Final Report

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Sheep Flagship Project – Supply side opportunities

Executive Summary

The Western Australian sheep meat industry currently faces significant opportunities and threats, including a significant decline in the sheep population over the last decade and at the same time great opportunities to gain and grow market share in fast-growing overseas markets, with increased demand for meat protein, including lamb.

The Sheep Flagship Project identified opportunities and capacity for growth in the WA sheep industry, specifically for export markets, as a sustainable global competitor. The production capacity along the entire supply chain was asessed in order to measure industry capacity for growth. This information allowed for the development of strategic supply chain options and the evaluation of the cost, reliability and feasibility of these options.

Options were developed in conjuction with the Producers of WA through industry assessments done by Gattorna Alignment. Insights were needed into the willingness and capability of producers to increase flock size, and to make long-term commitments to these levels. Segmenting suppliers provided a base to predict the ability of the supply base to change and the different sourcing strategies that might be used to maximise supply in the long term. The information from this supply chain modelling in conjunction with the Gattorna Alignment assessments were used to select the options most suitable to support sustainable growth for each sector within the industry.

The options selected for further development and assessment into scenarios:

- Increasing existing production capacity.
- Diversifying markets for live export specifications.
- Changing turn off times for increased value.
- Increasing reproduction rates.

These scenarios were modelled and tested against the current supply chain performance, both in terms of throughput and financial benefit to the industry.

The application of the scenarios could deliver a significant increase in the number of sheep in WA and in excess of 1.1 Million additional animals for turnoff.

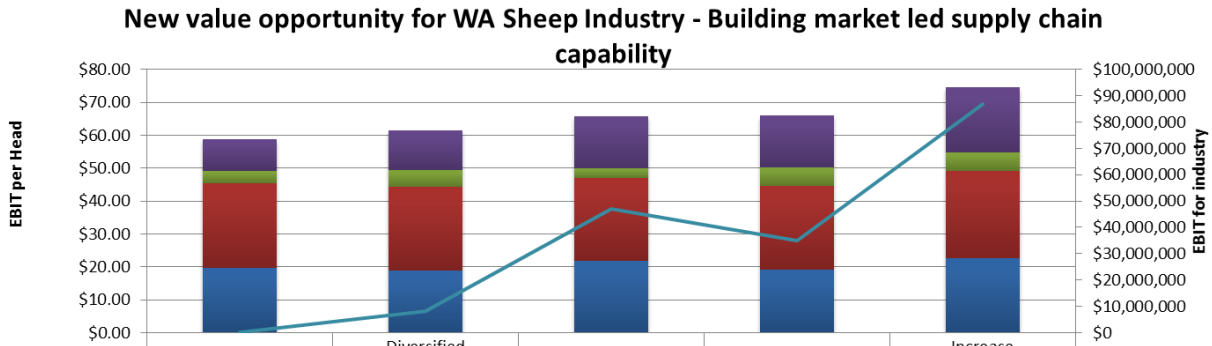
Refer to Table 1 below showing the increased number of animals for turnoff per scenario.

Scenario	Base line	1	2	3	4	**Total**
Turnoff ('000's)	5,726	6,005	6,293	6,063	5,726	
Increase Turnoff ('000's)	0	278	567	337	0	**1,182**

Table 1: Increased number of animals for turnoff per optimisation scenario

It was found that these options individually will be of great benefit to the industry, but combined even more so.

Figure 1 below shows the financial performance of each of the scenarios.



	Current Scenario	Diversified markets for light lambs	Using Latent Capacity - State	Early Turnoff - State	Increase Reproduction Rate - State
Abattior	$9.60	$11.89	$15.76	$15.87	$20.02
Feedlotter	$3.63	$5.14	$2.92	$5.74	$5.63
Store Lambs	$25.89	$25.41	$25.35	$25.35	$26.37
Producer	$19.55	$18.95	$21.72	$19.15	$22.66
Total Value (Industry)	$0	$8,151,264	$46,949,110	$34,898,193	$86,941,771
Production Stats					
Live export	1,782,269	1,681,995	1,780,228	1,832,909	1,849,413
Store Lambs	269,664	319,816	269,057	269,388	428,660
Feedlot	14,140	63,963	14,548	300,173	162,595
Abattior	3,943,989	4,043,921	4,224,519	4,229,932	4,443,877
Total	5,726,258	5,725,917	6,004,747	6,062,841	6,293,290

Figure 1: New value opportunity for WA Sheep Industry

Increasing the reproductive rate of sheep and using latent capacity are the two most beneficial options, resulting in an industry value benefit of **$86.9** and **$46.9 million** respectively.

The combined financial benefit of all the scenarios developed through this project is well in excess of **$300 million**. The recommendation is therefore to implement all scenarios in a combined fashion to realise the maximum benefits.

However, a few barriers have been identified and will need to be overcome:

- Store lamb and Feedlot capacity will need to be developed.
- A growth mindset is needed.
- Confidence in the industry will need to be built.

Glossary

DoF	Days on Feed
GSCDM	Greenleaf Supply Chain Development Model

Contents

1 Introduction

The Sheep Flagship Project was initiated due to both significant opportunities and threats to the Western Australian sheep meat industry.

On the opportunity side, the project supports the strategic growth of the industry in becoming more competitive and sustainable in a global environment. There is great opportunity in the significant increase in demand for food worldwide. The world middle class is expected to grow from 1.8 billion to 3.8 billion people, pointing to a growing demand for sources of protein inlcuding meat, milk and eggs (OECD, 2014).

The joint venture between V&V Walsh and Grand Farms is a significant opportunity for WA to capture a part of the growing abovementioned market. Grand Farms is one of the largest red-meat importers in China and initial market estimates inidicate an additional demand of 500,000 lambs per year. The alliance presents an opportunity for the Western Australian sheep meat industry to gear up production and supply to the rapidly growing markets in China. To achieve the volume requirements, existing livestock production networks within V&V Walsh's will need to be expanded; new supply relationships will need to be developed and new sheep production enterprises will have to be built up.

WA is also facing significant threats, including a declining sheep population, seasonal variation impacts and strong competitor supply chains.

- In spite of the range of well-developed supply chains that include cooperative alliances and well-established procurement relationships, there has been a significant decline in the number of sheep over the last two decades. In the short run, flock size and dynamics are influenced by flock rebuilding initiatives, weather and market pricing, and all of these aspects mask out strong trends in overall population. In the long run, there is a clear and steep downward trend. The WA sheep population has declined from over 30 million in 1994 to 14.4 million sheep in 2014, a decline of more than 50% (Pritchett & Curtis, 2015). Refer to Figure 2 below showing the steep decline in population.

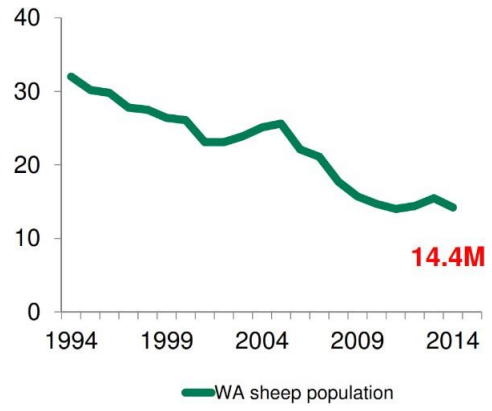


Figure 2: WA declining sheep population

- Competing states' processors in Eastern Australia and New Zealand also supply Grand Farms and these processors all have strong alignment between supply side capability and demand side requirements.

- Another threat is the seasonal variation in production systems over a 12 month cycle, and it also impacts on WA's competitiveness. Refer to Figure 3 below that shows the variation in seasonal production against the consistency of demand.

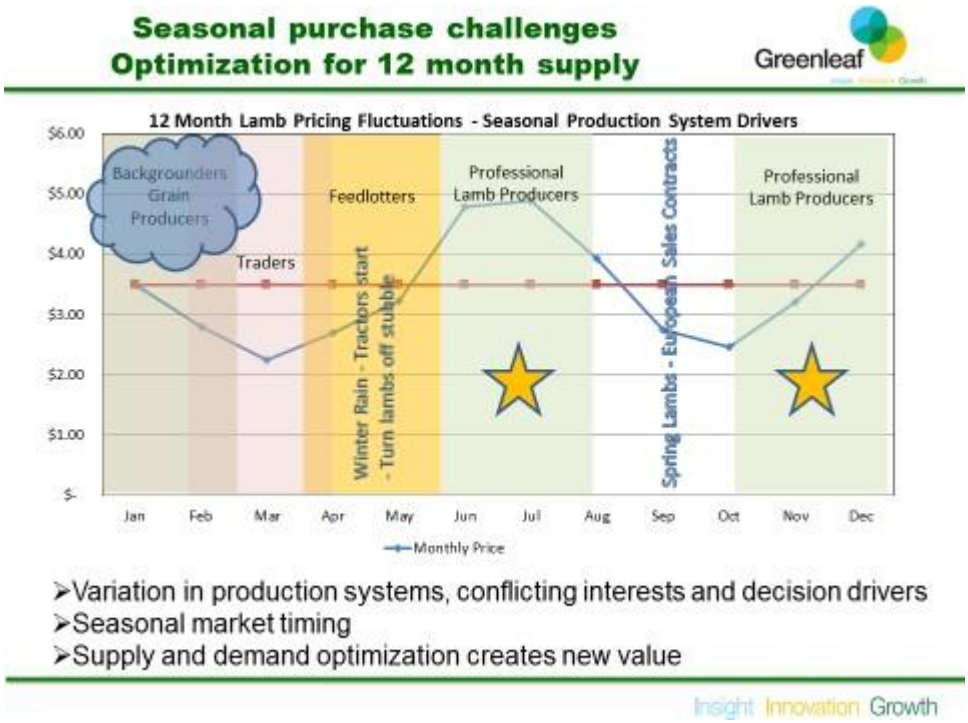


Figure 3: Seasonal lamb supply constraints challenge year-round supply

The Sheep Flagship Project aims to identify opportunity and capacity for growth in the WA sheep industry, specifically for export markets, to turn the industry into a sustainable global competitor. The production capacity along the entire supply chain is of importance in assessing the industry capacity. This information will allow for an understanding of what is possible, the cost, reliability and feasibility of these options.

Section 2 will list the detailed objectives derived from the project purpose.

2 Objectives

The objectives of this project were to:

- Map the supply chain capabilities.
- Identify opportunities for profitable growth.
- Map the potential growth strategies.
- Create a development roadmap.

These objectives are detailed below.

2.1 Mapping Supply Chain Capabilities

This mapping required the investigation of barriers along the supply chain that limit the ability of the chain to increase production and realise growth opportunities. It also involved the identification of profitable opportunities for growth coupled with risks around sustainable growth.

2.2 Mapping Production Potential and Growth Strategies

Information was obtained from producers and producer groups in order to map the range of production systems and seasonal challenges within a 12-month cycle. Considerations included product specifications and quality, cost of production, alternative pricing grids and other risks.

The other component of this objective was to identify growth drivers within businesses in each sector of the supply chain including their links to markets and agent networks. Special focus was given to the identification of investment opportunities and opportunities to increase production volume per region and season. In addition, opportunities were identified to convert land dedicated for alternative agricultural production choices to the increased production of sheep.

2.3 Development Roadmap

This objective was about finding sustainable strategies to overcome supply chain growth barriers and risks, making recommendations for the further development of the value chain competitiveness and considering implementation requirements.

3 Methodology

An important first step in developing and assessing value chains is understanding the value chain leader's objectives. From there, market and sales mix priorities can be derived and an assessment can be done of the value and volume of products available to support the initial demand side evaluation. Fragile new value chains need to achieve critical mass to be self-sustaining. Sensitivity drivers around mix of product and market requirements should be identified during these early stages and considered for the effective development of models and strategies.

A capable value chain requires both a stable customer base and a reliable supply chain. Alignment of both sides is required to find an ongoing equilibrium that maintains the value chains assets (capability). Value chains can also be optimised by upgrading of strategy and refinement of business models. As such, the methodology used by Greenleaf prioritised the market mix and considered the following key components supporting the value chain critical mass:

- Market options and alignment to market priorities.
- Supply capability to service market mix.
- Demand and supply side flexibility to access value potential.
- Achievement of a new equilibrium that supports the new value.

Figure 4 below summarises the development process working from right to left. The project addressed the pillars Market Leadership and Market Priorities on a very preliminary basis with the projects main focus placed on Production Capabilities. Some consideration was given to alignment of Production to Market Opportunities (Pillar 3) to increase supply chain value and competitiveness. Changing the production section of the supply chain to respond to deeper customer insights presents opportunities for new value along the chain. A more involved understanding of market opportunities to allow optimisation has been proposed as a second stage project.

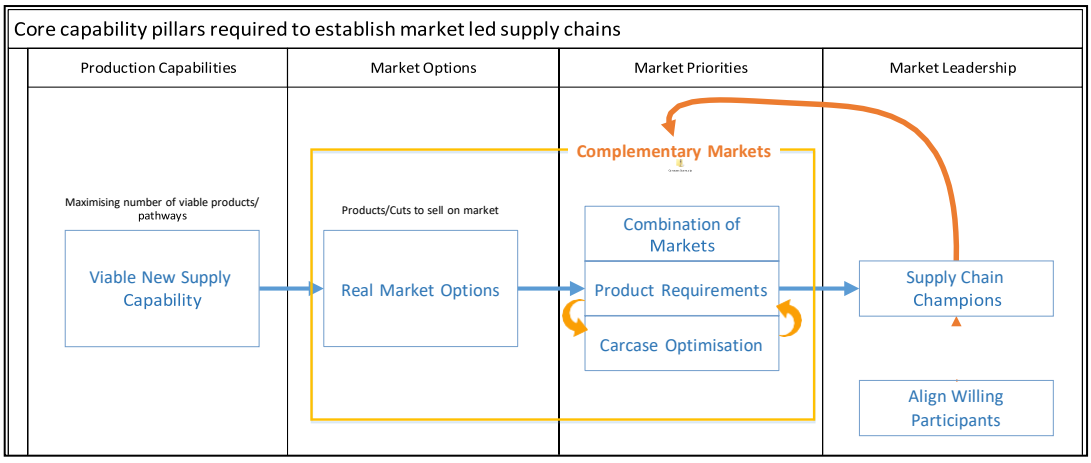


Figure 4: Market led value chain development process

To elaborate on the alignment of the demand and supply sides of the supply chain, the approach that Greenleaf followed is summarised in Figure 5 below. The approach involved a progressive, iterative process attempting to align the demand and supply sides of the chain for value optimisation. It considered the capabilities required to realise value opportunities along the chain and to find a sustainable equilibrium through demand and supply side pressures. This also took into consideration the barriers to adoption. Progressive development of capability within sections of the value chain assists with alignment and allows for further support of value chain growth.

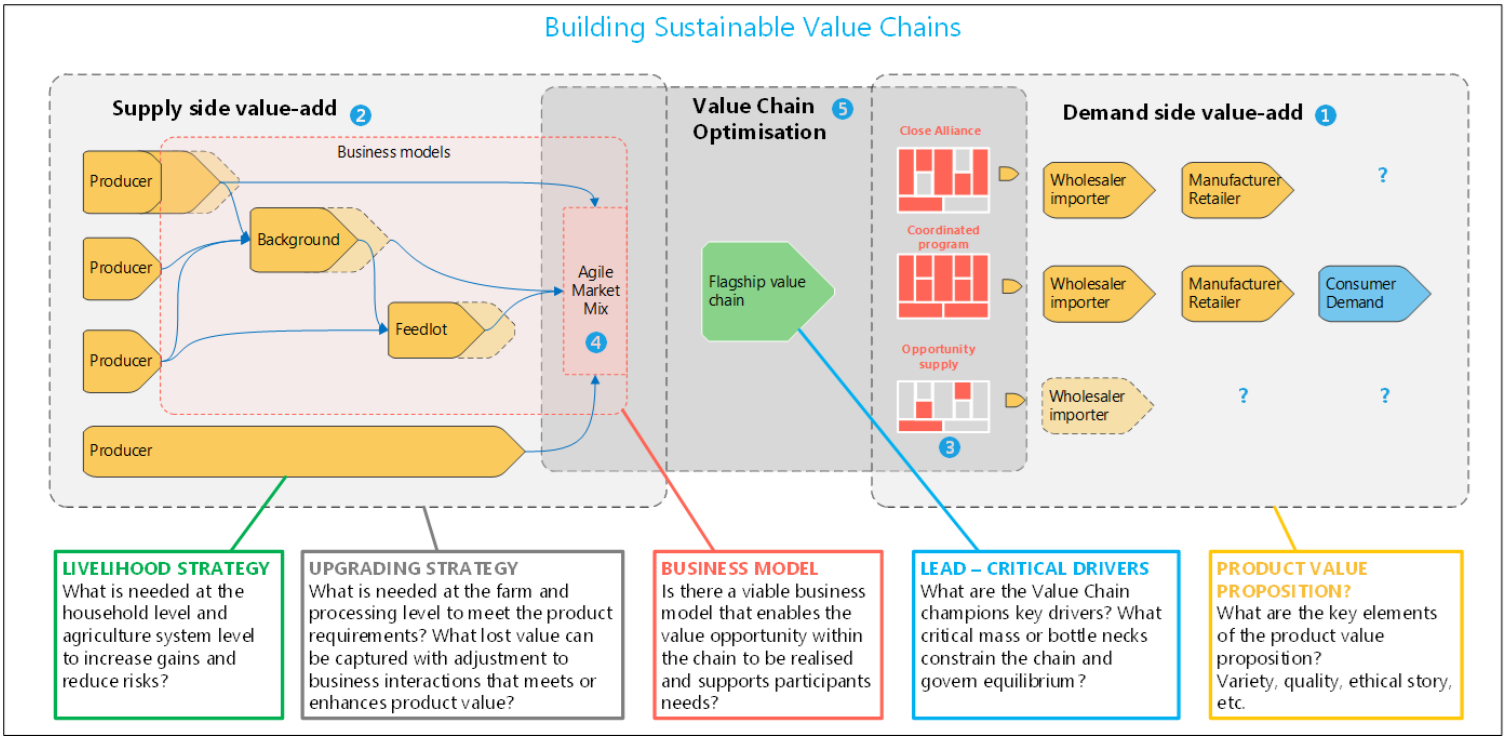


Figure 5: Greenleaf value chain optimisation approach

Guided by the methodology and approach described above, Greenleaf collected relevant data to evaluate the current situation, identify potential for growth and associated barriers. This knowledge allowed for benchmarking and for the development of optimisation scenarios and strategies. The optimisation scenarios were then applied to the supply chain model for assessment and for the development of a final recommendation.

The data collection, scenario development and supply chain modelling processes are described below in subparagraphs 3.1, 3.2 and 3.3.

3.1 Data Collection

Greenleaf sourced data from various sources including industry ABS, MLA and ABARE data, along with industry benchmarking surveys, industry reports and one on one interviews with commercial participants to validate assumptions used in supply chain modelling.

Each set of data was tabulated and combined into database.

Details of the type of data collected is described below to show what aspects were considered and what not.

3.1.1 WA General Data

The general data collected in WA explored the sheep population, distribution and movement through the supply chain.

Specific data sets and sources include the following:

- **Number of sheep in state by animal type** (lambs, ewes, rams & hoggets) *(ABS, 1990; ABS AG CENSUS, 2012).*
- **Number of sheep per Shire** *(ABS, 1990; ABS AG CENSUS, 2012).*
- **Current flow or animals through the supply chain** *(ABARE, 2014; ABS, 1990, 2015; ABS AG CENSUS, 2012; CAMPBELL ET AL., 2013; MLA, 2015).*
- **Number of properties by size in WA** *(ABARE, 2014).*

3.1.2 Sector Specific Data

Sector specific data collected explored each link in the supply chain: Producer, Store Lambing, Feedlot and Processor. Within each link, costs were investigated but also elements that influenced the production and/or throughput rate, such as growth rate at the Producer and Feedlot links and slaughter weight at the Processor link.

- **At the Producer link of the supply chain**: Greenleaf focused on collecting data about the number of ewes and lambs, the growth rate of lambs, shearing, variable and fixed cost of production and the current carrying capacity of WA.

- **At the Store Lambing link of the supply chain**: Greenleaf focused on collecting data about the number of animals and costs.

- **At the Feedlot link of the supply chain**: Greenleaf focused on collecting data about costs, purchase weight, growth rates and Days on Feed (DoF).

- **At the Processor link of the supply chain:** Greenleaf focused on collecting data about the profit margins, slaughter weight, processing capacity.

Table 2 below shows the details and sources of specific data sets sought along the supply chain.

Table 2 - Specific data sought for investigation

Producer

- **Number of ewes and lambs** *(ABARE, 2014; ABS, 1990, 2015; ABS AG CENSUS, 2012; CAMPBELL ET AL., 2013; MLA, 2015).*
    - **Weaning percentage** *(ABS, 2013; CAMPBELL ET AL., 2013)* - the fatal losses and deaths to marking are combined in this information.
    - **Breeding and lambing months** *(ABS, 1990).*
    - **4 kg lamb birth weight.**
    - **5% death rate from marking to slaughter.**
- **Growth rates of lambs up to 100, 150 and 400 days.**
- **Shearing** *(CARMODY, 2011).*
    - **Adult's sheep cutting yield wool clip greasy and clean.**
    - **Lambs sold heavier than 31kg live weight wool clip.**
    - **Wool sales price** *(AWEX, 2015).*
    - **Cost of shearing.**
- **Variable cost of production included** (cost varies between animal types) *((ABARE, 2014; CARMODY, 2011; DAHL, MARTIN, & GRAY, 2014; THOMPSON & TROMPF, UNKNOWN; YOUNG, 2013), DISCUSSIONS WITH PRODUCERS FOR VALIDATION – TABLES USED FOR VALIDATION IN THE APPENDIX).*
    - **Dipping.**
    - **Shearing.**
    - **Marking lambs.**
    - **Feed costs if kept over the summer.**
    - **Scanning ewes.**
    - **2 x drenching per year.**
        - **Shearing & Crutching.**
- **Fixed costs** (Number of properties in each size) *(ABARE, 2014; DAHL ET AL., 2014).*
- **State Carrying capacity** *(ABS, 1990; ABS AG CENSUS, 2012; COLIN MCLAREN, 1997).*

Store Lambing

- **Fixed costs.**
- **The number of store lambs** was calculated from the number of store lambs sold through the sale yards over a year.
- **Variable costs.**
    - **Purchases price of animals** was obtained from WA Livestock pricing indicator.
    - **Management costs** of animals per head.
- References – The same references were used for store lamb production as for the producer.

Feedlot Data

- **DoF** *(AUSTRALIA, 2007; MCFARLAND, UNKNOWN).*
- **Growth rates** *(AUSTRALIA, 2007; DUDDY, UNKNOWN; DUDDY, BALL, SHANDS, & HEGARTY, 2007; ROBINSON, 2007).*
- **Cost per head** (Australia, 2007; Duddy, Unknown; Duddy et al., 2007; Robinson, 2007).
    - **Feed & water costs** per head per day.
    - **Stepped linear fixed costs.**

- **Induction and selling costs.**
  - **Induction treatments and labour.**
  - **Selling costs including transport, sale levy and commission.**
- **Fleece management percentages for flies and shorn.**

- **Purchasing weight** of the majority of lambs.

Processor

- **Profit margin** currently for the past year across the whole of WA *(WAMMCO, 2014).*
- **Fixed costs** *(WAMMCO, 2014).*
- *AVERAGE CARCASE WEIGHT* at Slaughter *(ABS, 2015).*
- **Proportion of lamb and mutton processed** within WA *(ABS, 2015).*
- **WA processing capacity** *(DAVEY, 2013)*.
- **WA Slaughter numbers per months** *(ABS, 2015).*

3.2 Scenario Development

An initial set of scenarios was generated to guide further investigations and to identify barriers to further growth in the industry. These initial scenarios were refined against the industry's willingness for change and capacity for growth. The interview results were used to derive the final scenario numbers.

3.2.1 Initial Scenarios

The initial scenarios were developed with the requirements in mind of firstly, producing an additional 500,000 lambs per year and secondly, bringing value to each sector of the chain. Each of these initial scenarios are introduced below and detailed in Appendix 6.6.

- **Scenario 1: Sheep producers increase the numbers of lambs produced**. Production can be increased in a number of ways: increasing reproductive rates, changing turn off times, using latent production capacity, to name a few. This scenario assumes capacity (without further capital investment) to increase production rates.

- **Scenario 2: Beef and sheep enterprises increase the number of lambs produced – convert from beef to sheep**. This scenario is about enterprises producing both beef and sheep and it requires these producers to increase the number of sheep being produced. As per scenario 1, this scenario assumes there is capacity (without further capital investment) to increase the number of sheep. The methods to increase production would be similar to scenario 1.

- **Scenario 3: Alternative markets for lambs sold to live export**, redirect lambs from live export to different boxed meat sales channels. This scenario will likely impact on

product specification, costs such as transport costs and the current supply and demand equilibrium. It identifies alternative and more profitable alternatives.

- **Scenario 4: Beef producers start producing lambs**. This scenario is about beef producers switching from beef to lamb, partially or completely. It assumes that it is beneficial in terms of cost, risk and profitability to switch and that producers are interested to make such a change. This was not considered a key scenario based on previous lack of interest from industry.

- **Scenario 5: Grain producers start producing lambs**. This scenario is about investigating opportunities where it may be more beneficial to have sheep than grain, for instance because of seasonal changes, geographical location related to land use, or certain weather conditions.

- **Scenario 6: Sheep and grain producers increase lamb production**. This scenario is about combined enterprises increasing the number of lambs produced.

3.2.2 Refinement of Scenarios: Gattorna Alignment Findings

The initial set of scenarios was investigated for its suitability through interviews conducted by Gattorna Alignment. Gattorna Alignment is a boutique strategy advisory business working with selected clients around developing market-focused strategy, innovative supply chain strategies and aligning internal capability to ensure implementation of new directions (Gattorna, 2013). They were asked to focus on the behavioural segmentation of the WA sheep industry.

This project involved interviewing a significant sample of producers from both the Northern and Southern regions of Western Australia, and using the Dynamic Alignment framework to identify what their 'supply logics', i.e. the behaviours and capabilities that drive the way they prefer to operate and make supply decisions.

On the supply side, the key issue was the major increase in inputs required to support new market opportunities. Insights were needed into the willingness and capability of producers to increase flock size, and to make long-term commitments to these levels. Experience has shown that just as in the market, any given supply base also has a range of behaviours and capabilities. Segmenting suppliers provides a base to predict the ability of the supply base to change and the different sourcing strategies that might be used to maximise supply in the long term.

Gattorna Alignment mapped producer profiles and segments with growth potential. Producers were segmented into behavioural groups: collaborative, transactional and opportunistic. The potential growth value of each segment were then determined. Gattorna Alignment also measured the levels of confidence in the industry across different sectors of the industry.

The interviews aimed to explore topics such as the potential for further growth and capacity and willingness for change within the supply chain.

The interviewed group included 194 producers (3% of population) and 10 agents. They were asked 25 open-ended qualitative questions and 14 quantitative questions. The qualitative questions were asked to elicit behavioural responses and investigate levers for change. The quantitative questions were asked to build a profile and analyse growth potential.

From these results, Greenleaf was able to target groups more likely to be receptive and thus estimate the potential numbers of respondents.

The interview results showed that the following options were favourable for further investigation:

- Increasing existing production capacity.
- Moving away from live export.
- Changing turn off times.
- Increasing reproduction rates.

While the interview results showed that convincing beef or grain producers to increase/move to sheep production was a favourable option as well, Greenleaf decided that this would be a harder sell and that the other four options would provide all the capacity required. In particular, beef producers believe that sheep is more demanding and their infrastructure and management skills are not believed to be directly transferrable (Thompson & Trompf, Unknown).

3.2.3 Final Scenario Numbers

The Gattorna Alignment data was segmented across farm size and the four regions (based on: *(ABS, 2006)*), namely:

- WA cereal-sheep north.
- WA cereal-sheep south.
- WA medium winter rain north.
- WA medium winter rain south

The segments were then compared in terms of the total producer numbers in order to help identify what segments of the market would be better to target first. It should be noted that the sample sizes of the individual segments were too small to be statistically meaningful and segmented numbers should be viewed as indicative only. Collectively, however, the sample sizes were big enough and thus statistically significant. The growth opportunities presented by each scenario are summarised here.

- **Diversified markets for light lambs**

The survey results showed that 12% of respondents have no confidence in the Live Export trade. These respondents were grouped as ‘Collaborative’. Greenleaf halved the numbers on the basis that many with potential will not act on the opportunity and for the sake of being

conservative, and then considered 35% of results poachable. The resulting number of sheep for processing across WA is 100,000. Refer to Table 3 below for the segmented breakdown of the survey results.

Table 3 - Diversified markets for light lambs: segmented breakdown (ABARE, 2014; ABS, 2013)

Sheep Number Increase								
Region	**1-500**	**501-1000**	**1001-2000**	**2001-4000**	**4001-8000**	**8001-16000**	**>16000**	
WA cereal-sheep north	-	-	2,853	902	4,128	-	3,018	**10,901**
WA cereal-sheep south	1,231	1,022	-	10,862	-	-	-	**13,114**
WA medium winter rain north	-	975	6,593	-	-	-	-	**7,568**
WA medium winter rain south	2,508	864	5,249	1,400	23,942	38,856	-	**72,820**
	3,739	**2,861**	**14,695**	**13,165**	**28,071**	**38,856**	**3,018**	**104,404**

- **Using Latent Capacity – State**

The survey result showed that 32% of respondents are willing to increase sheep production to their maximum capacity without needing further investment. These respondents were grouped as 'Collaborative'. Their capacity equated to an average 31% increase in sheep numbers across the board. Greenleaf excluded properties with less than 500 sheep and halved the number of sheep for the sake of being conservative. The resulting growth in lamb production for processing across WA is 250,000 (assuming current stocking rates). Refer to Table 4 below for the segmented breakdown of the survey results and Figure 6 showing the latent capacity for each of the regions. Note that towns have been singled out to reference the regions only and include a wider group of shires than those listed.

Table 4 - Using latent capacity: segmented breakdown

Sheep Number Increase								
Region	**1-500**	**501-1000**	**1001-2000**	**2001-4000**	**4001-8000**	**8001-16000**	**>16000**	
WA cereal-sheep north	136	7,868	1,886	42,044	7,041	-	-	**58,974**
WA cereal-sheep south	1,875	4,081	17,373	14,295	-	-	-	**37,624**
WA medium winter rain north	9,886	2,094	-	-	-	-	15,841	**27,822**
WA medium winter rain south	16,417	3,201	1,484	45,971	70,761	17,904	-	**155,739**
	28,315	**17,244**	**20,743**	**102,309**	**77,802**	**17,904**	**15,841**	**280,158**
							>500 Sheep properties only	**251,843**

Figure 6 : Latent capacity across the WA regions

- **Early Turnoff – State**

The survey result showed that 10% of respondents had a lot of flexibility to change their turn-off times. These respondents were grouped as 'Transactional'. In this scenario, lambs are mated two months later, turned off by the producer at the same time, then sent to store lambs for one month and feedlot for two months. The implication is that lambs are two months less on the land, animals are lighter than before and there is more pasture to support extra sheep. The increased production coupled with the change in mating time to match the peak in nutritional allows for the increase in animals produced on the same land area. Finishing enterprises and feedlots would then grow the lambs out to heavier weights resulting in a net increase in kilograms produced.

The change in turnoff times can be seen in Figure 7. The blue line identifies the average pasture growth for southern WA, the red line identifies the current turnoff patterns of lambs in WA with the green/orange line reprensenting the proposed supply pathway (orange section representing feedlotting lambs). The proposed lambing period would have added benefits to the producer by reducing weight loss in ewes as they are lactating during peak nutitional avalibility. However this style of production system will not develop unless there are markets and market signals for heavier weight carcases during late autumn and winter months are developed.

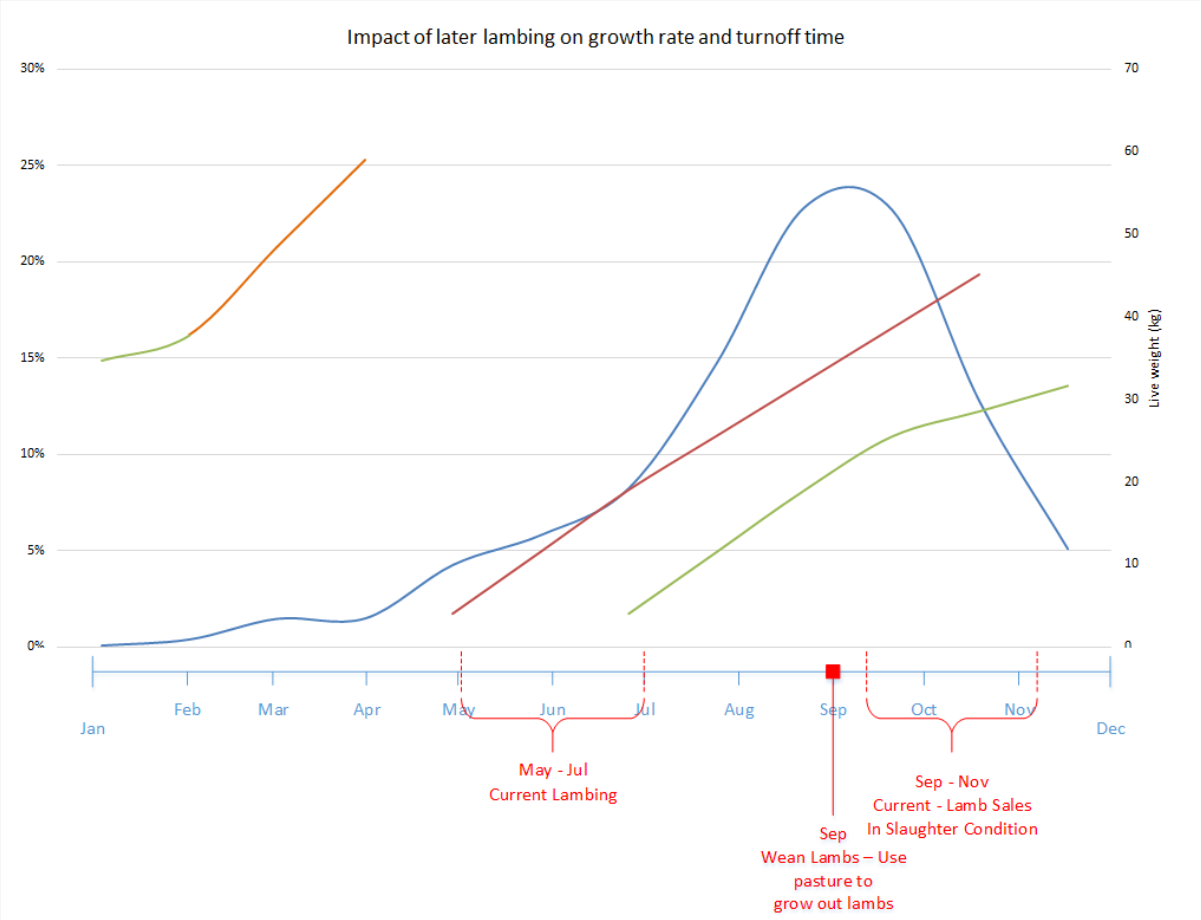


Figure 7: Impact of lambing on growth rate and turnoff time, the blue line represents the pasture growth, the red line identifies the current turnoff patterns, the green/orange line reprensents the proposed lambing times

Greenleaf halved the numbers for the sake of being conservative, and found that this scenario would result in 5% of properties and thus 50,000 sheep extra for processing. This scenario would mean increased profit for the producer but no extra fixed costs. Refer to Table 5 below for the segmented breakdown of the survey results.

Table 5 - Early turnoff: segmented breakdown

Sheep Number Increase								
Region	**1-500**	**501-1000**	**1001-2000**	**2001-4000**	**4001-8000**	**8001-16000**	**>16000**	
WA cereal-sheep north	2,751	3,207	4,789	17,766	9,830	-	-	**38,342**
WA cereal-sheep south	1,172	-	-	7,743	-	-	-	**8,915**
WA medium winter rain north	-	665	2,960	47,272	-	-	-	**50,897**
WA medium winter rain south	-	1,097	3,062	-	8,641	-	-	**12,800**
	3,923	**4,969**	**10,811**	**72,781**	**18,470**	**-**	**-**	**110,954**
							Normalised 2-4000 range	**52,814**

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- **Increase Reproduction Rate – State**

The survey results showed that 7% of respondents showed a desire to increase their lambing rates. These respondents were grouped as either 'Transactional' or 'Collaborative'. Greenleaf halved the numbers for the sake of being conservative and found that this scenario would result in 282 interested properties. Assuming methods could be implemented to increase lambing by 8%, this would equate to an additional 100,000 lambs for processing across WA. Refer to

Table 6 below for the segmented breakdown of the survey results.

Table 6 - Increased reproduction rate: segmented breakdown

Sheep Number Increase								
Region	1-500	501-1000	1001-2000	2001-4000	4001-8000	8001-16000	>16000	
WA cereal-sheep north	880	1,539	1,149	-	-	-	-	3,569
WA cereal-sheep south	-	476	-	3,717	53,294	-	-	57,487
WA medium winter rain north	598	-	-	-	-	-	-	598
WA medium winter rain south	-	527	1,470	-	8,295	-	-	10,292
	1,478	2,542	2,619	3,717	61,590	-	-	71,946
							Normalised 2-4000 range	100,333

3.3 Supply Chain Model

A key part of the project was to map the existing WA sheep supply chain from producer through to processor and live export. Using the data obtained from various sources as outlined in section 3.1, the supply chain could be constructed at an overall WA as well as shire and town level. This level of granularity is useful in identifying key focus areas across WA matching Gattorna Alignment's survey results to production opportunities. However, a much more detailed level of data collection is needed before being able to make any decisions on individual supply chain pathways from shire to shire. In particular, detailed market prices and costings at a much more granular level would be required.

The model mapped numbers of animals coming into each supply chain sector grouping by size, age and source as well as numbers leaving each sector by size age and destination utilising factors such as average daily gains, bill of materials for carcase breakdown and seasonal factors per sector. A profit and loss was also constructed for each of these groupings per sector. This helped to assess profitability at each point of the current supply chain as well as monitor profitability changes as different scenarios were applied. The database structure used to map the supply chain is shown in Figure 8.

This data was recorded into Greenleaf's web based supply chain modelling software. This software enables the development and comparison of a range of scenarios whereby supply chain pathways and costings can be adjusted, changed completely or new pathways created

in order to assess the changes in profitability and overall numbers at each point in the chain. This process highlighted a number of key improvements in each sector. The detailed results of these scenarios are shown in section 4.2. Note that the model itself was constructed at a level of granularity below this but is only shown at this level due to data validity concerns already mentioned.

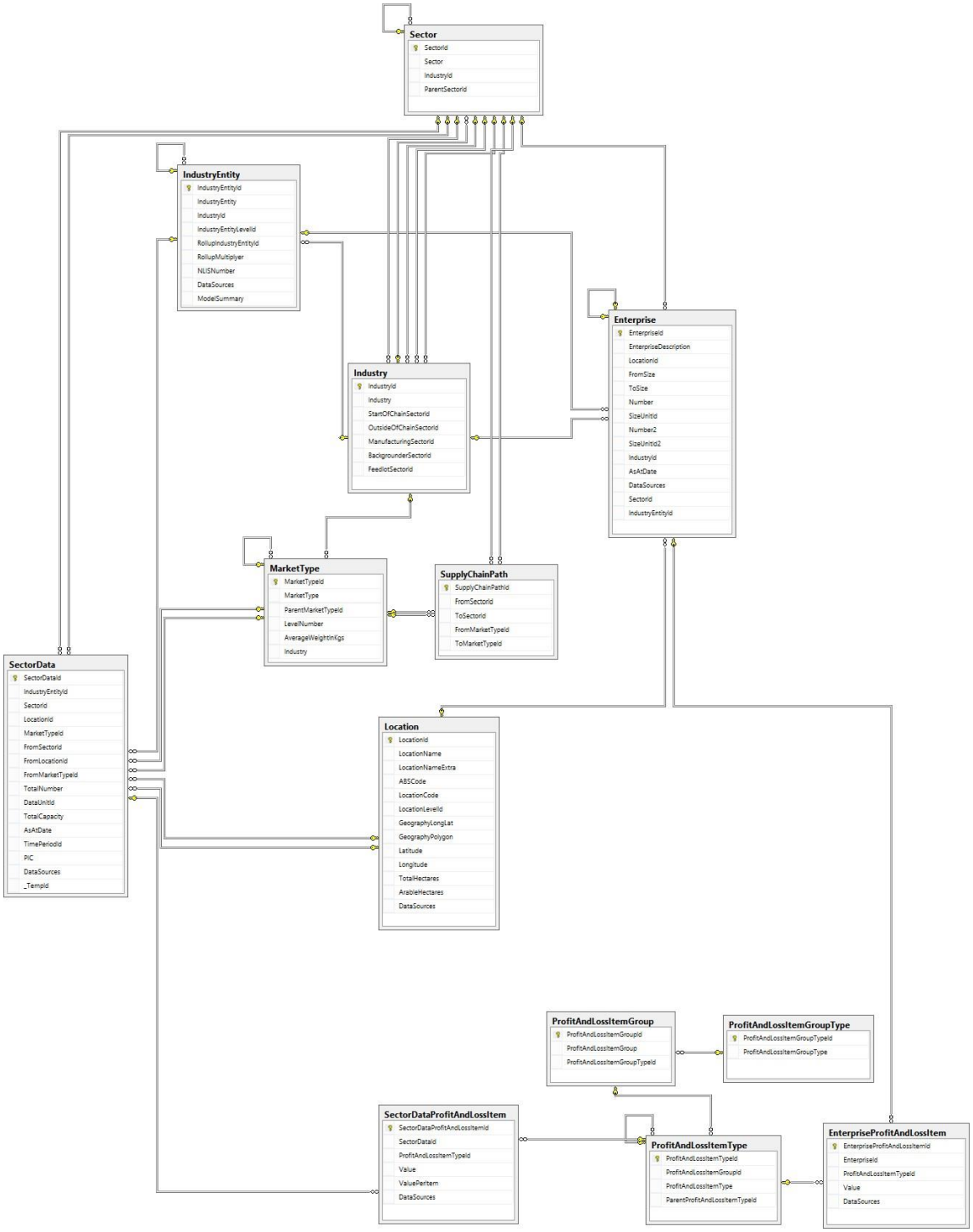

Figure 8 : Greenleaf Supply Chain model summary data structure

4 Results

4.1 Current WA Supply Capacity

The current supply chain capacity, specifically lambs for processing, was calculated on a seasonal and annual basis. As was shown in Figure 3, the supply chain capacity is seasonal. The capacity numbers should be considered within the assumptions made.

The calculation of the supply chain capacity was used as the baseline for the performance assessment of the final optimisation scenarios as described in paragraph 3.2.3. For the purpose of the project, the increase in capacity from the baseline should be a more accurate number than the baseline number on its own because the increase in capacity is the more sensitive modelling parameter.

Greenleaf used a population size of 14.2 million sheep in WA as a starting point. Of these, approximately 40% is turned off (abattoir and live export), i.e. 5.7 million. The seasonality of this number is significant. Figure 9 below shows how turnoff numbers change with season.

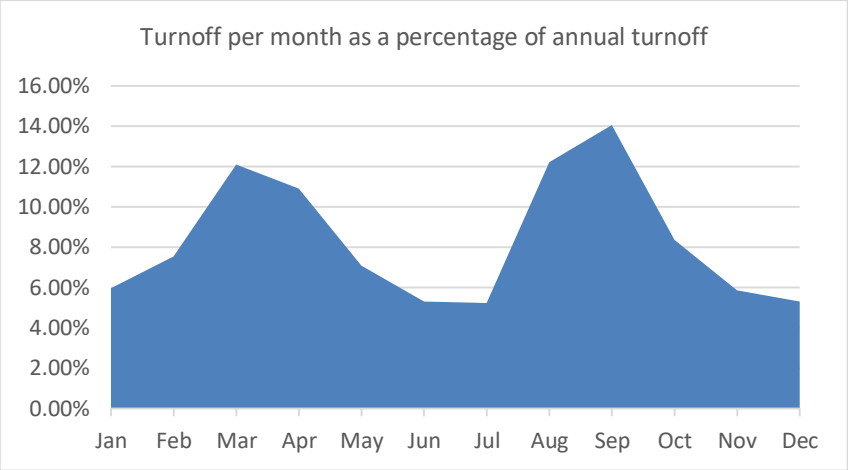

Figure 9 : Current seasonality of turnoff

All scenario performances were measured against the annual baseline production capacity but seasonal impacts were also considered where relevant. Any change in population because of this project should be measured against the currently declining trend shown in Figure 2.

Paragraph 4.2 below includes a description of the performance of each of the final scenarios against the baseline measurement.

4.2 Detailed Scenarios

This section describes the impacts and requirements of the detailed scenarios on an agricultural level. It also describes the conditions around the modelling as outlined in section 3.3.

4.2.1 Current Scenario

This paragraph describes the current supply chain configuration in terms of pathways, channel strength and volumes.

Figure 10 below shows the number of animals at each link of the current WA supply chain. It also shows the cost of production and margins at each of these links.

Data in '000s

		Supply Chain Numbers							Cost of Production				Margin			
Scenario Description	Supply Chain Pathway	Breeder	Store Lambs	Feedlot	Abattoir	Live Export	Boxed Exports	Retail	Breeder	Store Lambs	Feedlot	Abattoir	Breeder	Store Lambs	Feedlot	Abattoir
		#	#	#	#	#	Kg	Kg	$/Hd	$/Hd	$/Hd	c/Kg	$/Hd	$/Hd	$/Hd	c/Kg
01 - Current Scenario	Remain on Farm	8,488							$57.59				-$25.73			
	Direct to Abattoir	3,760			3,760				$65.04				$68.09			
	Abattoir via Store Lambs	175	175		175				$57.39	$106.90			$4.00	$28.93		
	Abattoir via Feedlot	9		9	9				$59.26		$134.12		$9.08		$6.72	
	Direct to Live Export	1,682				1,682			$64.44				$43.48			
	Live Export via Store Lambs	95	95			95			$57.39	$106.92			$4.00	$20.29		
	Live Export via Feedlot	5		5		5			$59.26		$134.53		$9.08		-$2.07	
	Boxed meat exports						159,423					476				19
	Retail							39,574				476				19

Figure 10 : Supply chain scenario – Current scenario

The important aspects from the table are the number of animals in the 'Breeder' column and the spread of animals along the various supply chain pathways. The spread of animals indicates how channels are used. The 'Margin' section of Figure 10 is also important – it shows the profitability of each of the channels.

Figure 11 is a graphical representation of the current supply chain pathways.

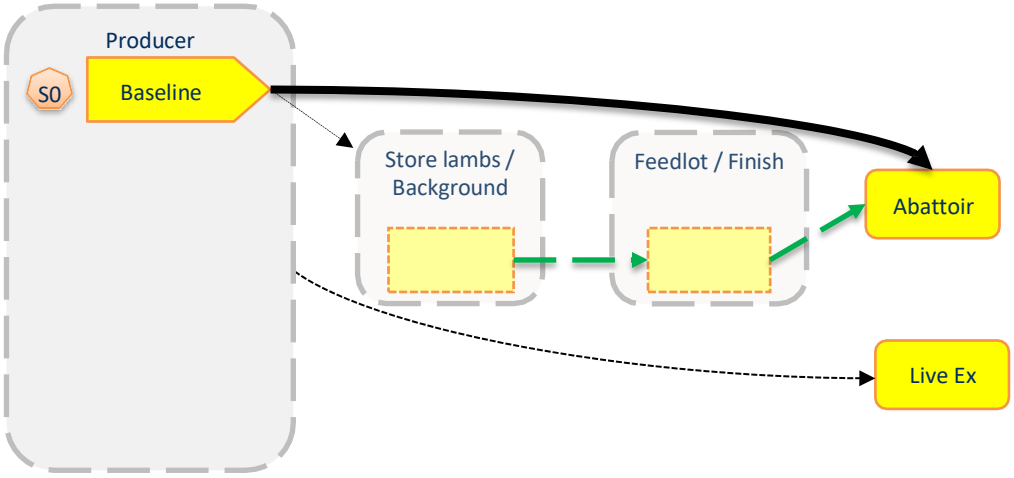

Figure 11: Current supply chain configuration and pathways

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The strength of each channel can be quantified by looking at the volume of animals proceeding along each supply chain pathway. Approximately 30% of the sheep population goes to the Abattoir and approximately 13% to Live Export. The Feedlot and Store Lambs channel is a weak channel, with only approximately 2% of the population going through this channel.

Figure 12 shows this spread in a graphical form, expressed as a percentage of the number of animals at the 'Breeder'.

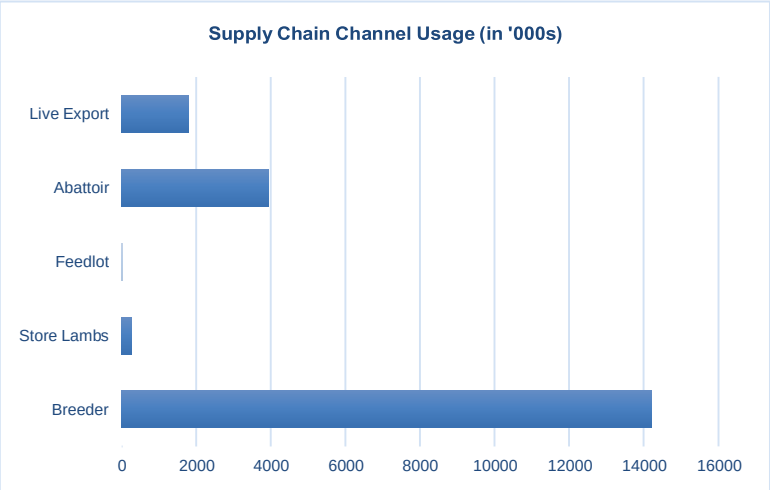


Figure 12 : Current Supply Chain Channel Volumes

Comparing Figure 12 with the 'Margin' section of Figure 10 provides some background for the channel usage distribution. A possible explanation is that the Feedlots and Store Lambing links are not profitable and therefore the channels are underutilised.

4.2.2 Diversified Markets for Light Lambs

This scenario explored breeding more but lighter lambs at the Producer link. This will be done using the Feedlot and Store Lambs channels to grow animals out before sending these animals to the processor instead of Live Export.

The application of this scenario to the supply chain model resulted in the following changes:

- From the Producer 100,000 lambs will be redirected from Live Export to the Feedlot and Store Lambs channels.
    - 50,000 lambs to the Feedlots – this is an increase of 350% from the current scenario.
    - 50,000 lambs to Store Lambs – this is an increase of 20% from the current scenario.

- These 100,000 lambs will be then taken from Feedlot and Store Lambs to the Processor channel.

Figure 13 below shows the supply chain impact of this scenario.

Data in '000s

		Supply Chain Numbers							Cost of Production				Margin			
Scenario Description	Supply Chain Pathway	Breeder	Store Lambs	Feedlot	Abattoir	Live Export	Boxed Exports	Retail	Breeder	Store Lambs	Feedlot	Abattoir	Breeder	Store Lambs	Feedlot	Abattoir
		#	#	#	#	#	Kg	Kg	$/Hd	$/Hd	$/Hd	c/Kg	$/Hd	$/Hd	$/Hd	c/Kg
04 - Diversified markets for light lambs	Remain on Farm	8,488							$57.59				-$25.73			
	Direct to Abattoir	3,760			3,760				$65.04				$68.09			
	Abattoir via Store Lambs	225	225		225				$57.39	$106.90			$4.00	$28.94		
	Abattoir via Feedlot	59		59	59				$59.26		$133.48		$9.08		$7.36	
	Direct to Live Export	1,582				1,582			$64.44				$43.48			
	Live Export via Store Lambs	95	95			95			$57.39	$106.91			$4.00	$20.30		
	Live Export via Feedlot	5		5		5			$59.26		$133.86		$9.08		-$1.86	
	Boxed meat exports						163,463					471				24
	Retail							40,577				471				24

Figure 13 : Supply chain scenario – Diversified markets for light lambs

The only change in this scenario is the distributions of animals through alternative pathways of the supply chain. The lambs currently being sold to Live Export are purchased by either Store Lambing, Feedlot or Processor. This Scenario would only be seen as a short-term opportunity and not a longer-term strategy.

It is expected that the profitability for the Production sector will not change, as the animals purchased will move through different supply pathways. Feedlot profitability will increase with an increase in throughput and fixed costs per head will reduce. This is driven by an increased demand for lighter finished lambs for domestic slaughter. The Abattoir profit will increase with a throughput increase and fixed costs per head will reduce.

The following modelling assumptions were made:

- The same cost of production and sales price were used for each pathway of this scenario as for the current scenario.
- The value created is due to the increased utilisation of infrastructure in Australia, as 5.6% of the animals will be going to Live Export.

4.2.3 Using Latent Capacity – State

In this scenario, additional ewes and rams will be purchased and accommodated on farmland that is not currently being utilised. Additional lambs will also be produced but at the current reproductive rates.

The application of this scenario to the supply chain model resulted in the following changes and are shown in Figure 14 below:

- The total number of sheep at the Producer will increase by 300,000.
- The 300,000 extra sheep at the Producer will result in an additional 100,000 lambs for turnoff.
- The additional 100,000 lambs will be distributed directly to the Processor.

The total number of animals was calculated from the GA surveys with producers indicating they have the capacity but were relocated to increase production due to a fear of not reducing the price per head for flooding the market.

Data in '000s

		Supply Chain Numbers							Cost of Production				Margin			
Scenario Description	Supply Chain Pathway	Breeder	Store Lambs	Feedlot	Abattoir	Live Export	Boxed Exports	Retail	Breeder	Store Lambs	Feedlot	Abattoir	Breeder	Store Lambs	Feedlot	Abattoir
		#	#	#	#	#	Kg	Kg	$/Hd	$/Hd	$/Hd	c/Kg	$/Hd	$/Hd	$/Hd	c/Kg
06 - Using Latent Capacity - State	Remain on Farm	8,620							$56.29				-$24.43			
	Direct to Abattoir	4,041			4,041				$63.74				$69.39			
	Abattoir via Store Lambs	174	174		174				$56.09	$106.90			$5.30	$28.10		
	Abattoir via Feedlot	9		9	9				$57.96		$133.91		$10.38		$6.09	
	Direct to Live Export	1,680				1,680			$63.14				$44.78			
	Live Export via Store Lambs	95	95			95			$56.09	$106.92			$5.30	$20.29		
	Live Export via Feedlot	5		5		5			$57.96		$134.29		$10.38		-$2.29	
	Boxed meat exports						170,763					464				31
	Retail							42,389				464				31

Figure 14 : Supply chain scenario – Using latent capacity

The increased number of animals produced in this scenario will be sold directly to the Processor, whereas the other scenarios generally involve a higher number of animals being sold through the Store Lamb, Producers or Feedlot channels.

The variability of fixed costs allocations for all animals produced in the state and thus the variable profitability of all supply pathways were incorporated in the modelling work. This was used to show a conservative value.

The increased Feedlot throughput reduces fixed cost allocation per head and increases profitability. The Abattoir profit increases as throughput increases and fixed costs per head decreases.

4.2.4 Early Turnoff – State

In this scenario, lambs are turned off earlier allowing additional stock to be run on farm using the same land. The increased growth rate could be achieved through a combination of techniques. This report does not detail all the possible methods, but only lists a few possibilities.

Growth rate will increase due to animals being born on a rising plain of nutrition. This will reduce feed costs for ewes as their peak in nutritional requirement is matched by the season, causing the animals to lose less body condition during lactation. This improved body

condition allows for the significate increase in production as animals are utilising energy from reserves rather maintain weight and utilising energy as consumed. In addition to this, it could also have a positive effect on the producer reproduction rate as ewes have maintained body weight during lactation. It is also anticipated that Producers will have the further benefit of an increased wool income due to the larger number of ewes.

This scenario resulted in the following changes shown in Figure 15 below:

- An additional 250,000 sheep will be run on farm – this is a 2% increase from the current scenario.
- Of these 250,000:
    - 150,000 will remain on farm – this equates to a 2% increase from the current scenario.
    - 100,000 will be distributed to the Feedlot to be grown out.
- The additional 100,000 lambs will then be sent from the Feedlot directly to the Processor.

Data in '000s

		Supply Chain Numbers							Cost of Production				Margin			
Scenario Description	Supply Chain Pathway	Breeder	Store Lambs	Feedlot	Abattoir	Live Export	Boxed Exports	Retail	Breeder	Store Lambs	Feedlot	Abattoir	Breeder	Store Lambs	Feedlot	Abattoir
		#	#	#	#	#	Kg	Kg	$/Hd	$/Hd	$/Hd	c/Kg	$/Hd	$/Hd	$/Hd	c/Kg
07 - Early Turnoff - State	Remain on Farm	8,630							$56.08				-$24.22			
	Direct to Abattoir	3,760			3,760				$63.53				$69.60			
	Abattoir via Store Lambs	175	175		175				$55.88	$106.90			$5.51	$28.93		
	Abattoir via Feedlot	295		295	295				$57.75		$132.06		$10.59		$7.94	
	Direct to Live Export	1,733				1,733			$62.93				$44.99			
	Live Export via Store Lambs	95	95			95			$55.88	$106.92			$5.51	$20.29		
	Live Export via Feedlot	5		5		5			$57.75		$132.45		$10.59		-$0.45	
	Boxed meat exports						170,982					464				31
	Retail							42,443				464				31

Figure 15 : Supply chain scenario – Early turnoff

Two cost parameters were held constant in the financial calculation of this scenario, being the variable costs of producing animals to certain specifications and the sales prices from animals moving throughout the chain.

The variability of the following cost parameters was incorporated in the financial calculation of this scenario:

- Fixed cost allocations for all animals produced in the state and thus the profitability for all supply pathways has changed. This was used to show a conservative value.
- Increased throughput reduces fixed cost allocation per head and increases Feedlot profitability.
- The variable cost to produce these animals has remained the same but realistically the cost to produces these animals would actually decrease.

The Abattoir profit increases as the facility throughput is increased and as a result, the fixed costs per head reduces.

4.2.5 Increase Reproduction Rate

A number of methods will be used to increase the reproductive rate of lambs:

- Scanning ewes to manage twinning and single ewes separately.
- Culling ewes on fertility and maternal instinct.
    - Sell dry ewes at scanning (3-4 weeks).
    - Sell dry ewes at marking.
- Increasing quality of feed or “spike feeding” ewes prior to the ram being put in, this increases the ovulation rate in ewes.
- Increase ewes body condition at joining (when discuss the following graph it can have a natural positive impact on body condition).

Feedlots particularly and Store Lambs to a lesser extent will be utilised more heavily to grow these new lambs out and then they will be sent to the Processor.

The application of this scenario to the supply chain model resulted in the following changes and are shown in Figure 16 below:

- An increase in the total number of lambs at the Producer by 10% (or 567,000 lambs) - this equates to an increase of 5% at the Processor.
- The additional 567,000 animals will be distributed from the Producer:
    - 150,000 to the Feedlot – this is an increase of 1,000% from the current scenario.
    - 150,000 to Store Lambs – this is an increase of 50% from the current scenario.
    - 200,000 to the Processor – this is an increase of 5% from the current scenario.
    - 67,000 to live export – this is an increase of 4% from the current scenario.
- From the Feedlot, the additional 150,000 lambs will be distributed to the Processor – this is an increase of 1,600% from the current scenario.
- From Store Lambs, the additional 150,000 lambs will be distributed to the Processor – this is an increase of 90% from the current scenario.

Data in '000s

		Supply Chain Numbers							Cost of Production				Margin			
Scenario Description	Supply Chain Pathway	Breeder	Store Lambs	Feedlot	Abattoir	Live Export	Boxed Exports	Retail	Breeder	Store Lambs	Feedlot	Abattoir	Breeder	Store Lambs	Feedlot	Abattoir
		#	#	#	#	#	Kg	Kg	$/Hd	$/Hd	$/Hd	c/Kg	$/Hd	$/Hd	$/Hd	c/Kg
09 - Increase Reproduction Rate - State	Remain on Farm	8,487							$55.82				-$23.96			
	Direct to Abattoir	3,953			3,953				$63.26				$69.74			
	Abattoir via Store Lambs	334	334		334				$55.61	$106.90			$5.78	$28.10		
	Abattoir via Feedlot	158		158	158				$57.48		$132.35		$10.85		$7.65	
	Direct to Live Export	1,749				1,749			$62.66				$46.42			
	Live Export via Store Lambs	95	95			95			$55.61	$106.92			$5.78	$20.29		
	Live Export via Feedlot	5		5		5			$57.48		$132.73		$10.85		-$0.73	
	Boxed meat exports						179,630					455				40
	Retail							44,590				455				40

Figure 16 : Supply chain scenario – Increased reproductive rate

Unlike the other scenarios, there is no requirement to increase the ewe population that could allow animals to be sold into the supply quicker with capability building exercises (by MLA or DAFWA) to educate producers on the best was to increase their reproduction rates.

Limited cost increases are associated with the increase in reproduction rate. All the benefits are associated with increasing the efficiency of the production system with getting more marked lambs per 100 ewes.

The benefits are driven by:

- Reduced fixed costs per head of animals sold.
- Increased number of saleable lambs, this is on two levels:
    - Increased number of male lambs for sale.
    - Increased number of ewe lambs for sale whilst maintain the same number of ewes in the breeding herd.

There will be no increase in adult wool sales but there will be an increase in the wool sales from lambs if they are over 26kgs when sold.

4.2.6 Scenario Summary

Figure 17 below shows the combined effect of the application of all of the final scenarios to the supply chain model.

Data in '000s

	Supply Chain Numbers							Cost of Production				Margin			
Scenario Description	Breeder	Store Lambs	Feedlot	Abattoir	Live Export	Boxed Exports	Retail	Breeder	Store Lambs	Feedlot	Abattoir	Breeder	Store Lambs	Feedlot	Abattoir
	#	#	#	#	#	Kg	Kg	$/Hd	$/Hd	$/Hd	c/Kg	$/Hd	$/Hd	$/Hd	c/Kg
01 - Current Scenario	14,214	270	14	3,944	1,782	159,423	39,574	$149.86	$106.91	$134.27	476	$19.55	$25.89	$3.63	19
04 - Diversified markets for light lambs	14,213	320	64	4,044	1,682	163,463	40,577	$149.75	$106.90	$133.51	471	$18.91	$26.37	$6.65	24
06 - Using Latent Capacity - State	14,624	269	15	4,225	1,780	170,763	42,389	$144.03	$106.91	$134.04	464	$24.41	$25.35	$3.15	31
07 - Early Turnoff - State	14,693	269	300	4,230	1,833	170,982	42,443	$142.57	$106.91	$132.07	464	$22.32	$25.89	$7.80	31
09 - Increase Reproduction Rate - State	14,781	429	163	4,444	1,849	179,630	44,590	$137.71	$106.91	$132.36	455	$25.07	$26.37	$7.39	40

Figure 17 : Supply chain scenario summary

From the table it can be the seen that the total increase in the number of sheep for turnoff relative to the current supply chain scenario is well beyond 500,000. Refer to the Supply Chain Numbers column.

This increase in the number of lambs to the Processor is directly in line with the initial market evaluations and the objective of the Sheep Flagship project. Paragraph 4.3 below discusses these results and the implications thereof.

4.3 Key Findings

4.3.1 Optimised Supply Chain

This section discusses how the supply chain will be optimised because of applying the final scenarios. It discusses the impact on the supply chain configuration and channels, the improved performance towards the turnoff numbers, profitability impact along the entire chain as well as the sustainability of the chain.

- **Channel impact**

The combination of scenarios will have an impact on the channels and equilibrium of the current supply chain. Consider Figure 11 showing the current supply chain configuration and channels. From the figure and the numbers shown in paragraph 4.2.1 it is clear that the primary channel is a direct link between the Producer and Processor. The Store Lambs / Feedlot channel is weak in terms of number and thus development. Currently, less than 5% of turnoff goes via Feedlots and Store Lambing.

The application of the final scenario numbers to the current supply chain configuration and channels shows that the Store Lambing / Feedlot channel will need to be developed to become a more pertinent channel. Combined, 30% of the average turnoff across the scenarios will go via this channel. This is equivalent to adding a new channel as the channel is currently barely in use.

In general, adding another channel increases a supply chain's flexibility. In the case of this project, adding another channel will also improve the efficiency of the whole chain. This is based on the assumption that the throughput of the chain will increase without a significant increase in operating cost (based on identified productivity gains).

Refer to Figure 18 below for a visual representation of the impact of applying the final scenarios to the supply chain configuration and channels.

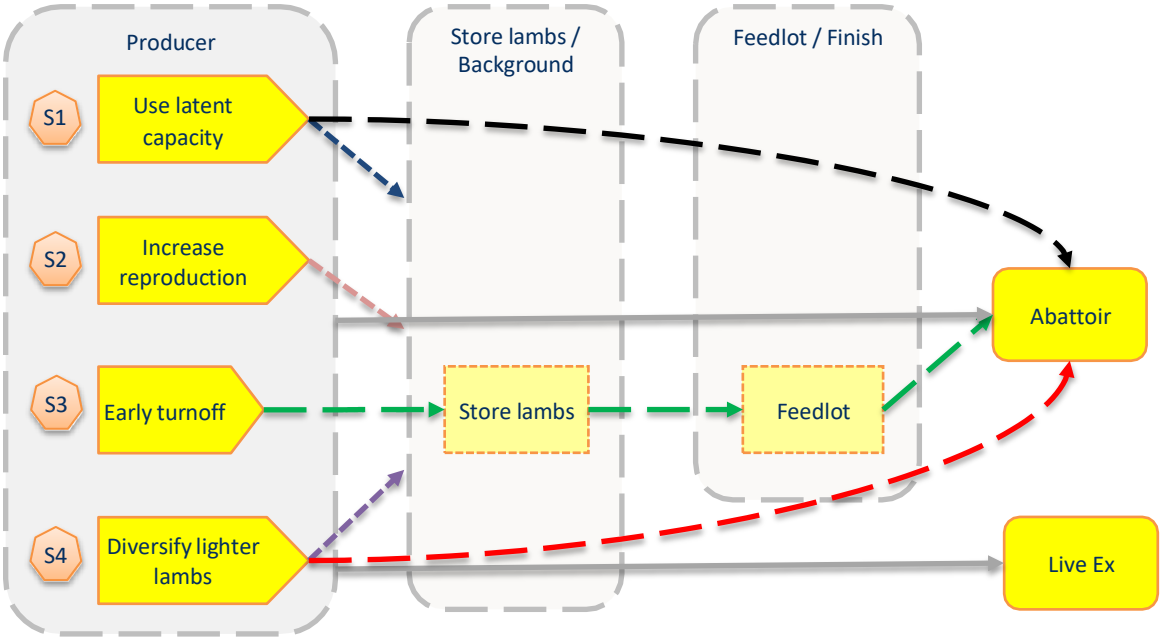


Figure 18: Supply chain configuration and channels with the scenarios applied

As mentioned before, the Store Lambs and Feedlot channels will become more important channels supporting the optimisation scenarios.

- **Improved performance in turnoff numbers**

In line with the optimisation requirements listed in section 2, the combined performance of all the scenarios results in an increase in the number of lambs available for turnoff. For the whole supply chain, approximately 1.1 million additional animals can be turned off. This is an increase in throughput of 20.6% across the supply chain without capital investment by producers.

Table 7 below shows the combined performance of the final scenarios, or the performance of the optimised supply chain in terms of turnoff numbers.

Table 7 - Optimised supply chain performance in turnoff numbers

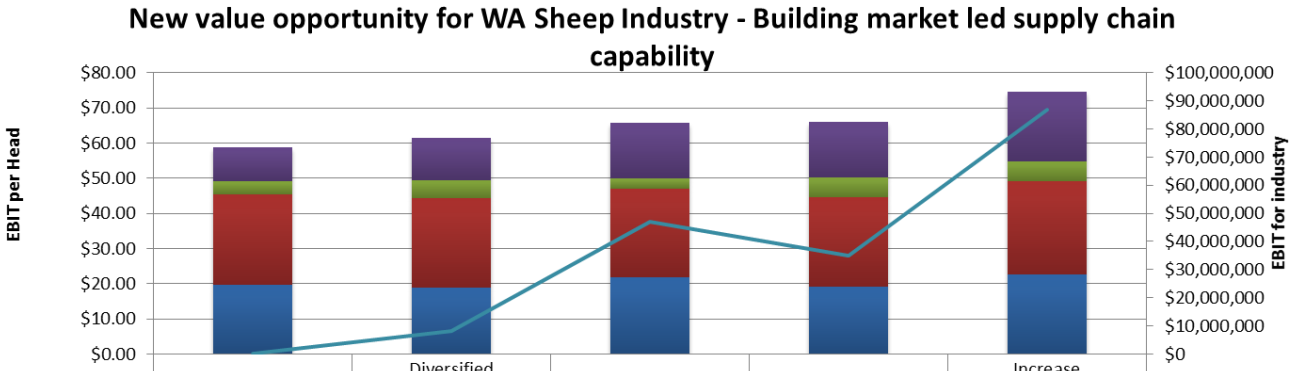
Scenario	Base line	1	2	3	4	**Total**
Turnoff ('000's)	5,726	6,005	6,293	6,063	5,726	
Increase Turnoff ('000's)	0	278	567	337	0	**1,182**

- **Beneficial to the entire chain**

Greenleaf assessed the financial impact of the optimised supply chain by combining the assessments of each of the final scenarios. The assumptions around the financial calculations are as follows:

- The fixed costs have been calculated on the entire flock so that as the number of animals in the state increases, the fixed cost per head produced increases.
- Feedlot fixed costs were used in a linear relationship with number of animals, however realistically it will increase in a step-wise fashion.
- The total fixed costs for the Processor and Producer was maintained.
- Variable cost per animal type per month of turnoff has remained the same.

Figure 19 shows the financial impact of each of the optimisation scenarios.



	Current Scenario	Diversified markets for light lambs	Using Latent Capacity - State	Early Turnoff - State	Increase Reproduction Rate - State
Abattior	$9.60	$11.89	$15.76	$15.87	$20.02
Feedlotter	$3.63	$5.14	$2.92	$5.74	$5.63
Store Lambs	$25.89	$25.41	$25.35	$25.35	$26.37
Producer	$19.55	$18.95	$21.72	$19.15	$22.66
Total Value (Industry)	$0	$8,151,264	$46,949,110	$34,898,193	$86,941,771
Production Stats					
Live export	1,782,269	1,681,995	1,780,228	1,832,909	1,849,413
Store Lambs	269,664	319,816	269,057	269,388	428,660
Feedlot	14,140	63,963	14,548	300,173	162,595
Abattior	3,943,989	4,043,921	4,224,519	4,229,932	4,443,877
Total	5,726,258	5,725,917	6,004,747	6,062,841	6,293,290

Figure 19: Summary of the financial performance of the optimised supply chain

The figure shows that all of the scenarios contribute significantly to the financial performance of the chain, and that increasing the reproductive rate of sheep and using latent capacity are the two most beneficial options, resulting in an industry value benefit of **$86.9** and **$46.9 million** respectively.

The profit spread varies between channel links and will frequently change due to supply and demand forces. However, the total Earnings Before Interest and Tax (EBIT) per scenario will be as estimated above and is thus considered as being highly beneficial to the entire chain.

The cumulative effect of optimising the supply chain using the scenarios developed in this project will have a calculated increased value in excess of **$314 million** across the WA sheep meat industry.

- **Sustainability of the chain**

The three pillars that make supply chains sustainable are:

- Pillar 1: managing business risk.
- Pillar 2: improving efficiencies.
- Pillar 3: creating sustainable products(Wilhelmer, Sisco, Berlanga, Espinosa, & Glazebrook, 2000).

The solutions developed in this project directly address Pillars 2 and 3. Pillar 2 is addressed as the efficiency of the supply chain is improved. Pillar 3 is addressed as the chain can better address evolving customer requirements.

Using the Greenleaf Supply Chain Development Model (GSCDM) to build sustainable supply chains shown in Figure 5, the solutions developed in this project address the alignment of the supply side with the demand side. From initial market estimates, the supply side of the WA supply chain is currently not ready or capable to meet expected increased demand.

The final scenarios provide viable upgrading strategies that are aligned with critical drivers (increased turnoff, improved efficiency and low investment costs) and that will allow the supply side to meet the anticipated demand of the supply chain. The upgrading strategies also considered the specific requirements due to the nature of each link of the supply chain to assess the feasibility of each strategy, including what is needed at the agricultural level. Thus, the solutions developed address all the elements of the GSCDM.

4.3.2 Barriers and Enablers

- **Store lamb and Feedlot capacity**

As mentioned above, the Store Lamb / Feedlot channel will have to expand to accommodate 1.8 million sheep against the current 0.28 million. This will require capital expenditure to develop, in the order of $1.2 million for 30,000 sheep. The Store Lambing market assessment currently shows a significant group of opportunistic underperformers. For example, the Feedlotter to Live Export channel loses money due to these animals being the shy feeders.

Further, producers were asked under what circumstances they would consider feedlotting and 66% of respondents replied that they would not consider it at all. It was encouraging that 34% would consider with the right market signals.

A growth mindset is needed or an alternative business model that builds separate capability in this area.

- **Growth mindset**

There are two aspects hampering growth on a behavioural front: the Gattorna Alignment interviews showed that only 46% of producers have a growth mindset and contracts have not been effective in building supply chain relationships. A key question is how to influence change indirectly.

In line with the behavioural segmentation groups mapped by Gattorna Alignment as discussed in paragraph 3.2.2, communication and relationship strategies can be modified per segment to improve effectiveness. Refer to Figure 20 below.

Figure 20 : Communication strategies for each producer segment

The building of a growth mindset starts with building confidence in the industry as a whole.

- **Confidence in the industry and risk management**

The confidence in the lamb and sheep meat industry is relatively high compared to other agricultural sectors such as wool and grain. Figure 21 below shows that the confidence level for lamb and sheep meat is 94%, significantly higher than the other measured industries with confidence levels around 62%, 60% and 85% respectively.

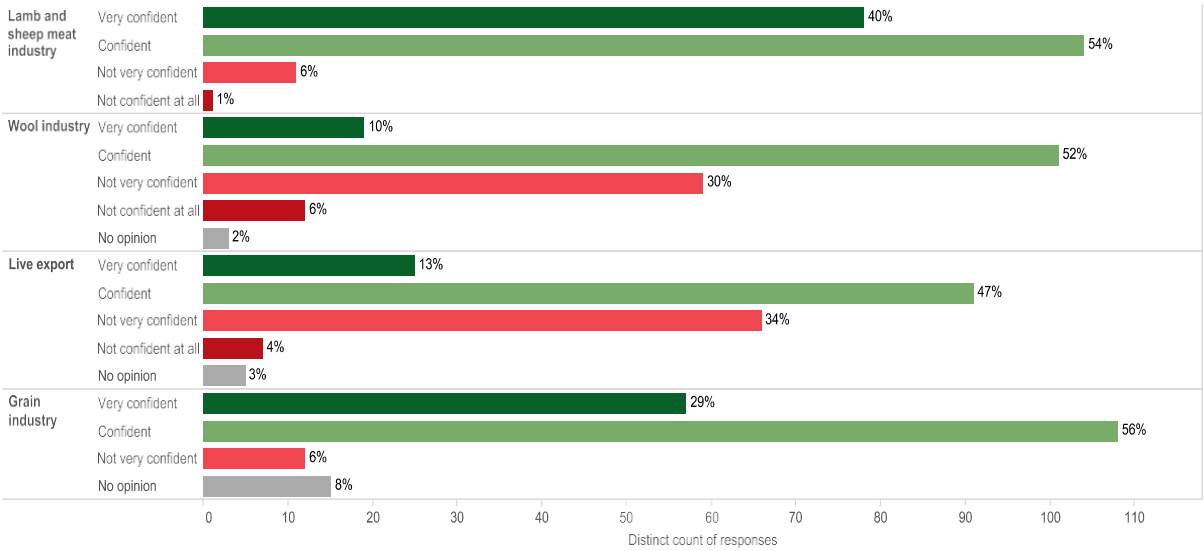


Figure 21 : Industry confidence across different agricultural sectors

However, increasing confidence towards the realisation of a new value chain is complex. It requires big goals to be broken down into small manageable steps in a collaborative effort; it requires messages to reach all required stakeholders. The skill base, knowledge and data of the industry should be leveraged where possible and multi-option development paths should be pursued to maintain momentum. Finally, project coordination and timing should be managed and intervened where necessary.

Risk management strategies can also influence industry confidence. A diversified chain will allow for risk management strategies that support confidence building. It will also allow the chain to be more flexible in accepting a wider customer mix, including a wider customer-initiated product specification. Thus, a diversified chain allows for better matching flexibility of demand and supply ends of the supply chain, all of which builds confidence.

5 Discussion and Recommendations

This section discusses how the project addressed the objectives and goals set in the beginning.

Towards the development of growth strategies, optimisation scenarios were developed and compared against current supply chain capabilities. The strategies were assessed for feasibility in conjunction with Producers and Agents in the current supply chain.

The two most effective strategies to implement are increasing reproductive rates of sheep and using latent producer capacity. However, Greenleaf recommends using all of the optimisation strategies developed in this project in a combined effort. The potential gains for the industry is massive – the financial benefit is in excess of **$300 million**. This will position WA to seize the new opportunity and capture market share of the growing world demand. It will also allow for the WA sheep meet industry to be more competitive on a global front and more sustainable. Finally, the chain will be more diversified as a weak channel will be developed into a more pertinent channel, increasing with more than **600%** of its current capacity.

The barriers identified in implementing the optimisation strategies include the absence of a growth mindset along key players in the chain and requires confidence to be built towards the vision of the capabilities of the new value chain. A specific recommendation to overcome these barriers is the use of tailored communications targeted to the behavioural producer segment. Buy-in on the magnitude of financial opportunities by those who contributed to the modelling validation process indicates the value in decision support tools to help create engagement, identify risk management strategies and confidence building.

To conclude, the WA sheep meet industry can be turned around from the current decline in sheep population and its current inability to meet anticipated future demand. Using the final scenarios developed in this project, the population growth can be improved and the initial market estimate of an additional 500,000 lambs for turnoff can be met.

6 Appendices

6.1 List of Tables

6.2 List of Figures

6.3 References

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6.4 Presentation of Information to Producers

Paragraphs 6.4.1 through to 0 describes examples of the wide range of PDF reports, data sets, and region maps and results that were presented to producers and supported many of the modelling scenario assumptions.

6.4.1 Reports Used to Gather Data

HOLMES SACKETT

mla
MEAT & LIVESTOCK AUSTRALIA

finalreport

Project code: B.COM.0351

Prepared by: Sandy McEachern
John Francis
David Lee

Holmes Sackett

Date published: April 2014

ISBN: 9781740361903

PUBLISHED BY
Meat & Livestock Australia
Locked Bag 991
NORTH SYDNEY NSW 2059

Prime lamb situation analysis

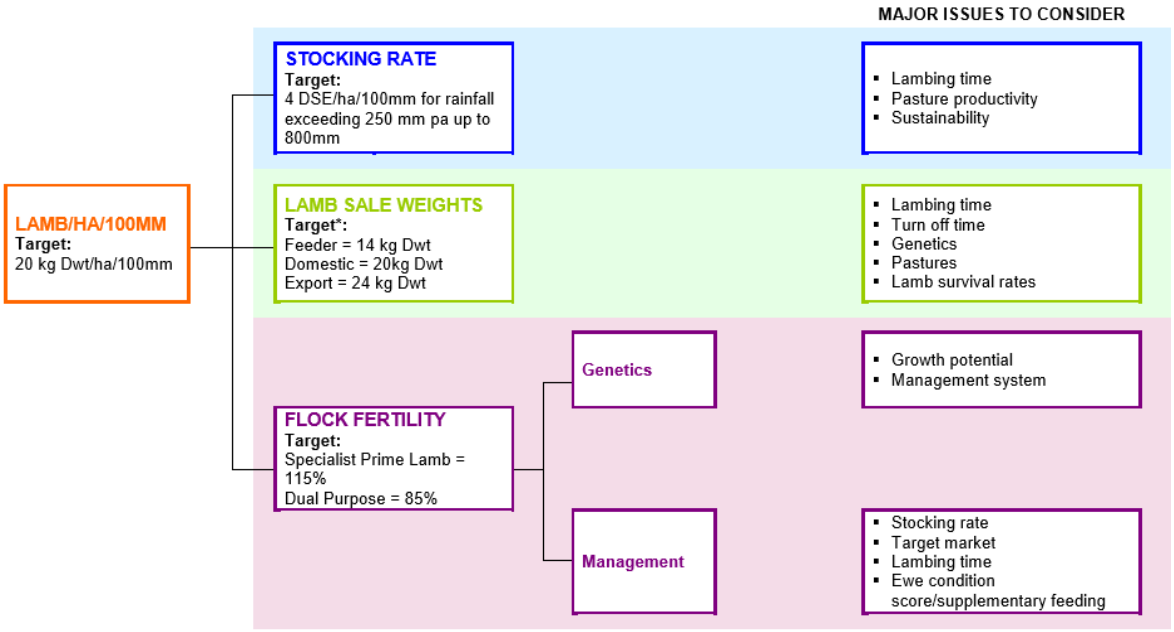
Greenleaf
Insight Innovation Growth

Table 1.5: Price percentiles (2002 to 2012) and 2012 prices for common broadacre commodities

Percentile	17.5 Micron c/kg Clean	19 Micron c/kg Clean	21 Micron c/kg Clean	Lamb c/kg Dwt	Sheep meat c/kg Dwt	Steers c/kg Lwt	Cows c/kg Lwt	Wheat $/tonne	Canola $/tonne
100%	2275	1772	1526	690	504	223	178	490	800
90%	1606	1424	1286	514	412	207	156	335	609
80%	1384	1281	1103	482	316	198	152	283	568
70%	1306	1146	997	452	272	191	149	270	543
60%	1245	1085	963	413	217	187	145	247	510
50%	1183	1044	898	382	199	181	140	229	474
40%	1132	1005	854	357	186	176	137	201	424
30%	1070	963	809	344	172	171	134	192	406
20%	1027	936	758	331	161	166	131	174	369
10%	984	908	736	307	139	157	125	160	338
0%	852	774	652	181	18	123	95	129	270
2012 Price	**1609**	**1444**	**1319**	**468**	**348**	**204**	**147**	**208**	**530**
2012 CoP		**838**		**370**		**120**	**120**	**212**	**530**

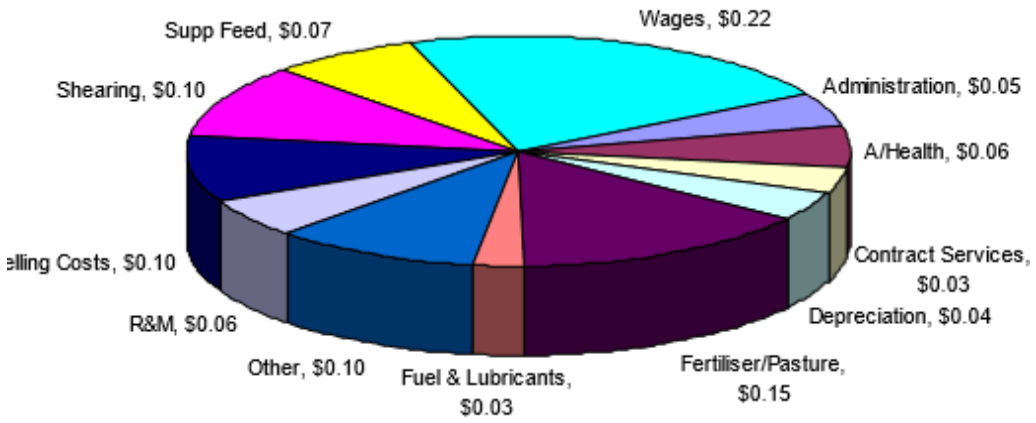
Nearest percentile to 2008 price

Figure 2.2: Factors that influence per hectare production of lamb



*Note: These are suggested optimums. Producing heavier lambs in many cases may reduce overall profitability due to the high cost of additional kilograms

Graph 2.03: Components of lamb production costs per $1 spent



Source: Holmes Sackett Pty Ltd (2009-2012)

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5 Financial performance of slaughter lamb producers

average per farm

		specialist slaughter lamb producers				all slaughter lamb producers			
		2008–09	2009–10p		2010–11z	2008–09	2009–10p		2010–11z
Physical									
Area operated	ha	1 876	2 140	(10)	2 100	3 287	3 010	(7)	2 800
Area sown to crop	ha	253	305	(18)	279	596	678	(6)	635
Beef cattle at 30 June	no.	89	96	(12)	98	130	118	(10)	115
Sheep at 30 June	no.	2 085	2 203	(6)	2 330	2 342	2 505	(3)	2 597
Ewes mated	no.	1 253	1 309	(8)	1 377	1 356	1 375	(3)	1 472
Lambs marked	no.	1 179	1 225	(7)	1 351	1 180	1 214	(3)	1 375
Lamb marking percentage	%	94	94	(2)	98	87	88	(1)	93
Sheep and lamb turn-off rate	%	64	61	(4)	58	55	51	(3)	49
Sheep sold	no.	310	260	(12)	223	488	414	(9)	331
Total lambs sold	no.	1 033	1 077	(8)	1 094	828	861	(3)	919
Slaughter lambs sold	no.	997	1 030	(11)	na	778	806	(8)	na
Receipts									
Sheep and lamb sales	$	110 198	129 690	(7)	137 200	95 980	115 990	(3)	124 700
Adult sheep receipts	$	17 846	20 650	(12)	20 400	26 930	32 890	(9)	29 700
Lamb receipts	$	92 352	109 040	(9)	116 800	69 050	83 110	(3)	94 900
Slaughter lamb receipts	$	90 394	105 550	(11)	na	47 054	64 180	(4)	na
Non-slaughter lamb receipts	$	1 958	3 490	(37)	na	21 996	18 920	(8)	na
Crop receipts	$	53 006	52 850	(15)	109 700	209 075	193 050	(7)	246 600
Wool sales	$	38 950	43 590	(9)	43 900	53 451	61 070	(4)	58 500
Beef cattle sales	$	30 459	33 980	(11)	36 800	42 919	39 800	(14)	39 800
Total cash receipts	$	254 600	282 100	(8)	344 800	447 382	451 170	(4)	502 800
Costs									
Sheep and lamb purchases	$	15 802	23 150	(17)	22 600	12 782	18 600	(8)	17 300
Beef cattle purchases	$	4 867	5 870	(29)	4 900	6 203	6 870	(38)	6 000
Fodder	$	7 169	5 210	(31)	3 600	7 247	5 390	(12)	3 700
Agistment	$	1 017	1 360	(26)	600	1 159	1 530	(25)	500
Fertiliser	$	19 634	22 180	(16)	25 300	46 434	45 700	(8)	47 500
Sprays	$	9 055	12 660	(16)	16 000	28 275	31 930	(7)	37 400
Fuel, oil and lubricants	$	15 948	15 980	(8)	17 700	28 589	28 690	(5)	31 100
Repairs and maintainance	$	17 641	20 320	(8)	23 600	27 852	32 290	(5)	34 100
Interest payments	$	27 455	25 700	(12)	29 200	43 147	44 220	(6)	49 400
Hired labour	$	5 545	5 810	(20)	7 100	10 612	11 780	(9)	12 000
Total cash costs	$	203 939	222 580	(9)	246 100	337 576	361 100	(4)	369 100
Farm capital and debt									
Total capital value	$	3 307 799	3 269 620	(5)	3 272 300	4 243 814	4 349 470	(3)	4 258 300
Farm debt	$	334 307	368 310	(13)	360 700	550 902	635 780	(7)	608 800
Equity ratio	%	90	89	(4)	na	84	82	(2)	na
Interest paid to receipts ratio	%	10	11	(21)	8	10	10	(5)	10
Farm financial performance									
Farm cash income	$	50 661	59 520	(10)	98 600	109 806	90 070	(9)	133 700
Farm business profit	$	–24 895	–14 390	(52)	30 400	9 170	–9 680	(76)	40 600
Rate of return									
– excluding capital appreciation	%	0.2	0.5	(44)	2.0	1.5	1.0	(16)	2.4
– including capital appreciation	%	1.0	0.4	(324)	na	2.1	–0.3	(366)	na
Prices									
Slaughter lamb price	$/hd	91	103	(2)	na	85	98	(1)	na
Average lamb price	$/hd	89	101	(2)	107	83	96	(1)	103
Population of farms	no.	8 639	9 410		9 600	19 059	19 240		19 400

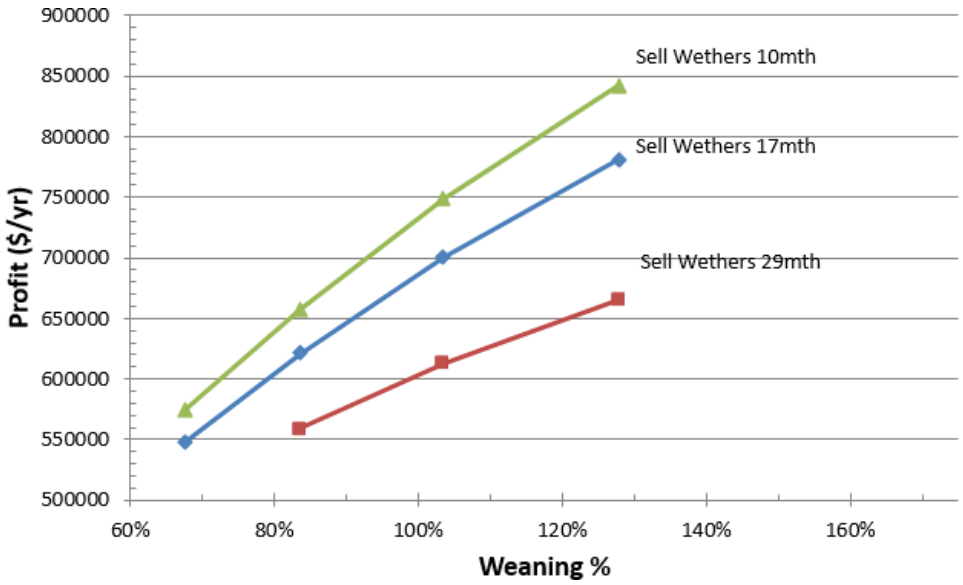
p Preliminary estimate. **z** Provisional estimate. **na** Not available.
Note: Figures in parentheses are standard errors expressed as a percentage of the estimate provided.

The Value of Increasing Reproductive Rate

Presentation to AAAC April 2012

John Young

Farming Systems Analysis Service



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Final Report

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Dr Jason Trompf

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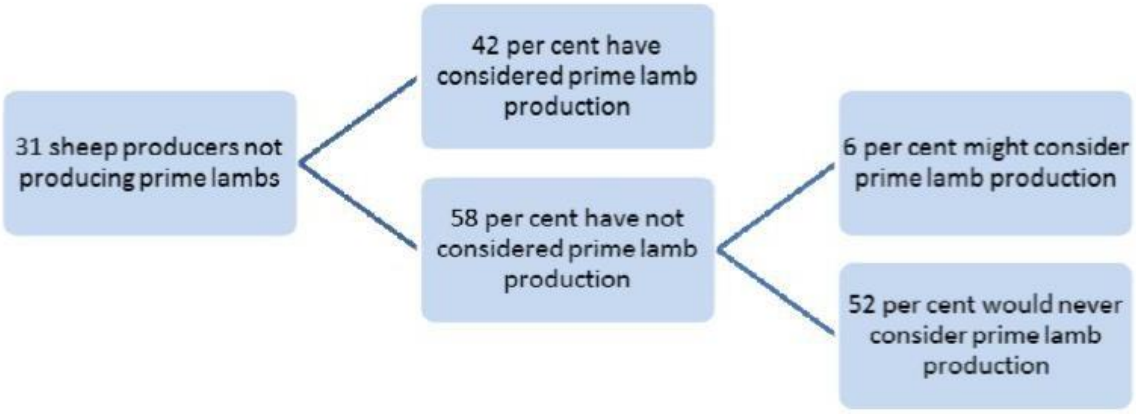
Scoping Study for the WA High Rainfall Zone Lamb Initiative

Table 2. The 2010/11 average (±SE) Red Sky benchmark data for the beef and sheep component of combined beef and sheep enterprises.

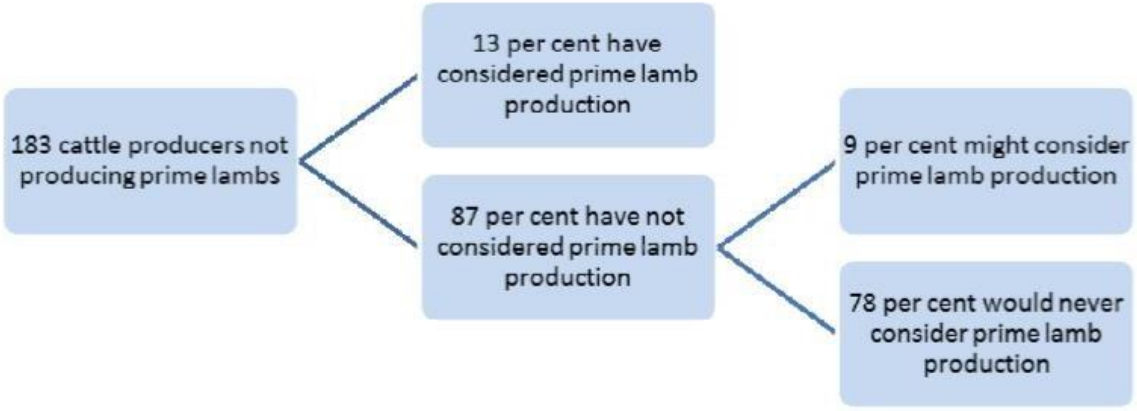
Measures	Beef			Sheep		
	Average	±SE	State Ave	Average	±SE	t-test
Physical						
Area	733	123	710	564	229	NS
Total DSE	11,166	1,928	10,405	7,033	2,316	NS
DSE/ha	15.7	1.8	14.7	14.1	1.6	NS
DSE/FTE	9,467	1,771	7,595	8,413	1,888	NS
FTE	1.3	0.2	1.4	1.0	0.3	NS
Pasture harvested	3.1	0.5	2.7	3.7	0.5	NS
Financial						
Gross revenue ($/ha)	415	75	407	842	112	0.010
Sale cattle or sheep	361	78	374	422	114	NS
Wool			33	411	46	NS
Other	8	4		9	3	
Gross expenses ($/ha)	353	35	379	498	70	NS
Animal health	15	5	14	47	12	0.05
Feed/Supplements	35	20	45	63	22	NS
Fertiliser	68	12	56	75	11	NS
Shearing & crutching				51	9	NS
Management & staff	89	15	93	103	19	NS
Other	161	19	185	207	37	NS
Operating profit ($/ha)	98	55	28	343	89	0.05
Operating profit ($/DSE)	2.22	1.90	1.90	23.6	5.2	0.01
Return on capital (5)	1.9	1.1	0.4	5.8	1.8	NS
Ave price beef or lamb ($/kg)	1.8	0.1	1.71	4.13		
Ave price wool (c/kg clean)				1214	121	
Ave price per sheep ($/head)				85	3	
Productivity						
Wool produced (kg clean/ha)				33.1	4.6	
Cattle or sheep produced (kgLW/ha)	239	48	220	136	40	NS
Cost of production wool (c/kg clean)				730	143	
Cost of production meat ($/kg)	1.64	0.21	1.73	1.9	0.3	NS

Table 3. The 2010/11 average (±SE) Red Sky benchmark data for the beef only and sheep only enterprises.

Measures	Beef			Sheep		
	Average	±SE	State Ave	Average	±SE	t-test
Physical						
Area (ha)	341	67	710	897	154	0.005
Total DSE	5,746	1,049	10,405	9,227	1,995	NS
DSE/ha	17.8	1.5	14.7	10.6	1.5	0.01
DSE/FTE	5,541	761	7,595	4,784	968	NS
FTE	1.1	0.2	1.4	1.9	0.1	0.005
Pasture harvested	2.9	0.2	2.7	3.6	0.5	NS
Financial						
Gross revenue ($/ha)	421	82	407	588	117	NS
Sale cattle or sheep	372	57	374	394	106	NS
Wool			33	193	24	
Other	50	35		0		
Gross expenses ($/ha)	552	54	379	557	76	NS
Animal health	18	5	14	32	14	NS
Feed/Supplements	75	22	45	124	32	NS
Fertiliser	76	10	56	61	7	NS
Shearing & crutching				48	11	
Management & staff	190	36	93	114	17	NS
Other	194	26	185	178	24	NS
Operating profit ($/ha)	-131	45	28	31	70	0.06
Operating profit ($/DSE)	-6.62	2.65	1.90	2.77	5.47	NS
Return on capital (%)	-1.4	0.5	0.4	0.6	1.2	NS
Ave price beef or lamb ($/kg)	1.74	0.07	1.71			
Ave price wool (c/kg clean)				786	58	
Ave price per sheep ($/head)				88	8	
Productivity						
Wool produced (kg clean/ha)				24.2	2.0	
Cattle or sheep produced (kgLW/ha)	208	30	220	100	27	0.05
Cost of production wool (c/kg clean)				7.9	1.0	
Cost of production meat ($/kg)	3.33	0.80	1.73	3.82	0.5	NS


31 sheep producers not producing prime lambs
42 per cent have considered prime lamb production
58 per cent have not considered prime lamb production
6 per cent might consider prime lamb production
52 per cent would never consider prime lamb production

(b)


183 cattle producers not producing prime lambs
13 per cent have considered prime lamb production
87 per cent have not considered prime lamb production
9 per cent might consider prime lamb production
78 per cent would never consider prime lamb production

Project code: AHW.087

Prepared by: David Sackett & Phil Holmes – Holmes Sackett & Associates, Kym Abbott – Charles Sturt University, Sandi Jephcott – Beef Cattle Nutrition and Veterinary Consultant, Mark Barber – ACIL Tasman

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Assessing the economic cost of endemic disease on the profitability of Australian beef cattle and sheep producers

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Table 43 Per-head economic effects of internal parasites of sheep

Zone	Reduced income ($)	Increased expenses ($)				Total ($)
		Crutching	Drenching	Shearing	Other	
High rainfall, summer	5.16	0.55	0.77	–0.33	–0.22	5.93
High rainfall, winter	4.61	0.17	0.73	–0.23	–0.17	4.61
Sheep cereal	1.56	0.08	0.89	–0.08	–0.05	2.40
Pastoral	–	–	–	–	–	–
Prime lamb	7.75	0.12	0.71	–0.06	–0.01	8.51

Table 59 Per-head effect of lice in sheep on income and expenses

Zone	Income ($)	Expenses ($)			Total ($)
		Dipping	Labour	Other	
High rainfall	0.37	0.41	0.26	–	1.04
Sheep cereal	0.31	0.59	0.15	–	1.05
Pastoral	0.54	0.75	0.16	–	1.44
Prime lamb	0.07	0.29	0.52	–	0.89

A producers' guide to production feeding for lamb growth

Contact:

Meat & Livestock Australia
Ph: 1800 023 100

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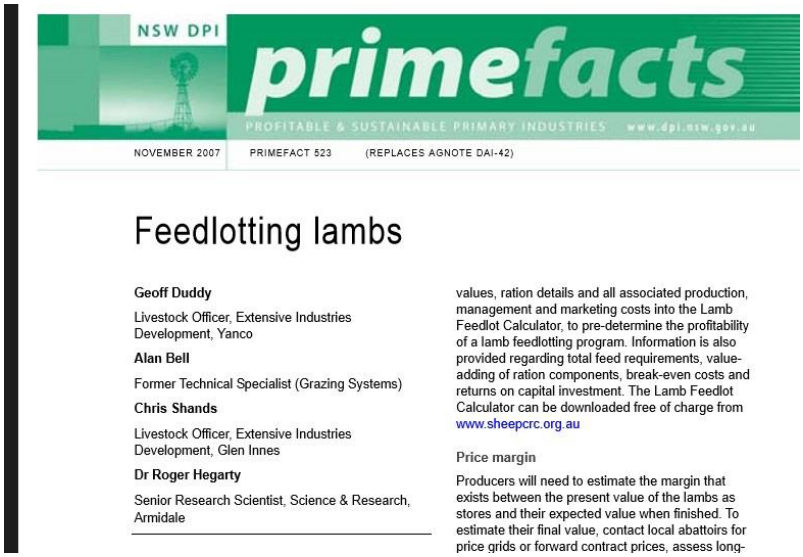
Table 1: Example of a simple gross margin budget

Budget for finishing crossbred lambs growing at 250g per day.			
Costs*			**Cost per head**
Purchase price	30kg liveweight lamb @ $1.12/kg	$	33.60
Transport to property	cost per lamb	$	–
Drench	cost per lamb	$	0.21
Vaccination	cost per lamb	$	0.24
Crutching and shearing	cost per lamb	$	2.70
Feed	1.53kg @ $0.30/kg x 56 days in feedlot	$	25.70
Fuel, oil, repairs	cost per lamb	$	0.05
Water	cost per lamb	$	0.01
Transport to market	cost per lamb	$	1.20
Commission on sale	5% of $73 lamb return	$	3.65
Slaughter levy	cost per lamb	$	1.50
Labour and administration	cost per lamb	$	3.30
Total cost per head		**$**	**72.16**
Returns per head			
Carcase value	20kg carcase weight @ $3.30/kg	$	66.00
Dressing percentage	45%		
skin price	price per lamb	$	7.00
Total return per head		**$**	**73.00**
Profit /(loss) per head		**$**	**0.84**

* Costs for specific expenses associated with intensively finishing lambs change frequently and can vary between states. The figures used in this sample budget are provided as an example of how to set up a budget; relevant costs for your situation should be sourced and used.



NSW DPI primefacts

PROFITABLE & SUSTAINABLE PRIMARY INDUSTRIES www.dpi.nsw.gov.au

NOVEMBER 2007 PRIMEFACT 523 (REPLACES AGNOTE DAI-42)

Feedlotting lambs

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Alan Bell
Former Technical Specialist (Grazing Systems)
Chris Shands
Livestock Officer, Extensive Industries Development, Glen Innes
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Senior Research Scientist, Science & Research, Armidale

values, ration details and all associated production, management and marketing costs into the Lamb Feedlot Calculator, to pre-determine the profitability of a lamb feedlotting program. Information is also provided regarding total feed requirements, value-adding of ration components, break-even costs and returns on capital investment. The Lamb Feedlot Calculator can be downloaded free of charge from www.sheepcrc.org.au

Price margin

Producers will need to estimate the margin that exists between the present value of the lambs as stores and their expected value when finished. To estimate their final value, contact local abattoirs for price grids or forward contract prices, assess long-

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The amount of energy and protein contained in these feeds was obtained from Table 2.

	ME/kgDM	Protein (%)
• 35% wheat	13.0	13.5
• 30% barley	13.0	11.3
• 10% lupins	13.0	32.0
• 25% Lucerne hay	9.2	17.0

Using the following process, energy content of this ration is:

$$\frac{(35 \times 13.0)+(30 \times 13.0)+(10 \times 13.0)+(25 \times 9.2)}{100}$$

$$= \frac{455 + 390 + 130 + 230}{100}$$

$$= \frac{1205}{100}$$

= 12.1 MJ/ kg DM

with dissolving bladder stones; however; they are extremely bitter, and may affect ration intake.

Cereal grains are also low in sodium. This deficiency need not be corrected if the feedlot water contains reasonably high levels of salt. If additional sodium is needed, however, fine salt should be added at a rate of 0.5%–1.5%. Lower rates can be added if sodium bicarbonate is used in the ration. Salt will increase ration intake and encourage water consumption. The latter will help reduce the risk of bladder stones.

Vitamins

As lambs are held in feedlots for only a short time, vitamin deficiencies are unlikely, particularly if lambs have previously grazed green pasture.

Vitamins A, D, E and B_{12} can be added as a vitamin/mineral premix to the ration, by oral drenching with a commercial supplement at feedlot entry or via vaccination. Vitamin supplements are recommended when it is known that the lambs

Australian Government
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Australian lamb

Financial performance of slaughter lamb producing farms, 2011–12 to 2013–14

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Table 6 Financial performance, specialist slaughter lamb producers

average per farm

Physical characteristics	Units	2011–12	2012–13p		2013–14y
Area operated	ha	2 022	2 080	(15)	2 100
Area sown to crop	ha	191	200	(35)	180
Beef cattle at 30 June	no.	96	100	(13)	100
Sheep at 30 June	no.	2 427	2 290	(8)	2 340
Ewes mated	no.	1 326	1 290	(9)	1 360
Lambs marked	no.	1 306	1 240	(9)	1 300
Lamb marking percentage	%	99	96	(2)	96
Sheep and lamb turn-on rate	%	8	7	(22)	6
Sheep and lamb turn-off rate	%	54	58	(5)	56
Sheep sold	no.	258	300	(10)	300
Total lambs sold	no.	1 012	1 040	(9)	1 010
Slaughter lambs sold	no.	987	1 020	(9)	na
Receipts					
Sheep and lamb sales	$	143 980	113 100	(10)	119 000
Adult sheep receipts	$	25 320	17 800	(12)	20 000
Lamb receipts	$	118 660	95 300	(11)	99 000
Slaughter lamb receipts	$	115 030	93 500	(12)	na
Non–slaughter lamb receipts	$	3 630	1 800	(33)	na
Crop receipts	$	63 000	71 100	(23)	88 000
Wool sales	$	66 170	51 800	(15)	55 000
Beef cattle sales	$	32 710	28 200	(14)	30 000
Total cash receipts	$	322 850	283 800	(13)	312 000
Costs					
Sheep and lamb purchases	$	28 110	14 500	(18)	12 000
Fodder	$	5 660	8 000	(36)	10 000
Fertiliser	$	23 750	19 000	(35)	21 000
Sprays	$	11 600	10 600	(32)	12 000
Fuel, oil and lubricants	$	16 890	15 700	(16)	17 000
Repairs and maintenance	$	24 660	21 100	(10)	23 000
Interest payments	$	23 610	21 100	(21)	20 000
Hired labour	$	6 700	6 700	(24)	7 000
Total cash costs	$	246 060	213 600	(13)	221 000
Farm capital and debt					
Total capital value	$	3 215 540	3 178 400	(10)	3 167 000
Farm debt	$	330 270	314 400	(12)	319 000
Equity ratio	%	90	90	(2)	na
Farm financial performance					
Farm cash income	$	76 790	70 200	(17)	91 000
Farm business profit	$	730	−16 700	(77)	2 000
Rate of return excl. capital appreciation	%	1.0	0.3	(138)	na

continued ...

Table 3.1 Physical and financial performance indicators, by use of grain finishing for lambs

average per farm, 2010–11 to 2012–13

Indicator	Unit	Grain finishing of lambs		No grain finishing of lambs	
Estimated population of farms	no.	960	na	17 870	na
Share of farms sold for slaughter	%	5	na	95	na
Location of farms					
Eastern states	%	69	na	84	na
Western Australia	%	31	na	16	na
Physical					
Area operated at 30 June	ha	2 158	(31)	3 453	(5)
Area sown to crop	no.	827	(16)	625	(2)
Sheep at 30 June	no.	2 558	(9)	2 745	(2)
Lambs marked	no.	1 258	(12)	1 346	(2)
Sheep and lamb turn-on rate	%	19	(33)	6	(6)
Sheep and lamb turn-off rate	%	60	(13)	47	(2)
Total lambs sold	no.	1 170	(17)	889	(2)
Grain finishing					
Lambs grain finished	no.	809	(21)	na	na
Average length of grain finishing	days	49	(7)	na	na
Proportion of lambs sold that were grain finished	%	71	(10)	na	na
Prices received					
Adult sheep price	$/hd	86	(14)	93	(2)
Slaughter lamb price	$/hd	113	(3)	110	(1)
Farm financial performance					
Adult sheep receipts	$	28 530	(19)	35 520	(4)
Lamb receipts	$	132 160	(17)	97 370	(2)
Total cash receipts	$	738 980	(19)	591 800	(2)
Sheep and lamb purchases	$	44 220	(29)	21 750	(5)
Fodder cost	$	12 840	(26)	6 120	(6)
Total cash costs	$	568 860	(20)	414 310	(2)
Farm cash income	$	170 130	(23)	177 490	(3)
Farm cash income per hectare operated	$	79	(32)	51	(6)
Farm business profit	$	63 980	(62)	76 240	(8)
Rate of return excl. capital appreciation	%	3.1	(27)	2.9	(4)

Note: Financial statistics are expressed in 2013–14 dollars. Figures in parentheses are standard errors expressed as a percentage of the estimate provided.
Source: ABARES

Table 10 Physical and financial performance indicators, producers grain finishing lambs, by length of time on grain

average per farm, 2010–11 to 2012–13

Indicator	Unit	Less than 40 days		40 to 60 days		More than 60 days	
Estimated population of farms	no.	410	na	350	na	190	na
Estimated number of lambs grain finished	'000	294	na	329	na	151	na
Share of grain finished lambs	%	38	na	43	na	19	na
Physical							
Area operated at 30 June	ha	2 449	(39)	1 529	(41)	2 698	(46)
Area sown to crop	no.	1 023	(54)	568	(49)	883	(19)
Sheep at 30 June	no.	2 626	(20)	2 497	(20)	2 524	(13)
Lambs marked	no.	1 261	(21)	1 263	(32)	1 244	(20)
Sheep and lamb turn-on rate	%	19	(60)	22	(40)	16	(38)
Sheep and lamb turn-off rate	%	54	(20)	67	(24)	62	(12)
Total lambs sold	no.	1 101	(32)	1 255	(36)	1 164	(17)
Grain finishing lambs							
Lambs grain finished	no.	711	(36)	929	(44)	796	(14)
Average length of grain finishing	days	25	(5)	53	(3)	93	(3)
Proportion of lambs sold that were grain finished	%	68	(16)	74	(17)	74	(10)
Slaughter lamb price	$/hd	116	(5)	110	(6)	117	(7)
Farm financial performance							
Adult sheep receipts	$	21 997	(20)	32 683	(79)	35 019	(27)
Lamb receipts	$	127 325	(34)	137 344	(38)	133 045	(18)
Total cash receipts	$	831 931	(35)	623 731	(45)	751 465	(10)
Sheep and lamb purchases	$	41 754	(51)	49 595	(39)	39 538	(32)
Fodder cost	$	5 037	(29)	21 105	(37)	14 446	(35)
Total cash costs	$	616 602	(33)	523 576	(49)	549 269	(9)
Farm cash income	$	215 328	(47)	100 155	(37)	202 195	(28)
Farm business profit	$	111 984	(61)	−5 174	(65)	88 408	(69)
Rate of return excl. capital appreciation	%	3.7	(29)	1.9	(46)	3.7	(35)

Note: Financial statistics are expressed in 2013–14 dollars. Figures in parentheses are standard errors expressed as a percentage of the estimate provided.
Source: ABARES

Report prepared for the World Society for the Protection of Animals

Economic impact of phasing out the live sheep export trade

Dr Alistair Davey

March 2013

sapere research group

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Table 1 Estimated processing capacity of WA abattoirs to slaughter sheep per week

Abattoir	Capacity units per week
Fletchers (Narikup)	45,000
WAMMCO (Katanning)	20,000
V&V Walsh (Bunbury)	17,500
Beaufort River Meats (Beaufort River via Woodanilling)	12,500
Hillside (Narogin)	7,500
Shark Lake (Esperence)	6,000
Goodchild (Australind)	5,000
Total	113,500

Source: Kingwell, et al. (2011), Hillside Meat Processors Pty Ltd (2012) and Wellard Group (2012)
Note: Includes both lamb and mutton.


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