RMCG

AUGUST 2023

Calf Pathways Phase 2: Economic Impact Assessment

Summary Report

Dairy Australia

135 Mollison Street, Bendigo Victoria 3550

rmcg.com.au — ABN 73 613 135 247 — RM Consulting Group Pty Ltd

Victoria — Tasmania — NSW

Table of Contents

Executive Summary

This project aimed to gain a comprehensive understanding of the costs, benefits, and risks associated with raising surplus dairy calves for the beef market and investigate the economic viability of alternative 'dairy-beef' calf pathways. Through collaboration with a Farmer Reference Group (FRG) and industry, we gained valuable insights into the factors influencing on-farm decisions, and identified limitations in terms of understanding the economic risks associated with rearing surplus calves. We found some of the underlying reasons were due to the anticipated effort required to manage an additional beef enterprise, a lack of available feed and land, beef market volatility and a primary focus on milk production. To address these concerns and delve deeper into the issue, we conducted a detailed economic analysis of two case study farms that examined the additional infrastructure and management requirements associated with raising dairy calves for the beef market. Our analysis yielded the following key findings:

- On average, raising surplus calves for beef resulted in roughly a break-even result. However, the range in net benefit varied from approximately $1000/head in good years to -$600/head in poor years.
- The profitability of the enterprise was primarily influenced by fluctuating beef market prices, which emerged as the largest source of variation in the extra profit/loss generated by raising surplus calves.
- Access to premium markets, such as feedlots, showed potential for increasing profitability. However, it did not significantly reduce the worst-case scenarios associated with market volatility.
- Some dairy farms may require more significant investment in calf rearing facilities if they are to rear all of their surplus calves and will find it challenging to achieve an attractive return on investment unless they can obtain a more stable beef price.
- Growing dairy calves to 450+ kilograms showed potential for higher profitability. However, this approach also exposed the business to downside risks, including increased feed costs, limited land availability, climate variations, and beef market volatility.
- It is important to consider that an increased focus on managing a beef enterprise can divert attention away from the core goal of profitable milk production, which remains the primary business for dairy farmers.

In light of these findings, it is crucial to explore alternative strategies that can enhance the economic sustainability of surplus calves. The active involvement of specialised calf rearers holds potential in bridging the gap between dairy farmers and feedlot operators/meat processors and to help manage economic risks. The contribution that milk processers can make to help manage risk also warrants further investigation.

For this particular region (Taree/Kempsey), some follow up support to foster a regional working group/producer demonstration site may be very beneficial.

A decision support calculator has been developed (Appendix 1) and presented to the FRG and could potentially be tested, refined and circulated more widely.

For this project we adopted a participatory approach with the FRG. This method allows the project team to adapt the project design to meet the needs of participants as the project evolves. This approach proved its value when the FRG identified a key barrier to raising surplus calves was a lack of confidence in the potential demand and value of their product in Australian beef markets. To address this concern, we (RMCG) facilitated discussions between MLA, feedlot representatives and the group, these constructive discussions shed light on the market opportunities associated with dairy beef and outlined actionable steps that dairy farmers can take to improve their products attractiveness to meat processors and feedlots. Although this aspect was not initially in the project scope, it played a pivotal role in bolstering the confidence of dairy farmers within the group, that legitimate pathways for surplus dairy calves into beef markets do indeed exist.

This project has highlighted the need for a better understanding of the costs, benefits and risks associated with raising surplus calves for beef. By understanding the economic implications and collaborating with industry stakeholders (especially within the beef industry), there is potential to develop surplus calf management practices that are both socially and economically sustainable. However, these solutions will be regionally and farm business specific and significant attention needs to be devoted to reduce the proportion of years when there is likely to be a negative return.

ACKNOWLEDGEMENT OF COUNTRY

We acknowledge the Traditional Owners of the Country that we work on throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past and present, and we acknowledge emerging leaders. Moreover, we express gratitude for the knowledge and insight that Traditional Owners and other Aboriginal and Torres Strait Islander people contribute to our shared work in Australia.

We pay respects to all Aboriginal and Torres Strait Islander communities. We recognise that Australia was founded on the genocide and dispossession of First Nations people and acknowledge that sovereignty was not ceded in this country. We embrace the spirit of reconciliation, working towards self-determination, equity of outcomes, and an equal voice for Australia's First People.

1 Introduction

1.1 BACK GROUND

The dairy industry is a vital component of the agriculture sector and holds an important place in the structure of rural communities throughout Australia. Social license has become an important consideration for the dairy industry as farmers are beginning to face security issues regarding the treatment of bobby calves as part of the dairying process. This problem has led to a growing demand for alternative calf pathways where farmers can diversify their income streams while adhering to societal expectations. One such opportunity is raising dairy calves for the beef market. Traditionally, dairy farmers direct their non-replacement calves either into beef production or into early life slaughter. The pathway undertaken has been highly motivated by economic factors with market perceptions of “dairy-beef” and beef prices being major contributors.

1.2 PURPOSE

The primary objective of this project is to gain a comprehensive understanding of the costs, benefits, and risks associated with raising dairy calves for the beef market. Through this research, we aim to enhance the knowledge and understanding of dairy farmers regarding economically sustainable practices that can effectively extend the life of non-replacement calves on their farms negating potential social licence issues. We aim to aid farmers in making informed decisions that contributes to a future where surplus calves are consistently raised for beef, using practices that can withstand seasonal and commodity price volatility, as well as navigate regionally specific challenges.

1.3 APPROACH

The delivery of this program involved identifying two case study farms and developing a Farmer Reference Group (FRG) in the mid-north coast of NSW. Two workshops were held with the FRG to provide a participatory learning experience and assist with uptake of changes relating to surplus calf management.

By utilising data from the two case study farms, one with year-round calving and one more batch calving, implications for capital infrastructure, feedbase, labour and general trade-offs and interactions with dairy business were identified and used to create a partial budget.

To add value to this project we have also undertaken risk modelling to show the impact of normal variation in our main input prices and production outcomes on the investment outcome. This will allow an estimate, for example, of the relative break-even point of the investment compared to the beef price, expressed as the number of years in ten it will be profitable.

1.4 REPORT

This report will be useful for dairy farmers who are considering diversifying their income streams while also managing expectations around social license. The report will also be relevant to agricultural extension services, policymakers and academics interested in the economics of dairy calf rearing for the beef market. The results of this research project will provide insight into the economic viability of this alternative revenue stream and help farmers make informed decisions on the allocation of their resources, while also considering the societal expectations of their practices.

2 Scenarios

2.1 CASE STUDY FARMS

Two case study farms were used with two broadly different scenarios where we looked at keeping calves to different weights. The farms were located in the central/north coast area of NSW and both operated profitable dairy businesses.

The first case study farm had existing infrastructure and only required a small upgrade to comfortably manage keeping calves for longer.

The second farm required capital investment in an additional calving shed. This farm used a split calving autumn/spring system (not calving in summer and few in winter).

Table 2-1: Farming system description of case study farms

FARM	NO. MILKING COWS	CALVING PATTERN	GRAIN FED (T/COW/YEAR)	FEEDBASE	ADDITIONAL INFRASTRUCTURE REQUIREMENT
Bale	320	Year – round, batch calving	2.1	Milking area (92 ha) Support area (135ha). Kikuyu/annual ryegrass pastures.	$30,000 extension to calf shed
Grey	230	Split – Autumn to Spring and not many in winter	2.0	Milking area (75 ha): 25% perennial pasture (prairie grass, cocksfoot, lucerne and chicory mix) 25% ryegrass/sorghu m 50% ryegrass/ kikuyu Runoff area (33 ha) 55% ryegrass/maize (silage) 45% ryegrass / kikuyu	$75,000 calf shed

3 Approach and Key Assumptions

3.1 OPERATIONAL COSTS

The operational costs associated with raising dairy calves for beef plays a significant role in determining the feasibility of alternative calf pathways. The costs involved include feed, labour, animal health, and other inputs required for the care and management of animals.

Developing robust cost assumptions was a crucial component of the research project, Barber et al. (2020) was a key resource in this regard. By closely examining the operational costs, we can assess the feasibility and potential profitability of this alternative revenue stream. These cost profiles were developed in conjunction with the PRG as well as industry experts and published literature. The following tables present our assumptions and estimates for each of the costs that were impacted by the management changes and are based on our case study farms.

Table 3-1: Operational costs

ASSUMPTION	DESCRIPTION	VALUE
Animal health	$50 Weaning, $50 Weaning to sale	$100.00
Labour costs	Industry average at approximately $34 per hour, 6 hours per day to raise calves and manage beef	$34.00
Electricity and fuel	Extra costs annual	$1,000.00
Forgone income	Price of calf 1-2 weeks old	$50.00
Transport	Cost per head agistment and sales	$8.50
Sales and marketing	5% of total sales	5%

Table 3-2:Production assumptions

ASSUMPTION	DESCRIPTION	VALUE
Weaning days	10 weeks 7 days a week	$70.00
Weaning to 5 months	10 weeks 7 days a week	$70.00
Supplementary feed days fed (Months/days) 5- 10 months old	6 months	$182.50
Average consumption of milk per day per calf (litres)	This may vary from birth to end of weaning average 5.5	$5.50
Average consumption of calf pellets per day (kg)	As above may vary, average per day	$0.50
Average consumption of grain 5-10 Months (kg/day)	As above, average per day	$2.00
Weight at end of weaning (kg)		$100.00

Table 3-3: Feed costs

FOOD SOURCE	DESCRIPTION	ANNUAL COST
Weaning stage		
Milk formula ($/day/calf)	Calf rearing using milk powder – milk powder costed at 47 cpl ($4.00/kg DM) fed at 5.5 litres/calf per day for 10 weeks until weaning.	$231.00
Oaten hay ($/kg DM)	Birth to weaning (KG DM/day) 0.54 - Weaning to 150kg (10 weeks) 0.9	$17.50
Pellets	0.5 kg/Day to weaning	$15.75
Grain cost per week	2kg/day 5-10 months	$127.75
Total weaning cost	Includes: Milk, pellets, hay	$264.25

3.2 ECONOMIC ANALYSIS

Partial budgets were developed according to Malcolm et al. (2005) comprising a 15-year discounted cash flow analysis considering the capital and operational costs and benefits of keeping surplus calves longer to be sold as a mature animal into the beef mark. The key measures used in comparing the profitability and performance of the alternative development options were:

Annual Net Benefit, estimated once the options had been implemented and were fully operational. This comprised of the additional income minus the additional operating costs.

Net Present Value: the sum of future cashflows (positive or negative) over the life of an investment that are discounted to represent their present value.

3.3 @ RISK

The excel add in @Risk (ver. 8.2; Palisade Corporation, Newfield, NY, USA), was used to incorporate risk analysis into the economic model through Monte Carlo simulation. This powerful technique allows us to explore how various factors and uncertainties can influence the project's outcomes. Instead of relying on a single estimate, Monte Carlo simulation considers a range of possible values for key variables (such as beef price or grain price) and generates a distribution of possible results. By analysing this distribution, we gain insights into the likelihood of different outcomes and identify the factors that have the greatest impact on the project's success. This approach improves the information available and allows managers to make better- informed decisions and help understand the uncertainties involved in decisions. The results reported in this analysis are based on 50,000 iterations of 15-year periods.

The program was used to develop a number of probability distributions that are shown below in Table 3-4.

Table 3-4: Probability distribution data sources

DISTRIBUTION	DATA SOURCE
Milk prices	FRG and Dairy Businesses for Future Climates (DBFC) project
Grain prices	FRG and DBFC project
Beef prices	MLA (2023), Prices and Markets. https://www.mla.com.au/prices-markets/
Hay prices	FRG and DBFC project

DISTRIBUTION	DATA SOURCE
Pasture costs	Case study farms DairyBase data

3.4 PRICE DISTRIBUTIONS

The price distributions have been created by capturing information from a range of data sources, as referenced above, and combined with the local knowledge gained through the PRG.

Included in the cost distribution are both the manufacturing and feeder markets across different liveweights. The reason for including the variances is to provide a range of options when selling and to be able to plan a suitable program.

Table 3-5: Distribution of prices used for costs and prices

DESCRIPTION	LOWER 5TH PERCENTILE	UPPER 95 TH PERCENTILE	AVERAGE
Beef price $/kg liveweight manufacturing	$2.21	$4.15	$3.07
Beef price $/kg liveweight feeder	$2.34	$5.48	$3.51
Grazed pasture cost $/kg dry matter (Grey)	$0.15	$0.20	$0.17
Grazed pasture cost $/kg dry matter (Bales)	$0.09	$0.15	$0.11
Conserved pasture cost $/kg dry matter (Grey)	$0.27	$0.33	$0.30
Conserved pasture cost $/kg dry matter (Bales)	$0.19	$0.25	$0.21
Grain price $/tonne	$290.00	$555.00	$390.00
Hay price $/tonne	$270.00	$450.00	$320.00
Milk replacement price $/litre	$0.60	$0.95	$0.75

4 Results and Discussion

4.1 COSTS TO REAR TO VARIOUS AGES

The results from the cost analysis of the Bale farm shows expected costs during different stages of growth below in Table 4-1. If a week-old calf is held until it reaches 600kg, it could be expected that the cumulative cost per animal would be $1,263. During the weaning period, the cost per kilogram of weight gain is significantly higher than the cost per kilogram in subsequent stages of growth because of the high cost of milk per kilogram gained.

Table 4-1: Costs to rear to various ages – Bale Farm

STAGE OF GROWTH	COST PER ANIMAL	CUMULATIVE COST PER ANIMAL	COST PER KG WEIGHT GAINED	FEED INTAKE
Weaning	$338.00	$338.00	$6.76	5.5 Litres milk/Day
100–150kg	$103.00	$441.00	$2.06	5Kg/DM/Day
150–300kg	$319.00	$760.00	$2.13	7Kg/DM/Day
300–450kg	$240.00	$1,000.00	$1.60	11Kg/DM/Day
450–600kg	$262.00	$1,263.00	$1.75	11Kg/DM/Day

At the Bale farm the gathered costs for each kilogram gained are displayed in Figure 4-1 and Table 4-2 below. The range of costs per kilogram during weaning were well above the mean beef price of $3.07 and ranged from $8.08/kg down to $5.65/kg.

After weaning the costs per kg of weight gained drops to below the mean beef price. Calves were moved on to grain and hay until the point where they reached 150kg, at which point pasture was added. Once they reached 300kg they were taken off grain and fed mainly on pasture with some supplementary hay. When the animals reached 300kg and were mainly fed pasture, the costs were low with a maximum of just $2.07 and minimum of $1.37 and there was less variability in the range of cost prices. During the later stages of growth, the cost per kg of weight gain improves, leading to more efficient weight gain outcomes. However, the area of land required to rear the surplus animals increases if they are kept until the later stages.

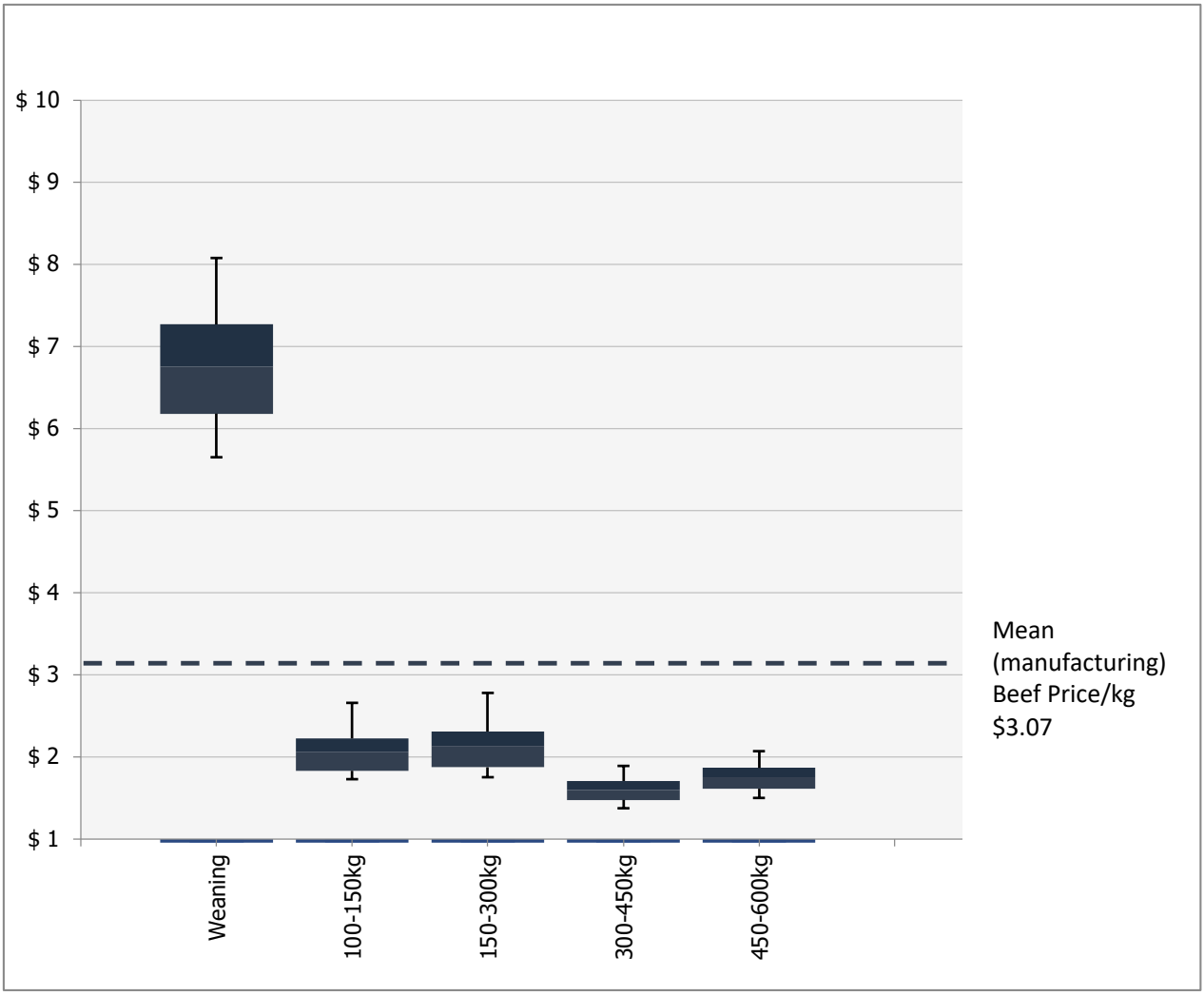

Figure 4-1: Costs per kilogram of weight gained during each stage of growth including the mean beef price per kg of $3.07 – Bale Farm

Table 4-2: Cost ranges per kilogram of weight gained during each stage of growth – Bale Farm

STAGE OF GROWTH	MAXIMUM PRICE PER KG	UPPER 75TH PERCENTILE PRICE PER KG	MEDIAN PRICE PER KG	LOWER 25TH PERCENTILE PRICE PER KG	MINIMUM PRICE PER KG
Weaning	$8.08	$7.27	$6.76	$6.18	$5.65
100–150kg	$2.66	$2.22	$2.06	$1.83	$1.73
150–300kg	$2.78	$2.31	$2.13	$1.87	$1.75
300–450kg	$1.89	$1.71	$1.60	$1.48	$1.37
450–600kg	$2.07	$1.87	$1.75	$1.61	$1.50

The Grey farm costs were analysed below in Table 4-3. In comparison to the Bale farm, the cumulative cost of an animal held until it reached 600kg was $1,474. The Grey farm had an additional $211 per head in costs.

The costs up to 150kg are identical to the Bale farm. However, the cost per animal and cost per kg weight gained is higher than the Bale farm following that growth stage.

Due to the Grey farm being further north than the Bales, it is more difficult to grow ryegrass and more challenging to maintain the quality of kikuyu pasture. Hence, they have moved to more cropping, which has some additional costs.

Table 4-3: Grey Farm Cost to rear to various ages

STAGE OF GROWTH	COST PER ANIMAL	CUMULATIVE COST PER ANIMAL	COST PER KG WEIGHT GAINED	DAILY INTAKE
Weaning	$338.00	$338.00	$6.76	5.5 Litres milk/Day
100–150kg	$103.00	$441.00	$2.06	5Kg/DM/Day
150–300kg	$335.00	$776.00	$2.23	7Kg/DM/Day
300–450kg	$333.00	$1,109.00	$2.22	10Kg/DM/Day
450–600kg	$365.00	$1,474.00	$2.43	11Kg/DM/Day

The Grey farm had a similar pattern to the Bale farm for costs per kilogram of weight gained as shown in Figure 4-2 and Table 4-3 below. The weaning prices were identical and well above the mean beef price, however following weaning the costs were below the mean beef price. It appears that during the growth stages between 100- 300kg they have lower minimum costs of $1.73 and $1.86 per kg with a higher variability in costs of close to $1. During the 300–450kg stage, minimum costs are $1.99 per head and variability is just $0.52 between the minimum and maximum cost. The minimum cost during the 450–600kg stage is $2.18 per head with a variability of $0.57 to the maximum cost.

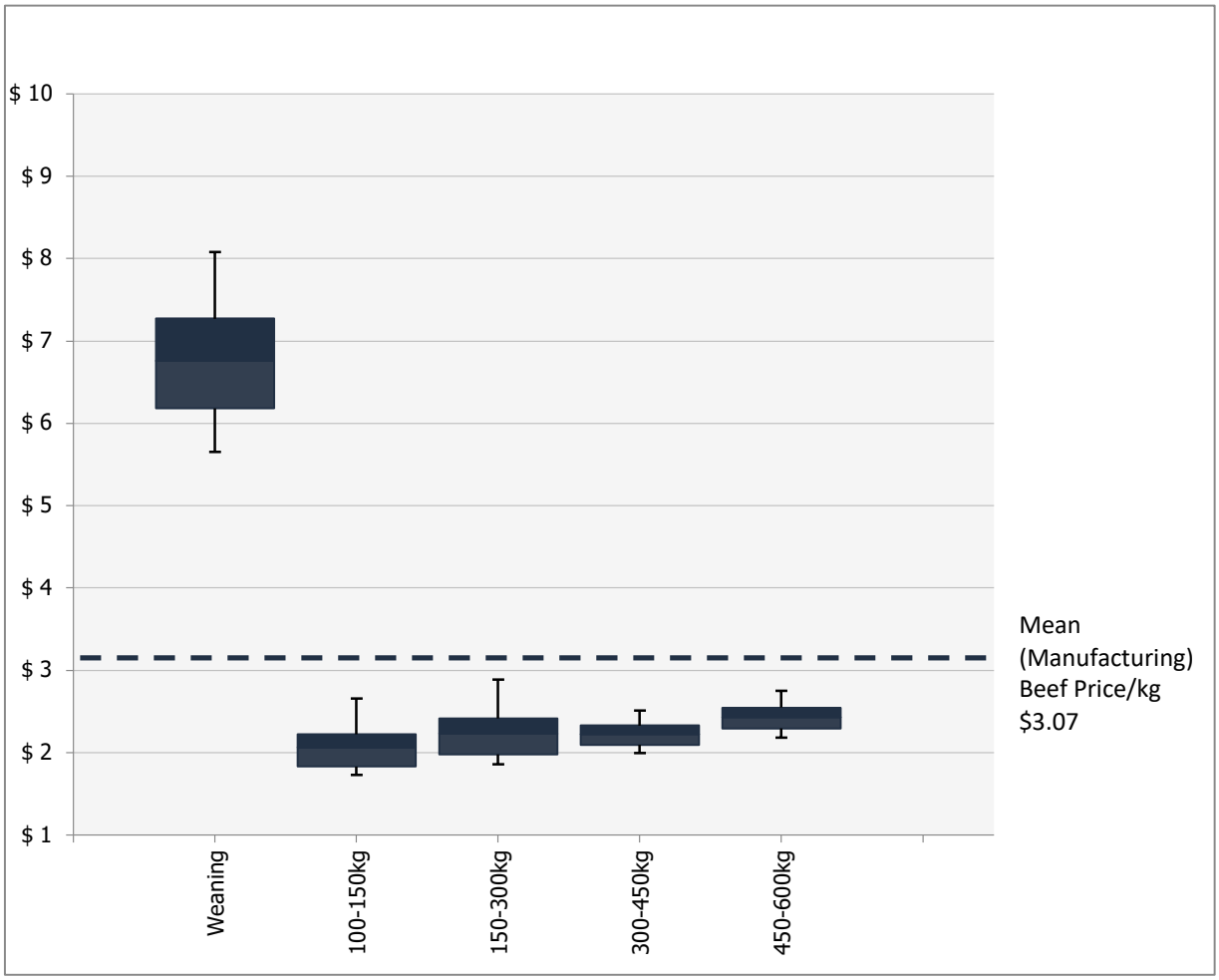

Figure 4-2: Costs per kilogram of weight gained during each stage of growth including the mean beef price per kg of $3.07 – Grey Farm

Table 4-4: Cost ranges per kilogram of weight gained during each stage of growth– Grey Farm

STAGE OF GROWTH	MAXIMUM PRICE PER KG	UPPER 75TH PERCENTILE PRICE PER KG	MEDIAN PRICE PER KG	LOWER 25TH PERCENTILE PRICE PER KG	MINIMUM PRICE PER KG
Weaning	$8.08	$7.27	$6.76	$6.18	$5.65
100–150kg	$2.66	$2.22	$2.06	$1.83	$1.73
150–300kg	$2.89	$2.41	$2.23	$1.98	$1.86
300–450kg	$2.51	$2.33	$2.22	$2.10	$1.99
450–600kg	$2.75	$2.55	$2.43	$2.29	$2.18

4.2 ANNUAL NET RETURN FROM RAISING SURPLUS CALVES FOR BEEF

The annual net return range for each farm has been calculated to work out the additional profit by market for manufacturing steers and feeder steers and the range of returns that can be expected. It is important to note that these outcomes are a result of all farm inputs. Therefore, the range of outcomes is influenced by input prices as well as beef prices. In years where beef prices are high and feed costs are low higher profits will be achieved. The counterfactual is true for high input costs and low beef market prices.

The Bale farm annual average net return is displayed below in Figure 4-3, and the profit range in Table 4-5. In the manufacturing market, the Bales could expect a profit if the beef price is at or above the median price. The maximum profit they could expect in the manufacturing market is $173k for a 600kg animal or $106k for a 450kg animal.

In the feeder market, annual net return is at the highest for a 450kg animal, reaching a maximum profit of $228k and losses are not as high. A 300kg animal sold in the feeder market reaches a maximum profit of $115k and is slightly below break-even if the beef price is at the median range.

A profit would not be achieved, and in fact, a loss would be made, if the beef price in both the manufacturing and feeder market is at the lower 25th percentile or at the minimum price.

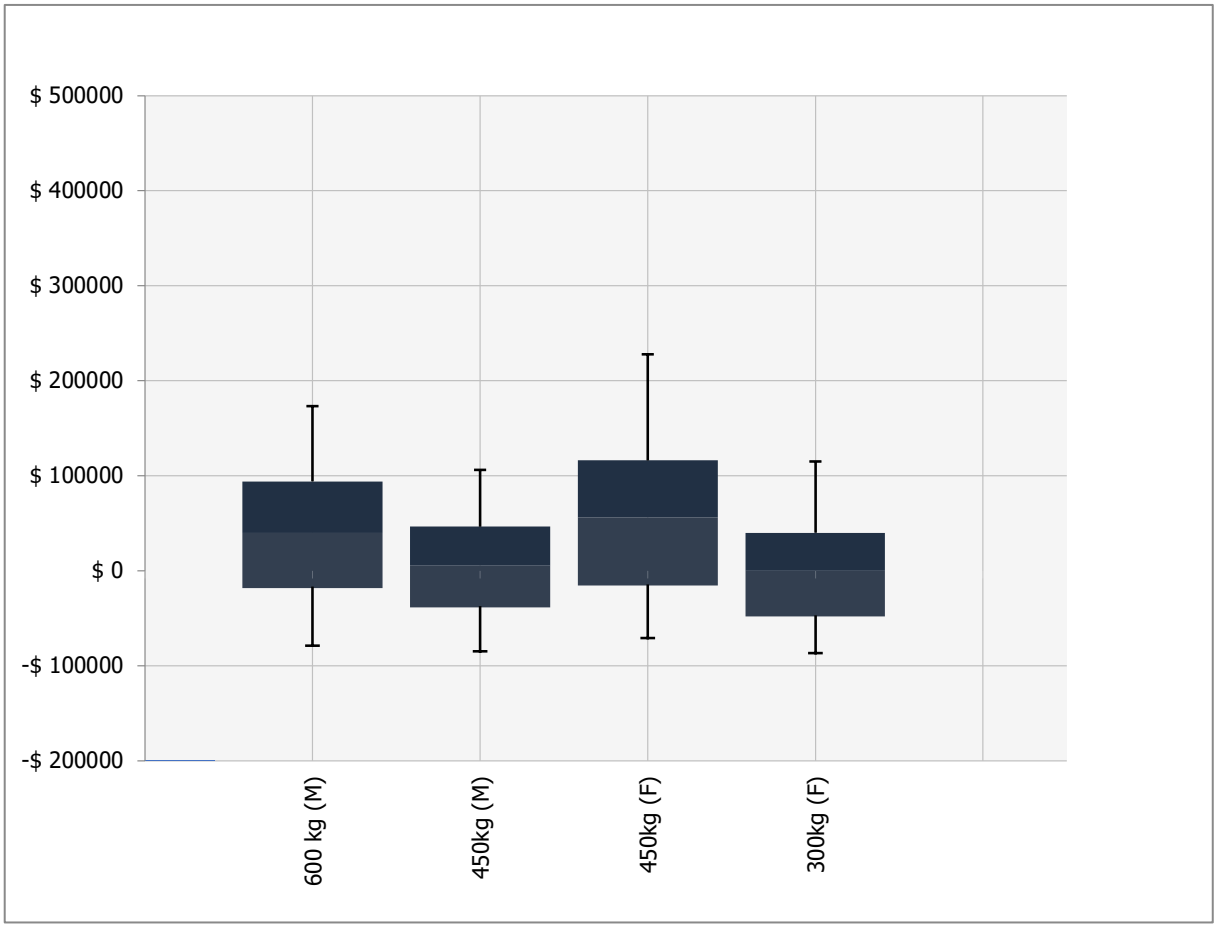

Figure 4-3: Annual average net return – Bale Farm

Table 4-5: Annual profit range – Bale Farm

BEEF MARKET	MAXIMUM PROFIT	UPPER 75TH PERCENTILE PROFIT	MEDIAN PROFIT	LOWER 25TH PERCENTILE PROFIT	MINIMUM PROFIT
600 kg Manufacturing	$173,429.00	$94,306.00	$39,945	-$17,974.00	-$78,733.00
450 kg Manufacturing	$106,270.00	$46,445.00	$5,458	-$38,351.00	-$84,549.00
450 kg Feeder	$227,998.00	$116,134.00	$56,177	-$15,537.00	-$70,745.00
300 kg Feeder	$115,160.00	$40,206.00	-$85.00	-$48,044.00	-$86,645.00

In comparison, the second farm is displayed below in Figure 4-4 and Table 4-6 In the manufacturing market, the beef price needs to be at the upper 75th percentile or at a maximum price for the farm to gain a positive annual net return. For a 600kg manufacturing steer the farm could receive a maximum profit of $85.5k and for the 450kg manufacturing steer the farm could expect a maximum $54k profit.

In the model the feeder market provides a maximum $143k profit for a 450kg steer or $77k for a 300kg steer. While a 450kg steer could still provide a profit if the beef price was at a median, the 350kg feeder steer and both the sizes in the manufacturing market would result in a profit loss if the beef price was at or below the median price. It is important to take into consideration the impacts of a 'good' year (where input costs are low and beef prices are high) Vs a 'bad' year (where inputs costs are high and beef prices are low).

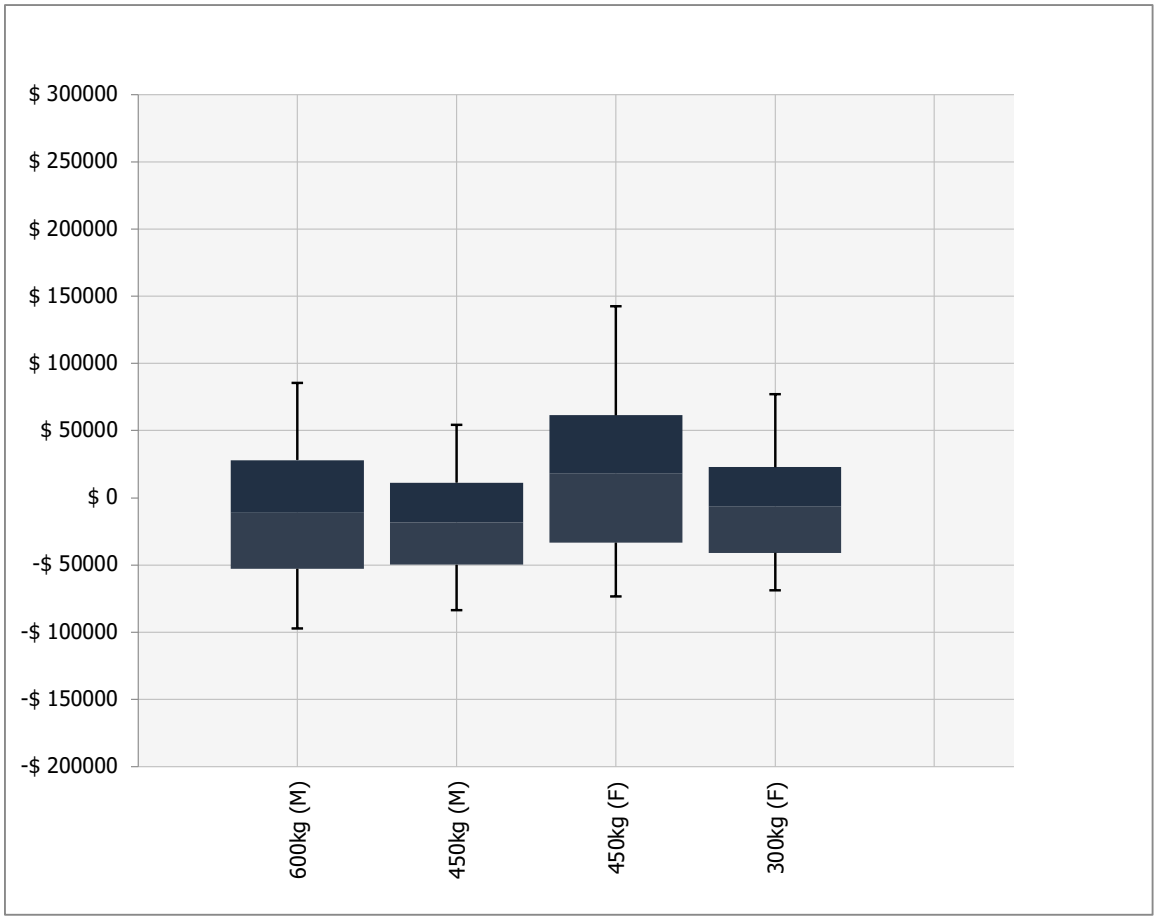

Figure 4-4: Annual average net return – Grey Farm

Table 4-6: Annual profit range – Grey Farm

BEEF MARKET	MAXIMUM PROFIT	UPPER 75TH PERCENTILE PROFIT	MEDIAN PROFIT	LOWER 25TH PERCENTILE PROFIT	MINIMUM PROFIT
600 kg Manufacturing	$85,513.00	$28,147.00	-$11,020.00	-$52,723.00	-$97,256.00
450 kg Manufacturing	$54,242.00	$11,333.00	-$18,408.00	-$49,862.00	-$83,500.00
450 kg Feeder	$142,581.00	$61,361.00	$18,119.00	-$33,422.00	-$73,415.00
300 kg Feeder	$77,118.00	$22,804.00	-$6,411.00	-$40,822.00	-$68,800.00

The Bale farm annual average net return per head of cattle is displayed below in Figure 4-5 and in Table 4-7. It shows the annual average net return but is further broken down to return per head of cattle.

In the manufacturing market, the Bales could expect a return if the beef price is at or above the median price. The maximum return per head they could expect for a 600kg animal is $796 or $487 for a 450kg animal.

In the feeder market, the maximum return per head they could expect for a 450kg animal is $1,046 and $528 per head for a 300kg animal.

A return per head would not be achieved, and in fact a loss would be made, if the beef price in both the manufacturing and feeder market is at the lower 25th percentile or at the minimum price, and the price per head for 300kg Feeder would be at break-even if the beef price was at the median price.

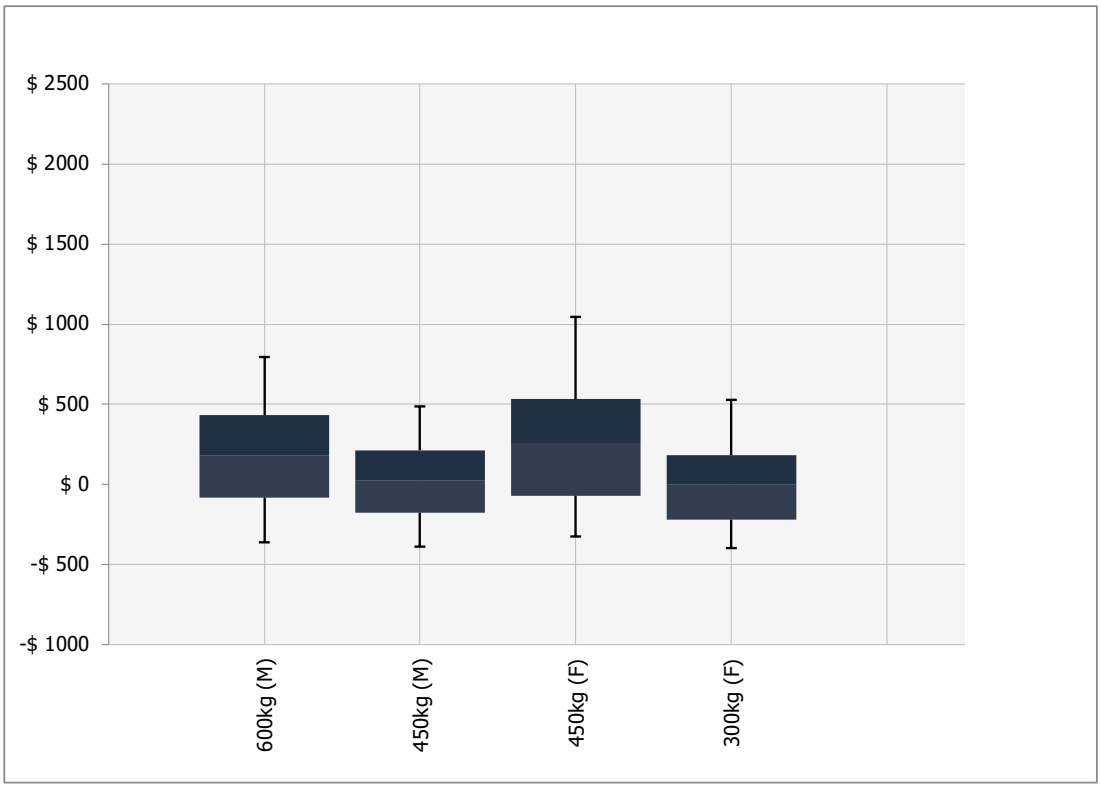

Figure 4-5: Profit per head – Bale Farm

Table 4-7: Profit per head range – Bale Farm

BEEF MARKET	MAXIMUM PROFIT	UPPER 75TH PERCENTILE PROFIT	MEDIAN PROFIT	LOWER 25TH PERCENTILE PROFIT	MINIMUM PROFIT
600 kg Manufacturing	$796.00	$433.00	$183.00	-$82.00	-$361.00
450 kg Manufacturing	$487.00	$213.00	$25.00	-$176.00	-$388.00
450 kg Feeder	$1,046.00	$533.00	$258.00	-$71.00	-$325.00
300 kg Feeder	$528.00	$184.00	-$0.00	-$220.00	-$397.00

The net return per head for the second farm is displayed below in Figure 4-6 and Table 4-8. For a 600kg manufacturing steer the farm could receive a maximum return per head of $545 and $345 for the 450kg manufacturing steer.

The feeder market could provide a maximum $908 net return per head for a 450kg steer or $491 for a 300kg steer. While a 450kg steer could still provide a return if the beef price was at a median, the 350kg feeder steer and both the sizes in the manufacturing market would result in a negative net return per head if the beef price was at or below the median price.

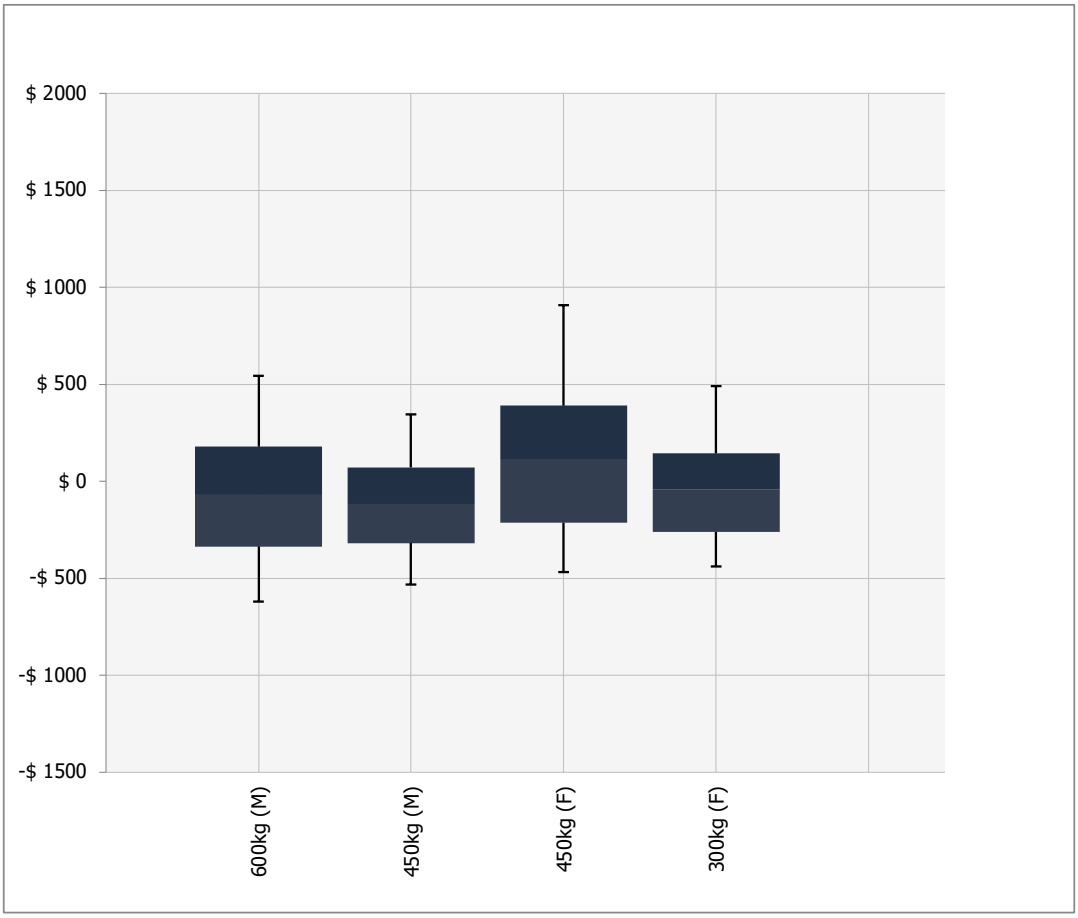

Figure 4-6: Profit per head – Grey Farm

Table 4-8: Profit per head range – Grey Farm

BEEF MARKET	MAXIMUM PROFIT	UPPER 75TH PERCENTILE PROFIT	MEDIAN PROFIT	LOWER 25TH PERCENTILE PROFIT	MINIMUM PROFIT
600 kg Manufacturing	$545.00	$179.00	-$70.00	-$336.00	-$619.00
450 kg Manufacturing	$345.00	$72.00	-$117.00	-$318.00	-$532.00
450 kg Feeder	$908.00	$391.00	$115.00	-$213.00	-$468.00
300 kg Feeder	$491.00	$145.00	-$41.00	-$260.00	-$438.00

4.3 RETURN ON INVESTING IN EXTRA IN FRASTRUCTURE

A 15-year discounted cashflow analysis was developed to show the economic outcome of the investments and incorporates all capital and operational changes to the business as benefits and costs that are associated with each scenario. The two case study farms had slightly different requirements for extra investment in calf rearing facilities if they are to rear all their surplus calves to weaning.

The results are displayed in boxplots, shown in Figure 4-7 and Figure 4-8 below. The box plots in these figures give the range of results associated with each tested scenario.

The Bale farm had more consistent positive results with the NPV for three out of the four scenarios on average being positive. The most consistent returns were from the heavier weight classes for both pricing scenarios with 600kg manufacturing steers averaging a NPV of $285K with a range of -$645K to $1.3M and 450kg Feeder steers averaging a NPV of $411K with a range of -$581K to $1.75M. The Bale farm had a capital investment of $35K and the payback period ranged from one to fifteen (plus) years (shown in Table 4-9).

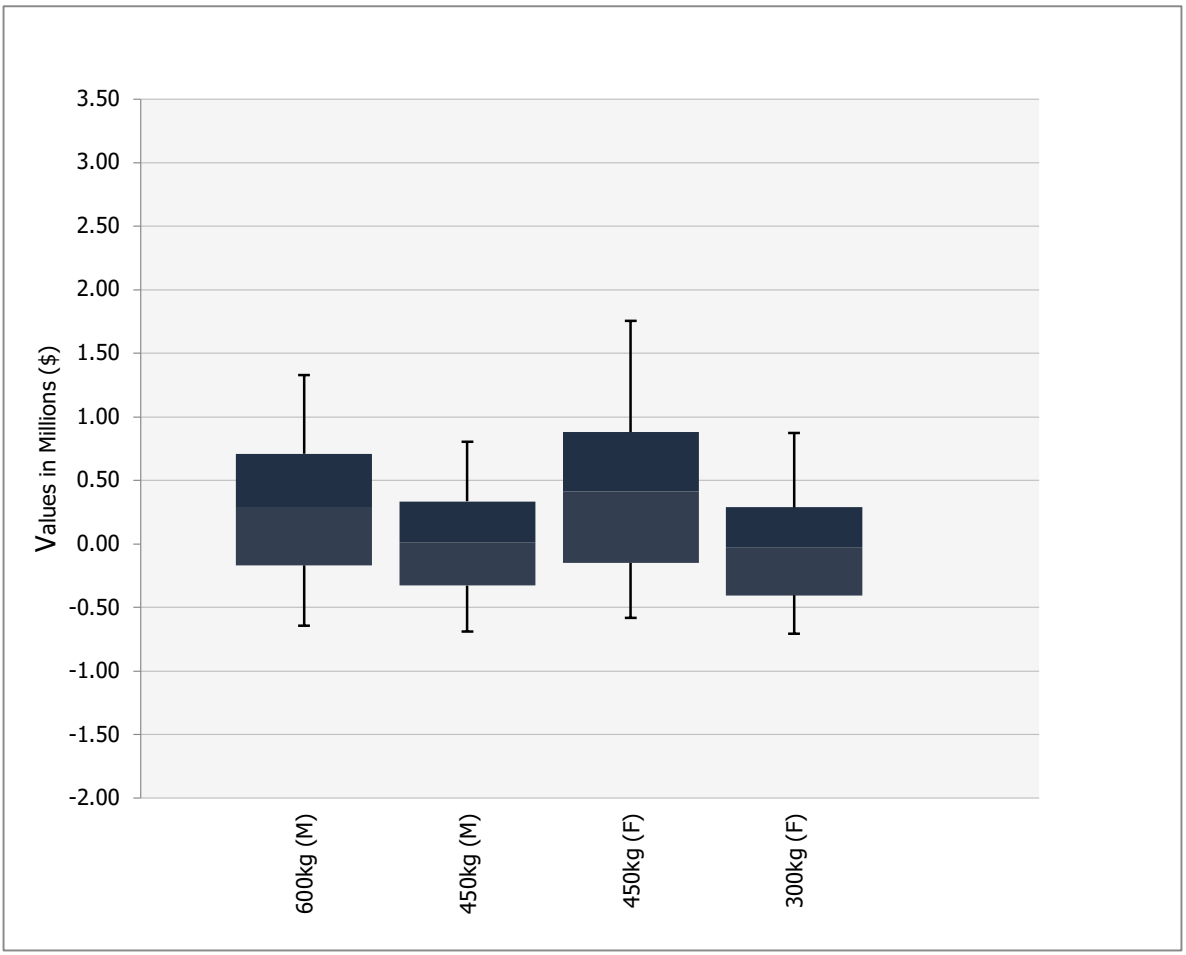

Figure 4-7: NPV - Bale farm

Table 4-9: Payback period - Bale farm

DESCRIPTION	600KG MANUFACTURING	450KG MANUFACTURING	450KG FEEDER	300KG FEEDER
Payback period	1	7	1	15+

The Grey farm had less consistent results. This was mainly due to a higher infrastructure requirement $75K, as well as consistently higher pasture costs. Their geographic position and the need for a larger more consistent cropping program contributed to these results. The NPV for three out of the four scenarios on average was negative, results are shown in Figure 4-8 below. As was the case with the Bale farm, better results were achieved from the heavier weight classes with the 450kg Feeder steers returning an average NPV of $18K. The Greys farm had a capital investment of $75K and the payback period ranged from two to fifteen (plus) years. Results are shown in Table 4-10.

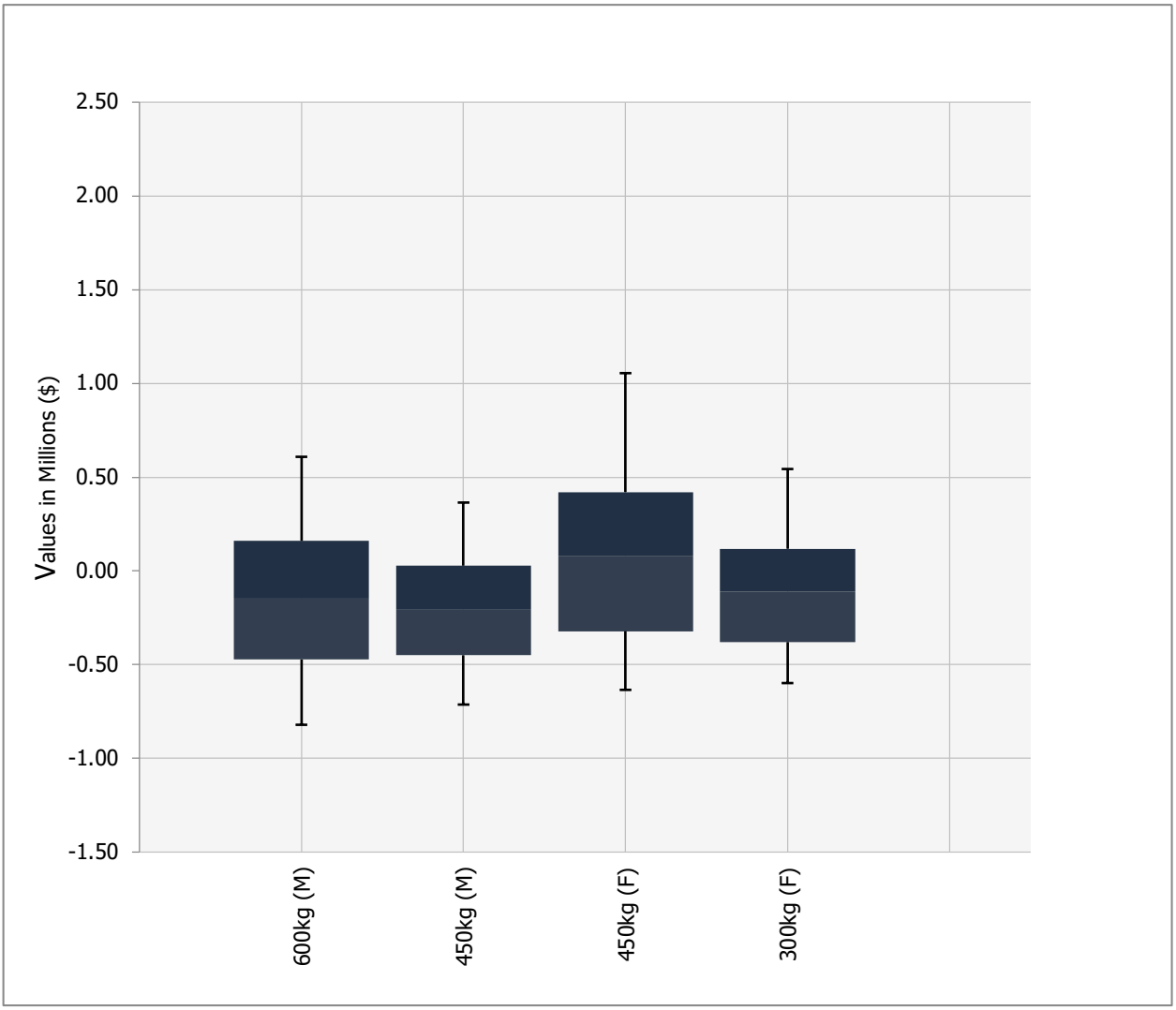

Figure 4-8: Net Present Value - Grey Farm

Table 4-10: Payback period - Grey farm

DESCRIPTION	600KG MANUFACTURING	450KG MANUFACTURING	450KG FEEDER	300KG FEEDER
Payback period	15	15+	2	15+

Some dairy farms may require more significant investment in calf rearing facilities if they are to rear all of their surplus calves and will find it challenging to achieve an attractive return on investment unless they can obtain a more stable beef price. It is important to acknowledge the infrastructure challenges posed by a tight single calving pattern compared to year-round or split calving patterns observed in our case study farms. Further consideration should be given to the required infrastructure and capital investment to support the change on a farm with a tightly scheduled single calving pattern, particularly in regions with colder winters. as our case study farms may not be representative of these scenarios.

5 Conclusions/Future Directions

Currently, in the Australian dairy industry, non-replacement calves are often culled early which causes societal upset due to the perceived poor treatment of the animals. Although it is undesirable, there are many factors that influence the farmers decision to cull early. Through this project, and in collaboration with the FRG, we found some of the underlying reasons were due to the anticipated effort required to manage an additional beef enterprise, a lack of available feed and land, a primary focus on milk production, and market volatility, particularly around beef prices. To delve into this problem further, we developed a detailed economic analysis of two case study farms evaluating the additional infrastructure and management requirements for alternative 'dairy-beef' calf pathways. Our key findings indicate:

- On average, raising surplus calves for beef resulted in roughly a break-even result. However, the range in net benefit varied from approximately $1000/head in good years to -$600/head in poor years.
- The profitability of the enterprise was primarily influenced by fluctuating beef market prices, which emerged as the largest source of variation in the extra profit/loss generated by raising surplus calves. If the beef market price is below the median, it is unlikely that a profit could be made for any size dairy-beef animal.
- As farmers are currently predicted to have a loss in profit or break even from a dairy-beef enterprise about 50% of the time, the expectation that a large number of dairy farms will pursue a 'dairy-beef' enterprise is unrealistic, unless more stable and profitable markets can be developed.
- Access to premium markets, such as feedlots, showed potential for increasing profitability. However, it did not significantly reduce the worst-case scenarios associated with market volatility.
- Some dairy farms may require more significant investment in calf rearing facilities if they are to rear all of their surplus calves and will find it challenging to achieve an attractive return on investment unless they can obtain a more stable beef price.
- Growing dairy calves to 450+ kilograms showed the potential for higher profitability. However, this approach also exposed the business to downside risks, including increased feed costs, limited land availability, climate variations, and beef market volatility.
- It is important to consider that an increased focus on managing the beef enterprise can divert attention away from the core goal of profitable milk production, which remains the primary business for dairy farmers.

The value of the participatory approach adopted in this project was demonstrated when the FRG identified a key barrier being their lack of confidence that there would be demand for their product if they were to raise surplus calves. We were able to organise MLA and feedlot representatives to talk to the group about what could be achieved with dairy beef and what dairy farmers could do to ensure that they have a product that is attractive to meat processors or feedlots. This aspect was not part of the original project brief but made an important contribution to increased confidence of dairy farmers in this region that there could be demand if they raised surplus dairy calves for beef.

This project has highlighted the need for a better understanding of the costs, benefits and risks incorporated with raising surplus calves for beef. Additionally, there is a strong need for dairy farmers, processors, beef markets, and industry bodies to come into partnership and make significant changes to processes and adjust market ideals. By understanding the economic implications and collaborating with industry stakeholders (especially within the beef industry), there is potential to develop surplus calf management practices that are both socially and economically sustainable. However, these solutions will be regionally, and farm business specific and significant attention needs to be devoted to reducing the proportion of years when there is likely to be a negative return.

5.1 FUTURE DIRECTIONS

In light of these findings, it is crucial to explore alternative strategies that can enhance the economic sustainability of surplus calves. Common themes within the FRG were a lack of land and labour coupled with limited access to premium beef markets. In order to bridge the gap (between dairy farmers and feedlot operators/meat processors) in the study region, the development of specialised calf rearers that raise the calves on leased land holds potential. Specialised calf rearers can provide the necessary effort, expertise and infrastructure to effectively raise and market surplus calves, alleviating the burden on dairy farmers while creating new sustainable opportunities for the beef market. This currently appears to be the most practical pathway to reduce the week old slaughter of surplus calves.

For this particular region (Taree/Kempsey) some follow-up support to foster a regional working group/producer demonstration site may be very beneficial.

While exporting dairy heifers is not an option in this region, further analysis of rearing surplus heifers for the export market could provide valuable insights for other dairying regions. Assessing the economic viability and market demand for these markets can provide additional revenue streams and profitable diversification options for dairy farmers in other regions.

It is important to acknowledge the infrastructure challenges posed by a tight single calving pattern compared to year-round or split calving patterns observed in our case study farms. Further consideration should be given to the required infrastructure and resource allocation necessary to support a tightly scheduled calving pattern particularly in regions with colder winters as these case studies may not be representative of these scenarios.

The contribution that milk processers can make to help manage risk also warrants further investigation. By offering premium prices for milk and/or providing incentives, milk processors could help mitigate the financial risks associated with rearing surplus calves. This may encourage more dairy farms to actively participate in raising surplus calves, which would foster a more sustainable industry in terms of social licence.

A decision support calculator has been developed (Appendix 1) and will be presented to the FRG and could potentially be tested, refined and circulated more widely.

In conclusion, the economic analysis emphasises the significance of market conditions, farm management efforts, and the goals of dairy farmers when exploring alternative pathways for surplus calves. Continued collaboration within the regional farmer working group, coupled with the active involvement of milk processors, meat processors and specialised calf rearers, holds potential for the development of viable surplus calf pathways. We see merit in a continued effort working towards sustainable and profitable calf solutions that will enable the dairy industry to continue to thrive while meeting the evolving demands of both market and societal expectations.

References

Barber, D. Bauer, M. Sullivan M. (2020) Scoping the development of high value beef production from dairy bulls using forage-based systems. Meat and Livestock Australia Limited, Sydney.

Malcolm B, Makeham J, Wright V (2005) The farming game – Agricultural management and marketing,

2nd edition.' Cambridge University Press: Melbourne.

MLA (2023), Prices and Markets. https://www.mla.com.au/prices-markets/ - Accessed 28th June, 2023.

Appendix 1: Decision Support Calculator

Scenario assumptions	Value
Number of cattle	150
Current age	
Current value	
Target weight (kg/animal)	600
Target weight gain (kg/day)	1

Profit/loss	Value
Per head	$524
Total	$78,559

Summary	Value
Sale price per animal	$1,842.00
Total feed costs	$984.14
Weaning costs	$334.13
Age at sale (years)	1.6
Age at sale (months)	19
Days to target weight	563
Total DM fed (tonnes) (after weani	4.6

Price assumption	Default	User	Value
Beef price ($/kg lw)	$3.07	*$3.07*	$3.07
Grain price ($/tonne)	$390		$390
Milk replacement price ($/lt)	$0.75		$0.75
Calf pellets ($/tonne)	$450		$450
Pasture costs ($/kg DM)	$0.17		$0.17
Hay price ($/tonne)	$320		$320
Labour cost ($/hour)	$34		$34
Additional costs (fuel, electricity, et	$5		$5
Transport (per head)	$8.50		$8.50

Feed Intake	Default	User	Value
Weaning (10 weeks)	5.5	*5.50*	5.5
100-150 kg	5		5
150-300 kg	7		7
300-450 kg	10		10
450-600 kg	11		11

Appendix 2: Draft Factsheet Example

PROJECT BACKGROUND

The Economic Impact Assessment for Calf Pathways project aimed to gain a clear understanding of the costs, benefits, and risks associated with raising surplus dairy calves for the beef market and investigate whether it would be economically practical to hold onto surplus dairy calves and pursue alternative pathways.

The delivery of this program involved identifying two case study farms and developing a Farmer Reference Group (FRG) in the mid-north coast of NSW.

Quote from the FRG “I’m interested in if it’s economically positive to raise surplus calves because I’m interested in making this a sideline business”

The need for the project arose due to social licence priorities and the importance for dairy farmers to meet societal expectations around the treatment of bobby calves.

Quote from FRG “It’s not just about the numbers but also what the consumer wants”.

The aim is to aid farmers in making informed decisions that contributes to a future where surplus calves are consistently raised for beef, using practices that can withstand seasonal and commodity price unpredictability, as well as navigate regionally specific challenges.

Farm 1 The Bales - runs a year-round calving pattern with 320 milking cows. The Bales had existing infrastructure and only required a small extension to their calf shed to comfortably manage keeping calves for longer.

Farm 2 The Greys - runs a split Autumn to Spring calving pattern with not many calves in winter and 230 milking cows. They required capital investment for an additional calving shed.

The factsheet content is attached.

Appendix 3: Beef Prices

Table A3-1: Market beef prices (low, average, high) used in sensitivity analysis[1]

				MARKET PRICE (C/KG LWT)			VARIANCE TO AVERAGE OF CATEGORIES		
Category	**Lwt Kg**	**Muscle score**	**Fat score**	**low**	**avg**	**high**	**low**	**avg**	**high**
Grown Steer	400-500	A-C	3-4	225	309	418	-2	-10	-38
Grown Steer	500-600	A-C	3-4	232	317	367	6	-2	-89
Grown Steer	600--750	A-C	3-4	240	338	437	14	19	-19
Grown Steer	750+	A-C	3-4	230	325	425	4	7	-31
Manufacturing Steer	540+	A-C	3-4	221	307	415	-6	-11	-41
Yearling Steer	330-400	A-C	3-4	244	376	558	18	57	102
Yearling Steer	400+	A-C	3-4	236	331	479	10	13	23
Vealer Steer	200-280	A-C		168	262	544	-58	-57	88
Vealer Steer	280-330	A-C		211	281	453	-15	-37	-3
Vealer Steer	330+	A-C		256	340	465	29	22	9
Average of categories				226	319	456			

[1] MLA, Australian Saleyard Cattle Transactions Armidale, https://www.mla.com.au/prices-markets/statistics/cattle-transactions/, viewed 5 May

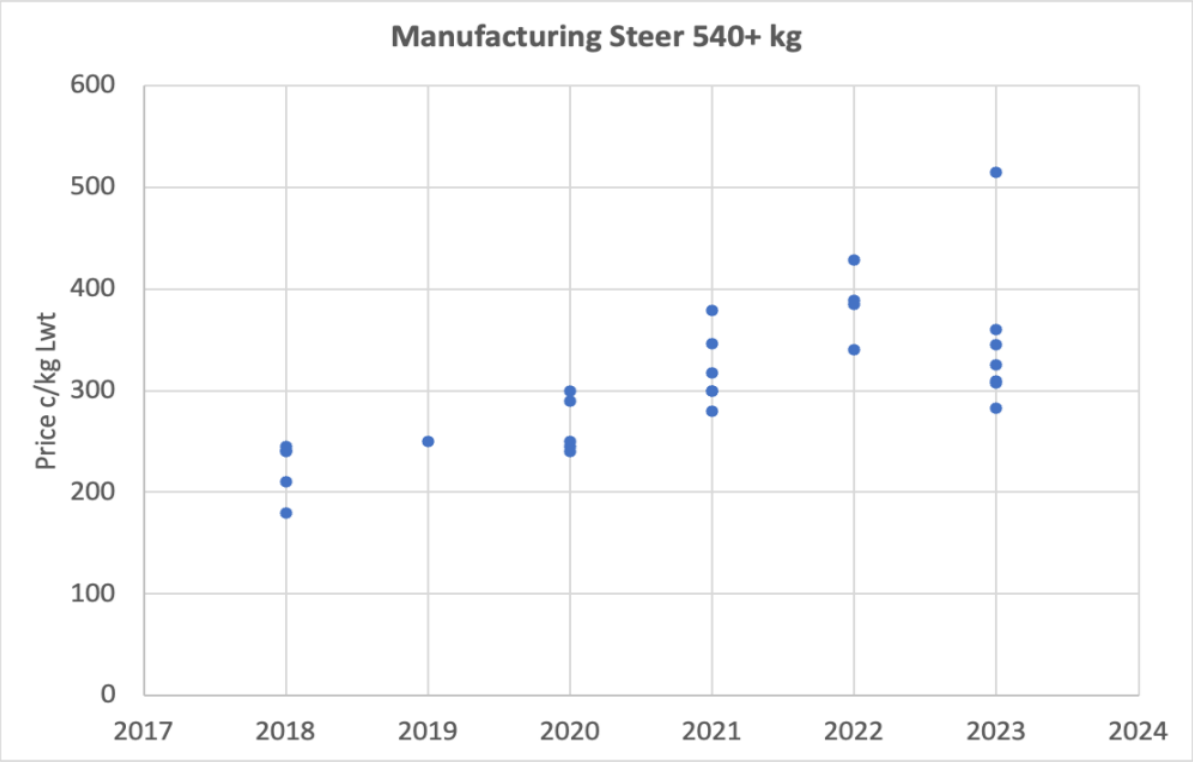

Figure A3-2: Distribution of Manufacturing Steers 540+ kg, Armidale (1 July 2017 – 5 May 2023)

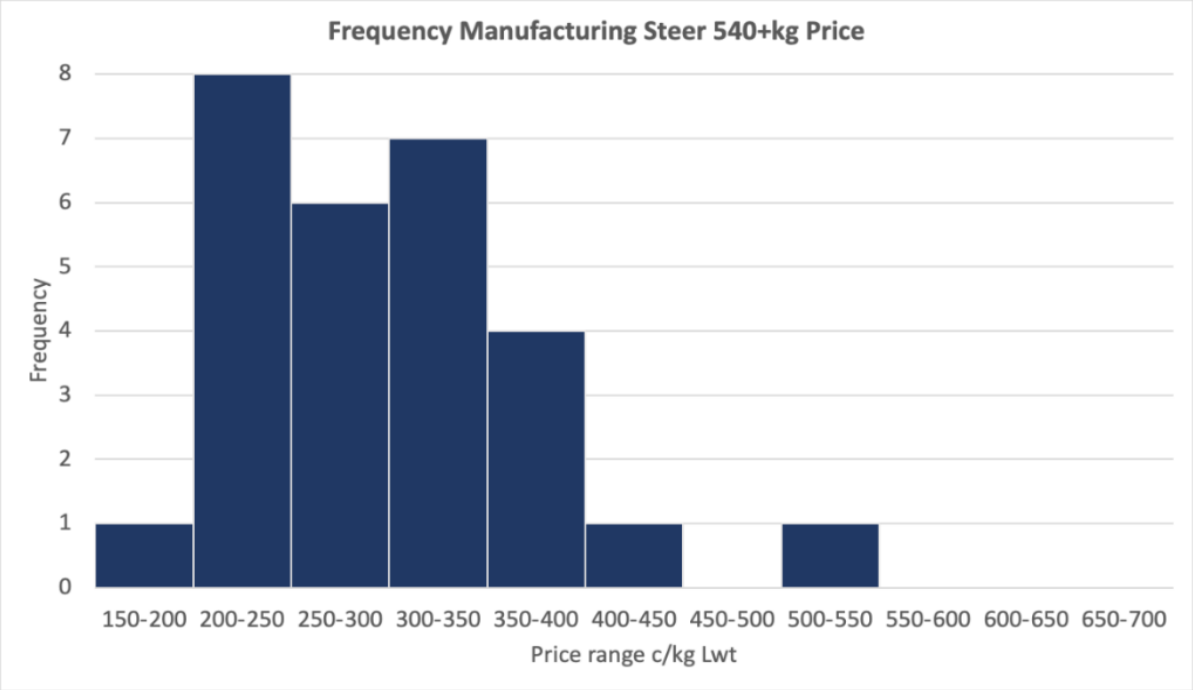

Figure A3-3: Frequency Histogram of Manufacturing Steers 540+ kg Prices, Armidale (1 July 2017 – 5 May 2023)

This report has been prepared by:

RM Consulting Group Pty Ltd trading as RMCG

135 Mollison Street, Bendigo Victoria 3550

(03) 5441 4821 — rmcg.com.au — ABN 73 613 135 247

Offices in Victoria, Tasmania and NSW

135 Mollison Street, Bendigo Victoria 3550

(03) 5441 4821 — rmcg.com.au — ABN 73 613 135 247

Key RMCG contact

Dan Armstrong

0427 337 934 — dana@rmcg.com.au

Document review and authorisation

Project Number: #1899

Doc Version	Final/Draft	Date	Author	PD Review	BST Review	Release approved by	Issued to
1.0	Final	25/08/2023	D. Armstrong T. Wardley L. Jones	D. Poole	L. McKenzie E. Kelly	D. Armstrong	Dairy Australia