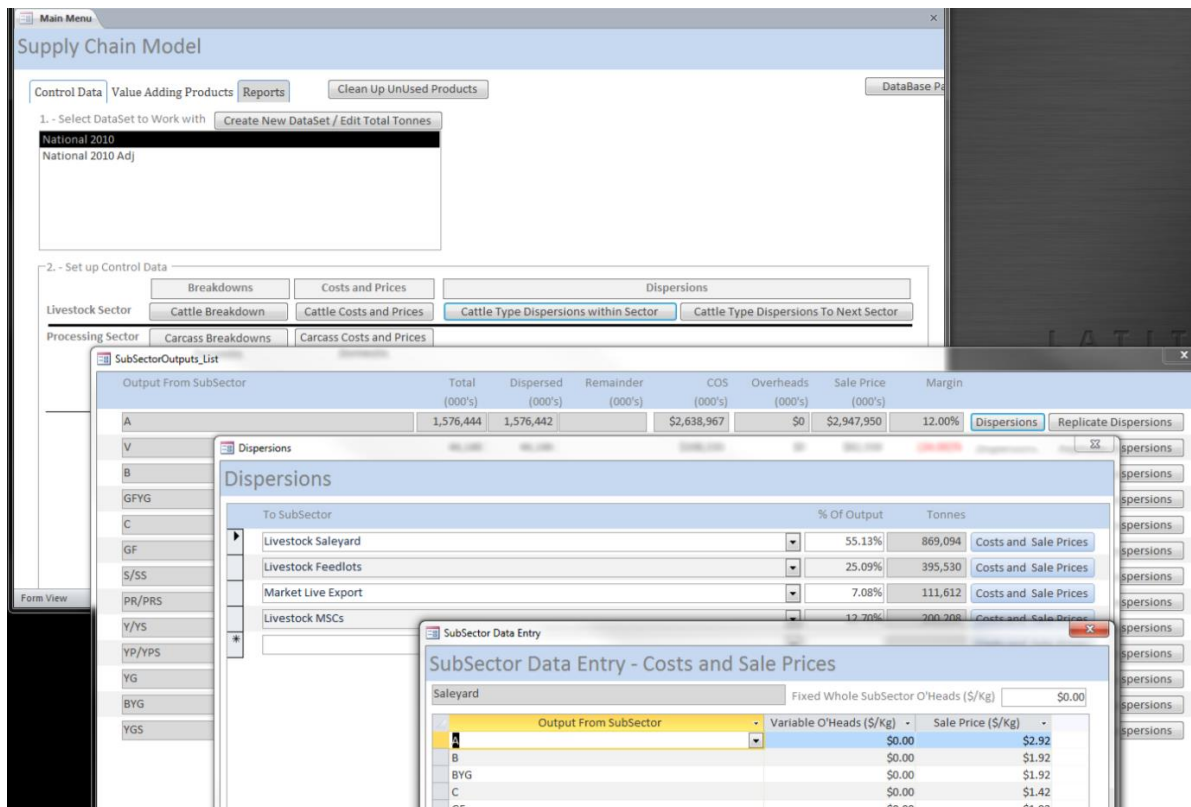
9.4.2.2 Cattle Costs and Prices

This section manages the cost and sales price of different cattle types leaving the on-farm production system. Different costs of production and sale prices can be allocated to each cattle type. Cattle sold to another livestock sector (not abattoir or live export) will have two livestock sales prices; the price into the feedlot and the price out of the feedlot into the abattoir for example. The price off the farm is entered here. The price out of the feedlot is entered in a different tab (“Cattle Dispersion to Next Sector” below).



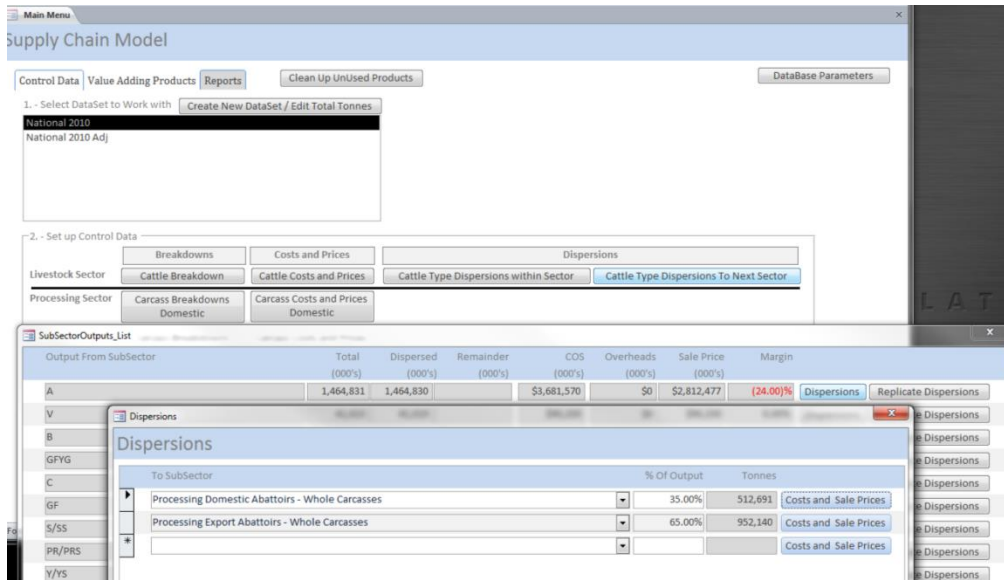
9.4.2.3 Cattle Dispersions within Sector

This section manages the transfer of cattle within the live animal sector including saleyards, feedlots, live export etc.



9.4.2.4 Cattle Dispersion to Next Sector

This section manages the transfer of cattle from each of the live animal sector including saleyards, feedlots into the processing sector as domestic or export carcasses.

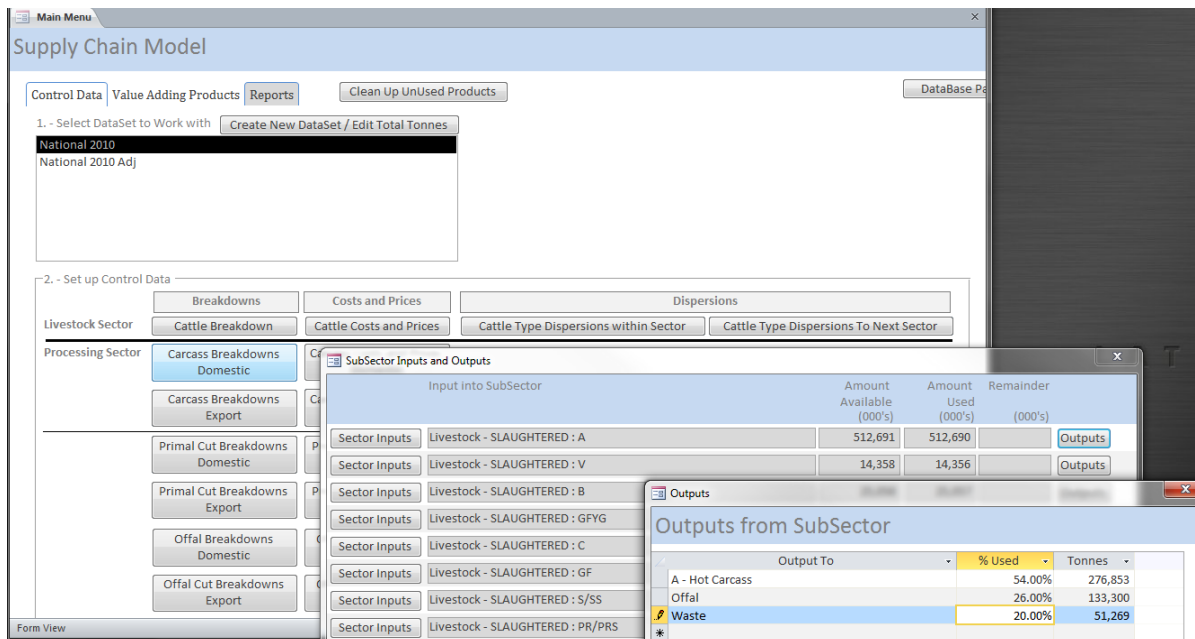


9.4.3 Setting Processor Sector Data

The Processing sector data determines how livestock coming into the sector are broken down into primals, co-products and by-products. This involves setting standards for dressing percentages, carcase cut yields, and product values for each cattle type. Domestic and export markets are treated separately to allow for differences between domestic and export processing.

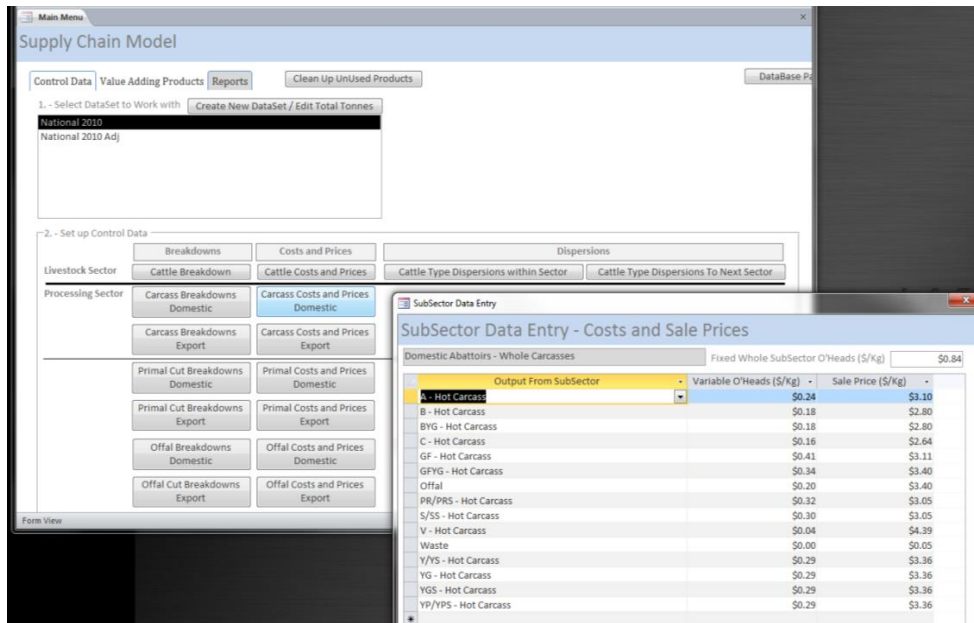
9.4.3.1 Carcase Breakdowns

Distribution of carcase types by AUS-MEAT cipher are adjusted as a percentage of the total volume processed.



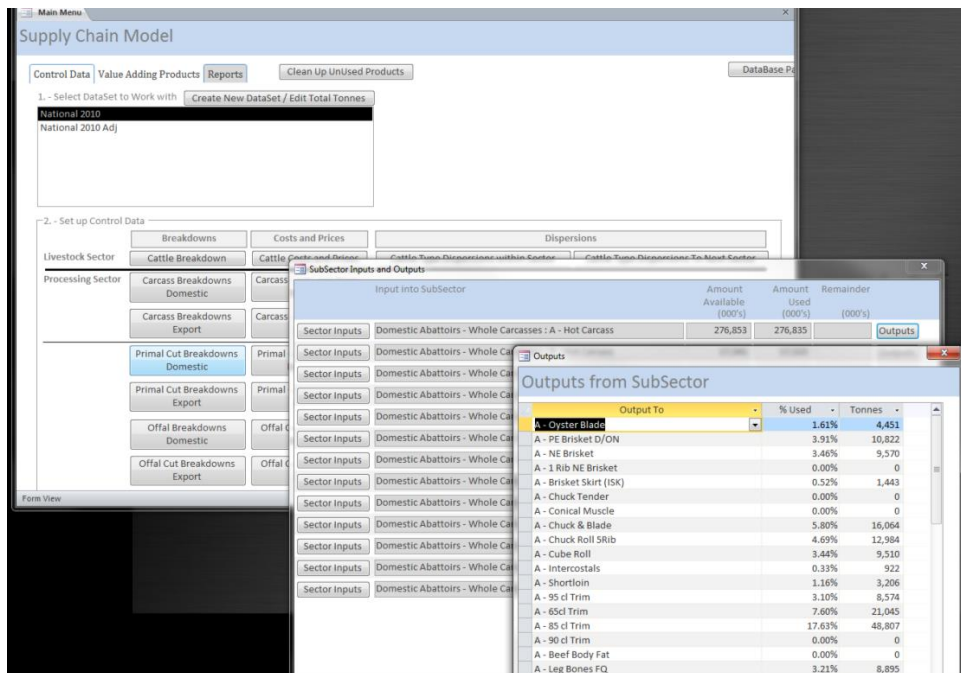
9.4.3.2 Carcase Costs and Prices

Carcase prices are assigned on a HSCW basis for each carcase specification. Discounts are not allowed in the system so need to be accounted for in the single entry carcase price.



9.4.3.3 Primal Cut Breakdowns

Standard carcase yields are included for each carcase type and can be adjusted or added to depending on the processors needs.



9.4.3.4 Primal Costs and Prices

Primal cut prices are applied on a per kilogram basis and built up to give a carcase value.

Output From SubSector	Variable O'Heads (\$/kg)	Sale Price (\$/kg)
A - 1 Rib NE Brisket	\$0.00	\$0.00
A - 65cl Trim	\$0.96	\$2.70
A - 85 cl Trim	\$0.96	\$3.60
A - 90 cl Trim	\$0.96	\$3.75
A - 95 cl Trim	\$0.96	\$4.15
A - ATCH BONE	\$0.96	\$0.05
A - Back Ribs	\$0.96	\$2.65
A - Beef Body Fat	\$0.96	\$1.30
A - Brisket Bones	\$0.96	\$0.05
A - Brisket Skirt (SK)	\$0.96	\$5.00
A - Butt Tenderloin	\$0.96	\$12.00
A - Chuck roll 5Rib	\$0.96	\$4.40
A - Chuck Tender	\$0.96	\$4.70

9.4.3.5 Cut Dispersions to Next Sector

The group of cuts (by carcase type) are presented with the volumes produced to be distributed to the next sector at a sale price per kilogram. This is the place where primal cuts targeted for value-adding would be diverted from the normal distribution path the a value-adding process.

Output From SubSector	Total (000%)	Dispersed (000%)	Remainder (000%)	COS (000%)	Overheads (000%)	Sale Price (000%)	Margin
A - Oyster Blade	4,451	4,450		\$13,798	\$4,268	\$21,365	18.00%
A - PE Brisket D/ON	10,821	10,819		\$33,547	\$10,377	\$39,499	10.00%

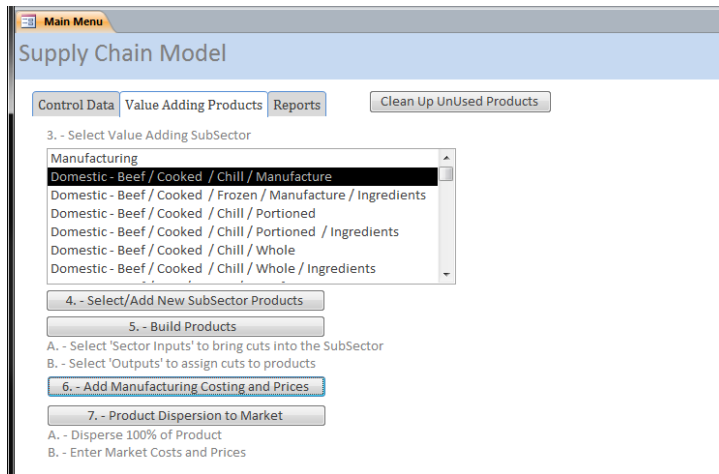
To SubSector	% Of Output	Tonnes
Manufacturing / Value Adding Domestic - Beef / Cooked / Frozen / Manufacture / Ingredients	0.00%	0
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Portioned	0.00%	0
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Portioned / Ingredients	0.00%	0
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Whole	0.00%	0
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Whole / Ingredients	0.00%	0
Manufacturing / Value Adding Domestic - Beef / Raw / Frozen / Manufacture	0.00%	0

9.5 Value Adding Products

Primal and subprimal products from the previous boning room dispersion are received into the value-adding section as raw material to be value-added.

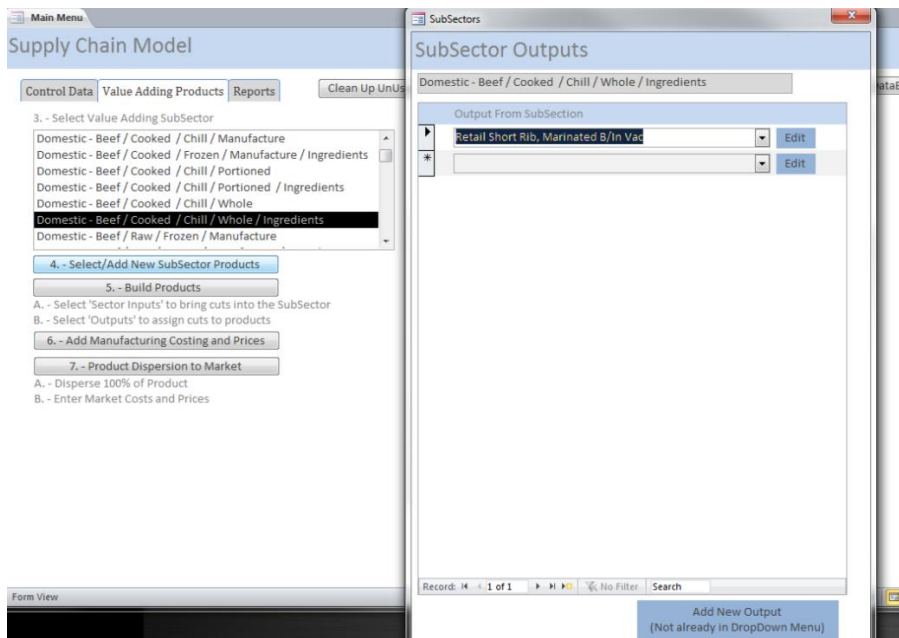
9.5.1 Select Value Added Products SubSector

Primals are then allocated to a particular value-added product code where additional ingredients are assembled in a bill of materials to give a finished value-added product cost including the raw material transfer price.



9.5.2 Select/Add New SubSector Products

New value-added products including their BOM components and costs are created.



9.5.3 Build Value-added Products

9.5.3.1 Redirecting raw material

Raw primals and sub primals currently dispersed to markets can be diverted from those markets to this value adding process.

The screenshot shows the 'Supply Chain Model' software interface. The main window displays a table titled 'Input into SubSector' with columns for 'Sector Inputs', 'Amount Available (000's)', 'Amount Used (000's)', and 'Remainder (000's)'. The table lists various beef cuts and their corresponding amounts. A dialog box titled 'Dispersed From SubSectors' is open, showing a list of subsectors and their percentage of output. The 'Manufacturing / Value Adding Domestic - Beef / Raw / Frozen / Manufacture / Ingredients' subsector is highlighted with a yellow background, indicating it is the selected source for the diverted material.

Sector Inputs	Amount Available (000's)	Amount Used (000's)	Remainder (000's)
Domestic Abattoirs - Cuts: A - Oyster Blade	0	0	0
Domestic Abattoirs - Cuts: A - PE Brisket D/ON	0	0	0
Domestic Abattoirs - Cuts: A - NE Brisket	0	0	0
Domestic Abattoirs - Cuts: A - 1 Rib NE Brisket	0	0	0
Domestic Abattoirs - Cuts: A - Brisket Skirt (15K)	0	0	0
Domestic Abattoirs - Cuts: A - Chuck Tender	0	0	0
Domestic Abattoirs - Cuts: A - Conical Muscle	0	0	0
Domestic Abattoirs - Cuts: A - Chuck Roll SRib	0	0	0
Domestic Abattoirs - Cuts: A - Cube Roll	0	0	0
Domestic Abattoirs - Cuts: A - Shortloin	0	0	0
Domestic Abattoirs - Cuts: A - 95 d Trim	8	8	0
Domestic Abattoirs - Cuts: A - 85cl Trim	35	35	0
Domestic Abattoirs - Cuts: A - 85 d Trim	253	253	0
Domestic Abattoirs - Cuts: A - 90 d Trim	0	0	0

From SubSector	% Of Output
Manufacturing / Value Adding Manufacturing	16.67%
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Manufacture	0.00%
Manufacturing / Value Adding Domestic - Beef / Cooked / Frozen / Manufacture / Ingredients	0.00%
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Portioned	0.00%
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Portioned / Ingredients	0.00%
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Whole	0.00%
Manufacturing / Value Adding Domestic - Beef / Cooked / Chill / Whole / Ingredients	0.00%
Manufacturing / Value Adding Domestic - Beef / Raw / Frozen / Manufacture	0.00%
Manufacturing / Value Adding Domestic - Beef / Raw / Frozen / Manufacture / Ingredients	1.52%
Manufacturing / Value Adding Domestic - Beef / Raw / Chill / Portioned	0.00%
Manufacturing / Value Adding Domestic - Beef / Raw / Chill / Portioned / Ingredients	0.00%
Manufacturing / Value Adding Domestic - Beef / Raw / Chill / Whole	0.00%
Manufacturing / Value Adding Domestic - Beef / Raw / Chill / Whole / Ingredients	0.00%
Market Domestic Retail - MISC	22.88%
Market Domestic Retail - Butchers / Other	37.43%
Market Domestic Food Services	22.56%

9.5.3.2 Allocating Raw Material

Diverted raw material is then added to a value-added BOM.

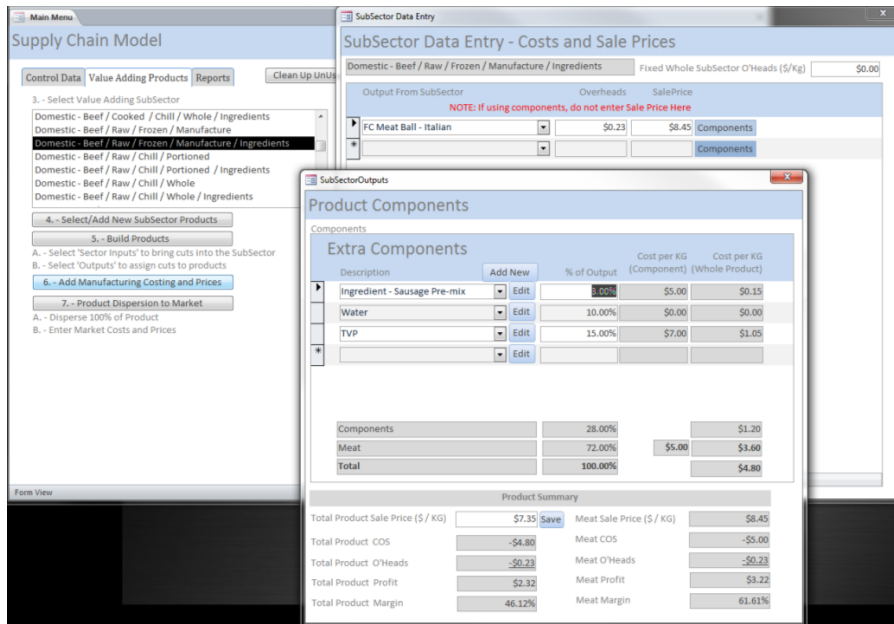
The screenshot shows the 'Supply Chain Model' software interface. The main window displays a table titled 'SubSector Inputs and Outputs' with columns for 'Sector Inputs', 'Amount Available (000's)', 'Amount Used (000's)', and 'Remainder (000's)'. The table lists various beef cuts and their corresponding amounts. A dialog box titled 'Outputs from SubSector' is open, showing a list of outputs and their percentage of output. The 'Sumest Sausage' output is highlighted with a yellow background, indicating it is the selected destination for the diverted material.

Sector Inputs	Amount Available (000's)	Amount Used (000's)	Remainder (000's)
Domestic Abattoirs - Cuts: A - Cube Roll	0	0	0
Domestic Abattoirs - Cuts: A - Shortloin	0	0	0
Domestic Abattoirs - Cuts: A - 95 d Trim	8	8	0
Domestic Abattoirs - Cuts: A - 85cl Trim	35	35	0
Domestic Abattoirs - Cuts: A - 85 d Trim	253	253	0
Domestic Abattoirs - Cuts: A - 90 d Trim	0	0	0
Domestic Abattoirs - Cuts: A - Beef Body Fat	0	0	0
Domestic Abattoirs - Cuts: A - Leg Bones EQ	0	0	0

Output To	% Used	Tonnes
Sumest Sausage	100.00%	253

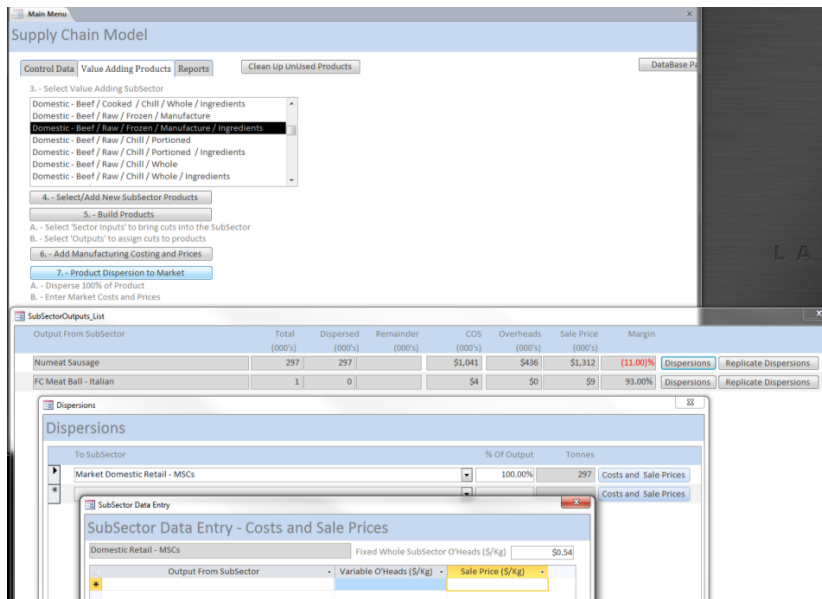
9.5.4 Add Manufacturing Costs and Prices

Building of BOM's for new products are added in this section. Mark-up or price margin is also added at this point and reflects the profit margin that will be produced when the value added product is dispersed to the market.



9.5.5 Product Dispersion to Market

This section disperses the product to the relevant market or group of markets at the designated sell price.



9.5.6 Summary

At this point the modelling scenarios have been completed. Scenarios stored in the data base are then uploaded to the summary reports where further analysis can be done. Reporting and analysis is summarised in the next section.

10 Reports

Supply Chain Value Distribution Map

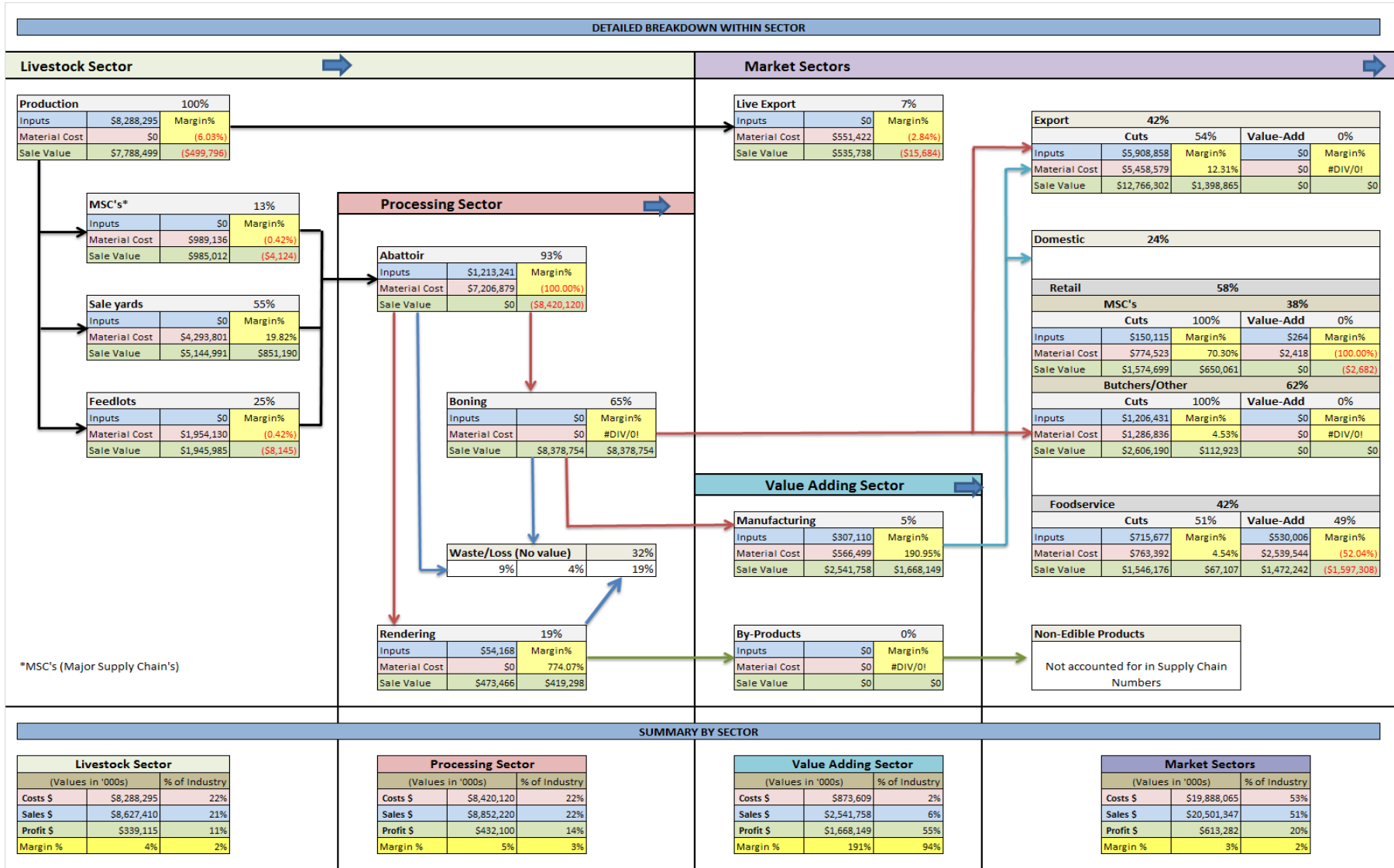


Figure 12:

Supply Chain Summary Map – Reported automatically as an export to Excel

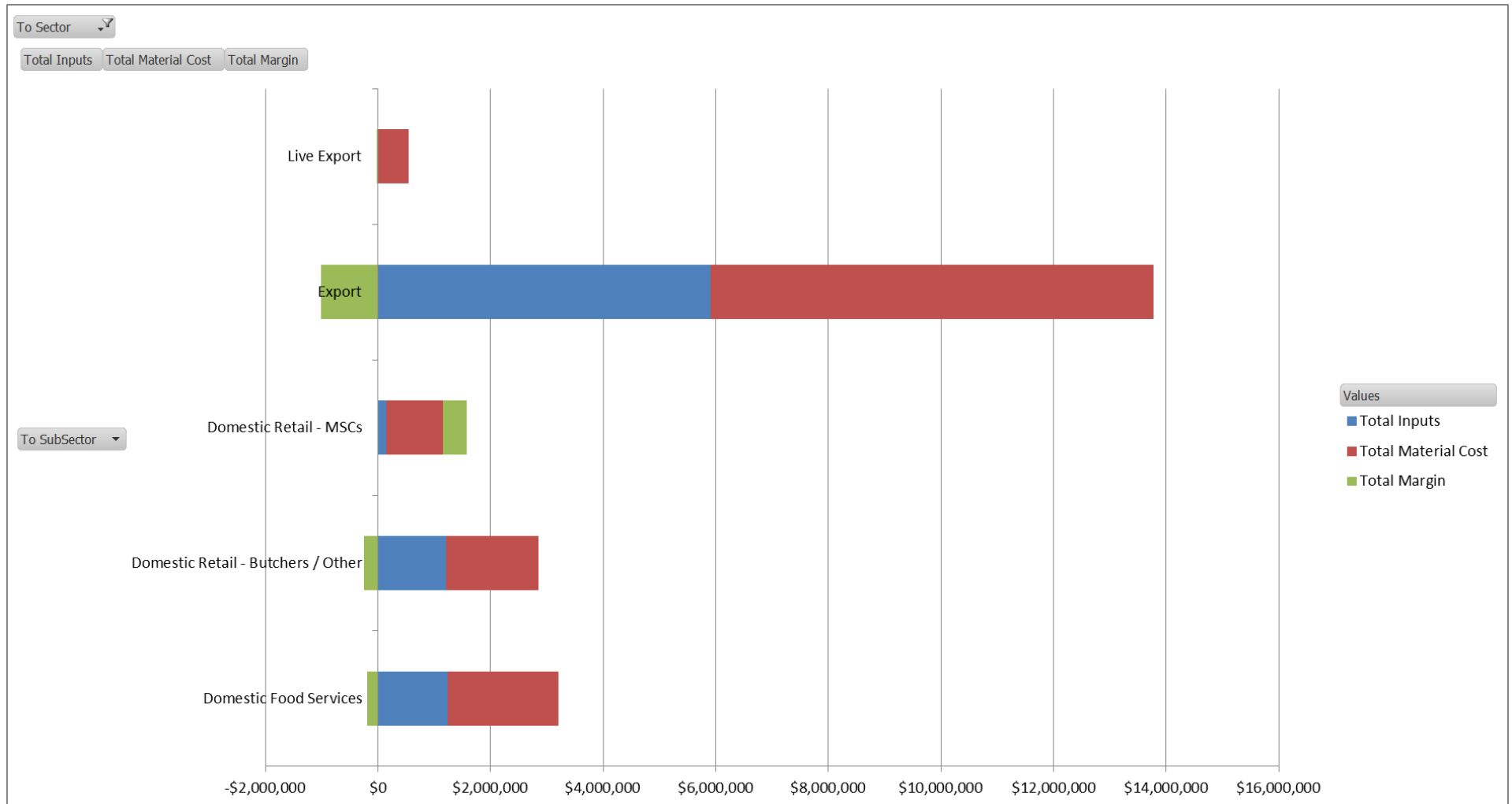


Figure 13: Example report enabling analysis of the various inputs and outputs within every sector captured in the database.

Two pivot table reports are exported from the database to Excel. Both allow the user to drill and refine the specific items and sectors to be reported in each graph. Figure 13 above reports all sectors of the supply chain while Figure 14 below provides specific comparison between a configurable number of value added products. Any primal cut of meat can be compared to any other primal cut in terms of use, margin and volume. Every use for a single primal cut can be plotted or narrowed to all its uses within a single sector such as the value-added sector.

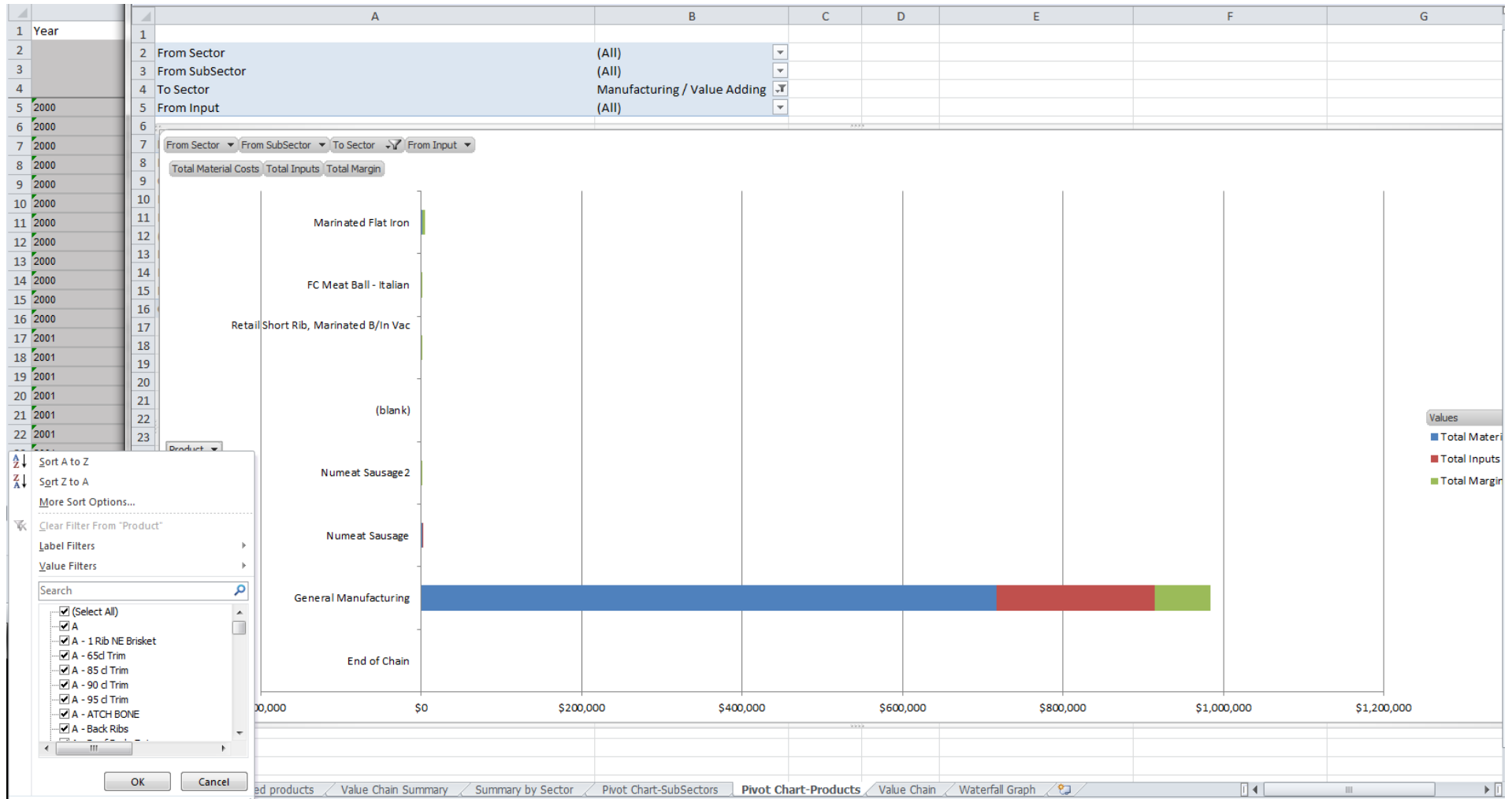


Figure 14: Analysis of cost and profit for individual raw materials in their various forms (Primal, boxed export, value added) within each market sector.

A report of all value-added product categories is generated automatically by total SubSector and by Domestic and Export market sectors in Figure 15 below.

TOTAL Value Adding Sector - By Category	Inputs	Material Cost	Sale Value	Profit \$	Margin%
(Values in '000s)					
Meat Products (Domestic and Export)	\$566	\$1,098	\$1,709	\$45	2.7%
Beef / Raw / Frozen / Portioned / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Frozen / Portioned / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Frozen / Whole / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Frozen / Whole / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Frozen / Manufacture / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Frozen / Manufacture / Ingredients	\$566	\$1,098	\$1,709	\$45	2.7%
Beef / Raw / Chill / Portioned / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Chill / Portioned / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Chill / Whole / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Chill / Whole / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Chill / Manufacture / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Raw / Chill / Manufacture / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Chill / Portioned / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Chill / Portioned / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Chill / Whole / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Chill / Whole / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Chill / Manufacture / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Chill / Manufacture / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Frozen / Portioned / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Frozen / Portioned / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Frozen / Whole / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Frozen / Whole / Ingredients	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Frozen / Manufacture / 100%	\$0	\$0	\$0	\$0	0.0%
Beef / Cooked / Frozen / Manufacture / Ingredients	\$0	\$0	\$0	\$0	0.0%
By Products (Domestic and Export)	\$0	\$0	\$0	\$0	0.0%

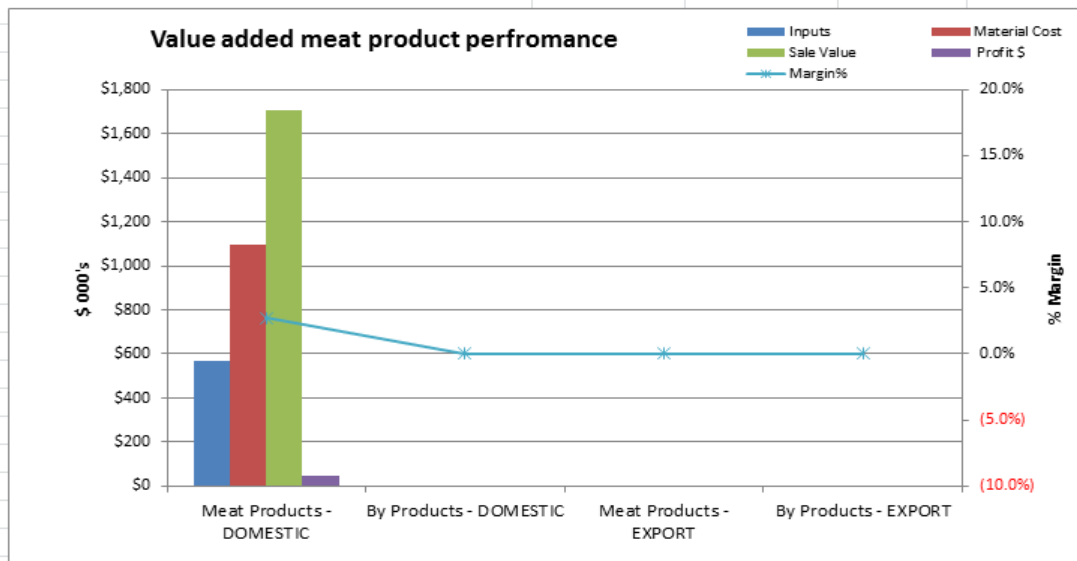


Figure 15: Report of product performance by type of value added product within each market

A sector summary report is also produced automatically within Excel and summarizes the amount of value added created within each sector. A return on dollars inputted allows profitability or return on investment to be compared between sectors.

SUMMARY BY SECTOR					
TOTAL Value Adding Sector -	Inputs	Material Cost	Sale Value	Profit \$	Margin%
	(Values in '000s)				
Total Supply Chain	\$8,288,295	\$17,863,256	\$17,895,157	\$1,679,124	6.4%
Livestock Sector	\$8,288,295	\$0	\$8,627,410	\$339,115	4.1%
Processing Sector	\$1,267,409	\$7,206,879	\$8,852,220	\$377,932	4.5%
Value Adding Sector	\$307,110	\$566,499	\$2,541,758	\$1,668,149	190.9%
Meat Value Add	\$307,110	\$566,499	\$2,541,758	\$1,668,149	190.9%
By-Product Valuee Add	\$0	\$0	\$0	\$0	0.0%
Market Sector	\$8,511,351	\$10,089,878	\$17,895,157	(\$706,072)	(3.8%)
Live Export Market	\$0	\$551,422	\$535,738	(\$15,684)	(2.8%)
Export Market	\$5,908,858	\$5,458,579	\$12,766,302	\$1,398,865	12.3%
Domestic Market	\$2,602,493	\$4,079,877	\$4,593,117	(\$2,089,253)	(31.3%)
RETURN ON INPUTS BY SECTOR (% of total industry value)					
		Inputs		Profit	ROI
Total Supply Chain Value		221.7%		100.0%	0.5
Livestock Sector		100.0%		20.2%	0.2
Processing Sector		15.3%		22.5%	1.5
Value Adding Sector		3.7%		99.3%	26.8
Meat Value Add		3.7%		99.3%	26.8
By-Product Valuee Add		0.0%		0.0%	#DIV/0!
Market Sector		102.7%		-42.1%	-0.4
Live Export Market		0.0%		-0.9%	#DIV/0!
Export Market		71.3%		83.3%	1.2
Domestic Market		31.4%		-124.4%	-4.0
Inputs and Profit reported as percentage of chain totals					
Sector ROI reported as ratio of return on inputs invested					

Table 7: Report of profitability and return on dollars invested within each supply chain sector

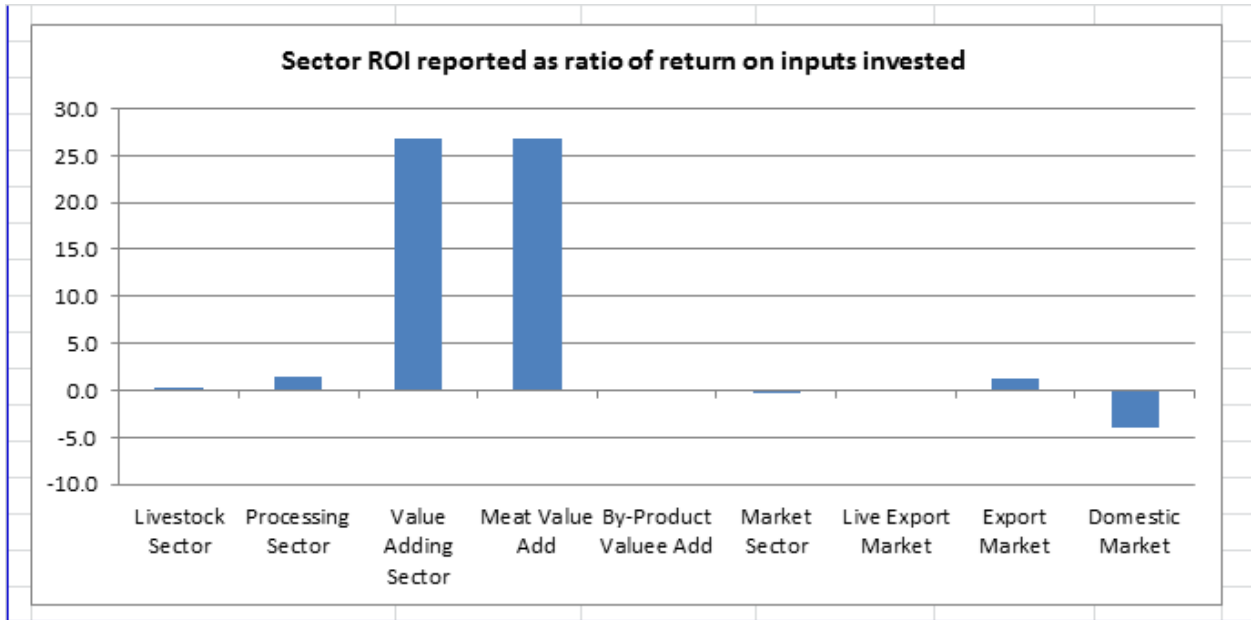


Figure 16: Return on investment by sector.

Note in the figure above that “Value adding sector” is the sum of Meat and By-Product value adding subsectors, and Market Sector is the sum of the three market subsectors.

11 Summary findings

The tracking of inputs through the entire value-chain is quite complex if drill down analysis on what-if-scenario modelling is to be achieved within each sector and then reported across the entire supply chain. This project achieved that key objective. However, the following observations were made:

1. Data inputs to achieve accurate model results is not readily available in one location.
2. Greenleaf conducted a significant amount of research outside this project scope to assemble the data which is included within the model. A lot of this data such as pricing of individual primals was extrapolated from known data. The base data should be used as a guide only. This facilitates companies to adjust to their own specific supply chain parameters.
3. Complexity of analysis across the whole supply chain makes the tool suitable for infrequent modelling. Continually modelling of a wide range of value-adding options is possible but tedious.
4. The tool provides all the functionality requested in the objectives. Use of the tool to model specific scenarios with companies will help identify the key areas of functionality that will add value to their businesses. This could then lead to cutting down and fine-tuning these key components to conduct more rapid scenario modelling.