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Integrated grower supply chain for production of merino lamb

Prepared for Merino NZ Inc

by

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Executive Summary

- This project considered whether businesses that specialised in either store production or hogget finishing would be more profitable than businesses that attempted to do both;

- Under the current market conditions a specialist store producer could make as much profit as a store/finisher by maximising store lamb production and reducing wintering costs in an average year;

- However, the low prices a store producer would get for lambs in dry seasons significantly reduce profit. Currently Store producers do not want to be caught in a dry seasons with a significant number of lambs for sale so have modified their businesses to finish as many as possible;

- The conclusion of this project is that a contract between the store producer and finisher could be constructed to remove the volatility of store lamb values. This would make it as attractive to be a store producer as a store/finisher;

- Most store/finishers would be attracted to simplifying their businesses if it did not cost them. It is concluded that such a contract would be implemented.

- Another benefit to the industry is this scenario would result in more hogget fleece that would offset the declining merino clip;

- Described are two contracts; one that provides an opportunity for store producers to retain ownership through to sale. This carries more risk but ensures the producers receives the spring premium;

- A second contract is suggested where both parties share the market risk equally.

- Both store producer and finisher have more guarantee that they can operate under average market conditions each year;

- Both contracts could be easily administered if they had two buying periods, before and after winter; both with no allowance needed for wool;

- There would be other benefits to being a specialist Store producer. Selling/procurement costs would be avoided. Both parties would also be focussed on the marketable product as improvements to stock genetics and health would be equitably shared through the production chain.

Purpose

The purpose of this analysis is to quantify the value added to store producers and finishing businesses though integrating stock policies so that neither needs to trade stock through the open market. Discussed is the advantages and disadvantages to both systems in two areas; biological improvement in being able to farm to the strengths of the resource and the reduction in transaction costs when grower arrangements are made.

Introduction

The merino industry has developed from enterprises with a high degree of reliance for their financial sustainability on wool price. This is partly because a significant premium has existed for super fine and ultra fine wool (18.5 micron and less). In these strains of merino more energy is partitioned into the production of secondary fibres (to create this finer fleece). Less energy is available for sheep fertility and lamb weaning weights than crossbred sheep. With the relative improvement in wool prices at the 19.5 to 21 micron range the opportunity exists to improve production efficiency through significantly better reproductive performance. Data (Merino Monitoring Group) shows that it is feasible in high performing flocks with a 52kg merino ewe to:

- Produce 110-120% weaning;
- Wean a 28kg lamb at 110 days;
- Finish lambs sold during October to November at 19kg carcass weight.

Using the farm system model Farmax (Marshal *et al*, 1991) to analyse the financial performance of a producer achieving the above performance at prevailing meat and wool prices (see Appendix 1) shows this would return 15.5 cents/kgDM eaten compared with a crossbred flock earning 12 - 14 cents.

In past years where a strong market has existed for replacement stock merino enterprises have had good returns. However, a shrinking merino industry has decreased this market and merino lambs in February and March are not popular with lamb finishers. Further, drought conditions can significantly reduce their value below $1/kg of liveweight. This is significantly less than crossbred lamb prices during drought. Under these conditions returns to producers vary from 6.0 to 10.7 cents. Past modelling by Ogle (2004) shows for a 9,000 stock unit merino property the effect of drought for a store producer will cost the business $133K. The main cost being the reduction in lamb value.

Raising reproductive performance is a long term objective starting with the rearing of replacements. The prospect of such low returns in dry years is a disincentive for merino farmers to increase merino lamb output. The response has been to:
- Maximise the number of terminal lambs;
- Decrease ewe numbers and or lower ewe liveweights, poor (or no) 2th mating and poor tupping performance;
- Increase hogget finishing through capital investment into irrigation, conservation and winter feed crops.

As a consequence finishers see declining availability of quality lines of merino hoggets. In years of good pasture growth prices are very high while in drought years there is considerably more livestock available and they very cheap. Finishers can make large margins in some years and very little margin in others. A response to this situation is to simply take on dairy grazers that make a similar amount to hogget finishing.

This project assessed whether a better outcome for farmers who both breed lambs and finish them (Store/finisher) to:
- Minimise market risks with an appropriately structured contract;
- Specialise in breeding quality lambs by using the post weaning feed that normally went to finishing hoggets to raise better replacement stock, provide better ewe flushing and feed ewes better post lambing to raise weaning weight;
- Improve the natural fit between feed supply and feed demand (by avoiding carrying hoggets through winter on store properties) reducing the need for winter forage crops and other supplements;
- Minimise the transaction costs of commission and yardage.

Methodology

To assess the biological benefits this analysis considered two models for a high country station. One model (a Store/finisher) represented by a high country station that has chosen to avoid the production of store lambs by finishing 65% of surplus lambs to modest weights drafting in October and November. The second model is for the same farm choosing to specialise in store production selling all surplus lambs at weaning.

To ensure both models were equally feasible the following steps were followed:
1. The Store/finisher model was set up using the Farmax Pro modelling program. Data was based on merino farms in the dry Central Otago environment.

2. The model was optimised so that no more stock could be run without the model running out of pasture.

3. The hogget finishing mob was then modified to sell all surplus lambs 3 weeks after weaning. This freed up considerable winter feed which could be used to improve the breeding flock performance. The following management decisions were made to utilise the surplus feed until both models were equally feasible:
   - The amount of winter supplements made (forage crops and silage) were halved;
   - Ewe lambs and 2th ewes were raised to higher weights;
   - The overall ewe flock, having consistently higher replacements had higher liveweights;
   - More flushing of ewes and 2ths was allowed for;
   - With greater flushing better scanning index were achieved;
   - Better ewe liveweights were maintained through lamb rearing leading to greater lamb weaning weights;
   - Better ewe nutrition during lambing enabled slightly lower lamb losses at this time;

4. The gross margin for the two models was compared.

Climatic risk

During the 2001/02 and 2006/07 years a dry summer impacted badly on lamb prices. The price for lambs dropped below $1/kg of liveweight. Subsequently, those who were able to hold on to lambs and finish them in October and November received good prices. The risk for the Store producer is created because they sell their product on a different market to the finisher. The magnitude of this risk is definable if we know how often it will occur. In this analysis we have considered the sensitivity to it occurring 1 in 5, 4, and 3 years. The models have therefore been run with sale prices reducing to those shown below for each system.

	Store/finisher ($/kg liveweight)	Store producer ($/kg Liveweight)
Store lambs	0.85	1.00
Blackface lambs	1.35	NA
Cull ewes	1.00	1.00

Table 1. Lamb price assumptions used for comparing the financial returns between store/finisher and store producer during normal and dry years.

While there would be other biological effects in a dry season it is considered that both systems would be affected similarly.

Reduced transaction benefits

To assess the value of reducing transaction costs the new specialist breeding model was run without the 6.0% commission on all store lambs as the parties would not need the services of a third party. Also, the cost of yardage of $1/head was removed.

Treatment of financials

1. This analysis assumes both models are in a status quo situation post development.
2. Product prices – A long term view of product prices has been used. These are shown in Appendix 1.
3. The cost of conserved feed includes an allowance of 8 cents/kgDM for feeding out. Therefore the benefit of reducing conservation is included in the gross margin results.
4. Financial comparison – It is assumed each unit is run in an owner – operator structure. The financial comparison uses a gross margin. This is calculated as the Gross Farm Revenue less shearing, animal health, forage crops and conservation, regrassing, and interest on livestock. It is not expected that any other costs will be significantly different. If there are expected differences these are discussed.

Results and discussion

Overall results and discussion

Selling all surplus lambs at weaning enabled slightly more ewes to be run. However, the main benefit was having better ewe breeding performance. Better ewe and 2th ewe nutrition was feasible to the point of an increase in lambing of 12 and 14% respectively. A higher weaning weight also contributed to a lift in ewe breeding efficiency of 7%. The larger and better fed ewes also grew 200 grams more clean fleece weight.

Stock Numbers	Store/finisher	Store producer	Difference
Ewes (numbers)	8120	8410	290
2th Ewes (numbers)	1630	1690	60
Ewe Hoggets	2000	2060	60
Sale Hoggets	3640	0	3640
Wool production (kg clean)			
Ewes	3.0	3.2	0.2
2th Ewes	3.0	3.2	0.2
Hoggets	2.0	2.15	0.15

Reproductive performance	Store/finisher	Store producer	Difference
Ewe tupping weight	50.0	54.0	4
2th tupping weight	45.4	49.1	3.7
Ewe weaning %	95	107	12
2th Ewe weaning %	77	91	14
Ewe's lamb weaning weight	26.0	26.8	0.8
2th's lamb weaning weight	24.5	25.5	1.0
Ewe breeding efficiency (%)	39	46	7

Young stock performance	Store/finisher	Store producer	Difference
Average replacement lamb growth rate[1] (grams/day)	67	72	5
Average replacement hogget growth rate[2] (grams/day)	36	40	4
Finishing hogget sale weight (kg)	17.2	NA	
Finishing hogget sale value ($/hd)	90.35	NA	
Store lambs weight (kg)	23.5	29.3	5.8
Store lambs value ($/hd)	45.56	56.72	11.16

Table 2. Changes in stock numbers, wool production reproductive performance, and performance of young stock modeled for the store/finisher and store systems.

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[1] Weaning to 30 June.

[2] 1 July to sale.

The financial result was that a Store/finisher who specialized in breeding and store production would be $31 worse off. However, if commission and yardage could be avoided this gap closed to $9K - The gap is therefore eroded to $1.30 per lamb. This gap would be further narrowed by rationalizing transport with cartage to sale yards often being a diversion to the destination property.

The real difference is caused by dry weather when store prices plummet. This would reduce the profit to a Store producer by $41 to $63K depending on the frequency of dry seasons. This is a strong incentive for breeding properties to attempt to finish as many lambs as possible.

Financial			
Merino enterprise GM/kg eaten	13.3	12.7	0.6
GM ($)	$621,610	$590,400	-$39,100
GM ($) No commission or yardage	$621,610	$612,700	-$8,580
GM drought impact ($)	$546,370	$346,150	-$172,000
- Every 3 years			-$63,050
- Every 4 years			-$51,580
- Every 5 years			-$41,260

Table 3. Finacial results for the store/finisher and store systems

Store producer Finisher supply contracts

The situation described above will always incentivise the Store producer to finish as many lambs as possible compromising an important resources for the merino industry; lamb numbers and hogget fleeces (because of the number of terminal sires used for early production).

The key function a contract must service is therefore to link both the Store producer and the finisher to the market value when lambs are processed. This means both businesses are focussed on the final product and its value proposition to the market. Two contracts are suggested; the liveweight contract and a new contract developed as part of this paper referred to as a Shared Market Contract.

The liveweight gain contract

The liveweight gain contract enables the store producer to maintain ownership of the lamb through until slaughter. He is the paid the value of the lamb and must pay the finisher a sum for finishing. The sum is based on:

- The liveweight gained while on the finishers property;
- A contracted price per kg of liveweight gained.

The contract price is normally related to what the store producer picks the market will pay. The risk for the store producer can be reduced by a forward contract with a meat company or a supermarket such as the Rissington contract (now   Silver Fern Farms).
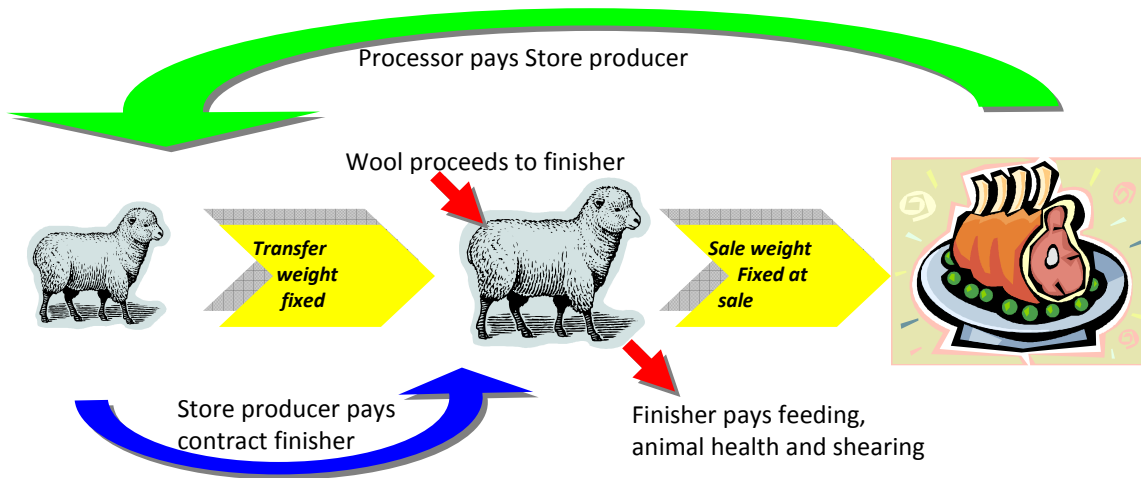
Figure 1. The relationship between costs and returns for a liveweight gain contract.

The store producer must pay all costs up to and including the delivery of the lamb to the finisher. The finisher then pays for feeding, animal health and shearing. In the crossbred situation wool is seen as an expense that each party would wish to avoid ie the cost of shearing may not meet the net wool value. The store lamb is therefore normally transferred woolly and the finisher must shear it.

For merino lambs wool has a real value of $20-25 net/head if shorn at around 70-75mm (Industry average length is 72 mm). Below 65 mm it becomes significantly discounted. Between 45 mm and 65 mm wool is discounted by around 25%. Below 45 mm the fleece falls into cardings and would be discounted by 30 to 50% with the net value above the cost of shearing being very little. Normally the length increases into a more marketable length from late August. The graph below demonstrates the net value after shearing of a hogget fleece that reaches a peak yield of 2.2kg/head in late October. The fleece value becomes worthwhile after most of winter has past and therefore falls to the party who incurs the wintering costs.
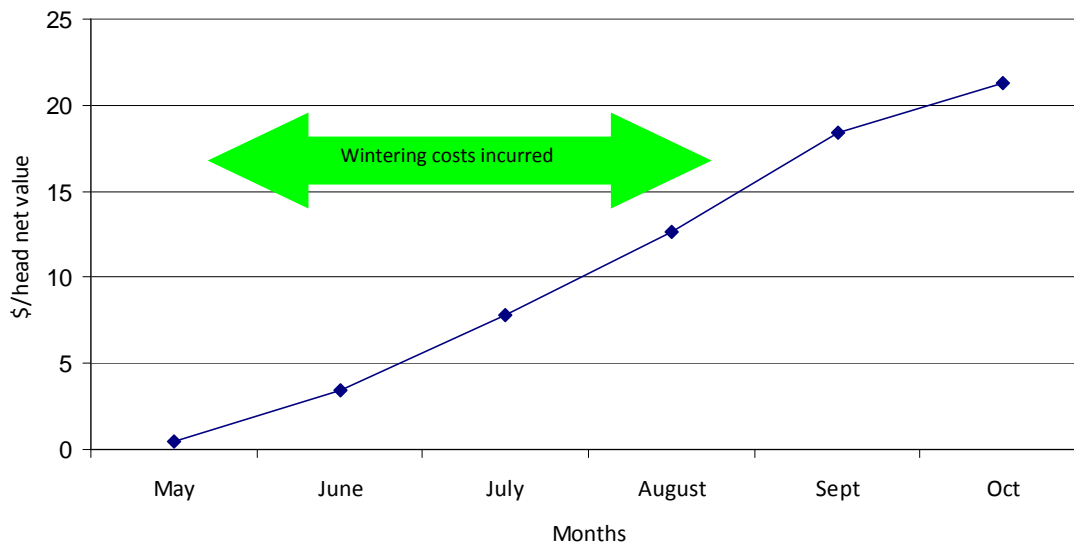
Figure 1. An example of the change net value of hogget wool through the year.

The simplest contract arrangement would have two periods, pre-winter when no significant fleece needs valuing (as is the current situation), and in spring post shearing; again no fleece is required to be valued. The earlier purchase price would enable the finisher to grow a fleece to meet the costs of wintering while the later period would avoid much of the wintering costs but have no fleece.

For a store merino producer the benefit is in avoiding autumn store sales (and the impact of dry season) and receiving the schedule premium in spring. Another benefit for farmers with genetically superior and healthy lambs is that they share in the added growth rate which will result in an earlier sale when the schedule is at its highest (normally in October). For the finisher a key advantage must be that his returns are solely based on factors that he can influence.

The disadvantage for a store merino producer is that the contract rate for finishing, by necessity, must be negotiated at the start of the season, otherwise lamb finishers will not be secured. If the lamb market moves sharply downward the store producer could be face with a loss after meeting the costs of finishing. This contract therefore presents the store producer with an opportunity to increase returns with corresponding increase to risk.

Shared market contract

The parties could come to an arrangement where they both share the risk of the market and forego the opportunity to make money at the expense of the other party. Their returns would be based solely on the market conditions at sale. The contract value lambs sold to the finisher as follows:y

- The market price per kg of carcass weight would be determined at the average sale date of lamb finisher;

  (Example $5.80/kg)

- The market price would be multiplied by a conversion factor (%) to convert it to $/kg carcass weight. The conversion factor would alter each month to represent the value to the finisher of lambs within each month. For example a 28kg lamb in March would have a lower /kg of liveweight value than a 33kg lamb in July because much of the winter and opportunity cost can be avoided. The conversion factor percentages would be part of the contract agreed to when the parties agree to supply lambs;

  (Example $5.80/kg
  x 32% for March = $1.85)

- Multiplied by the weight of the lamb when sold to the finisher This eliminates the risk of buying and selling on tdifferent markets. The parties would need to agree on a mechanism that determined an equitable relativity between the market sale price for the finished product and the store price.

  (Example $5.80/kg
  x 32% for March = $1.85
  x 26kg lamb = $48.10/lamb)
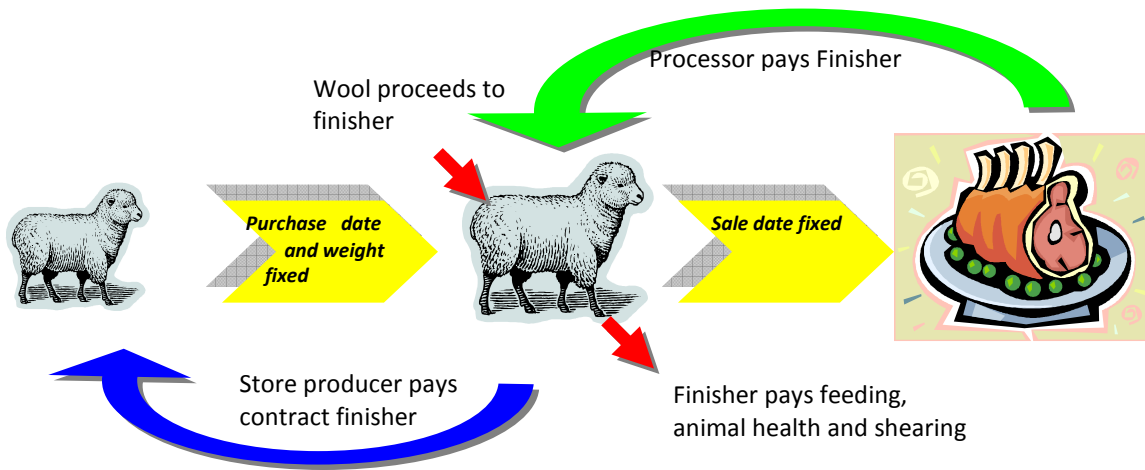
Figure 3. The relationship between costs and returns for a Shared market contract.

The long term average relativity between the works price per kg of carcass weight and the store price per kg of liveweight is shown below in the dashed line. This has been calculated by Farmax Limited for crossbred lambs which can be considered shorn (as the lamb wool contributes little to the value).
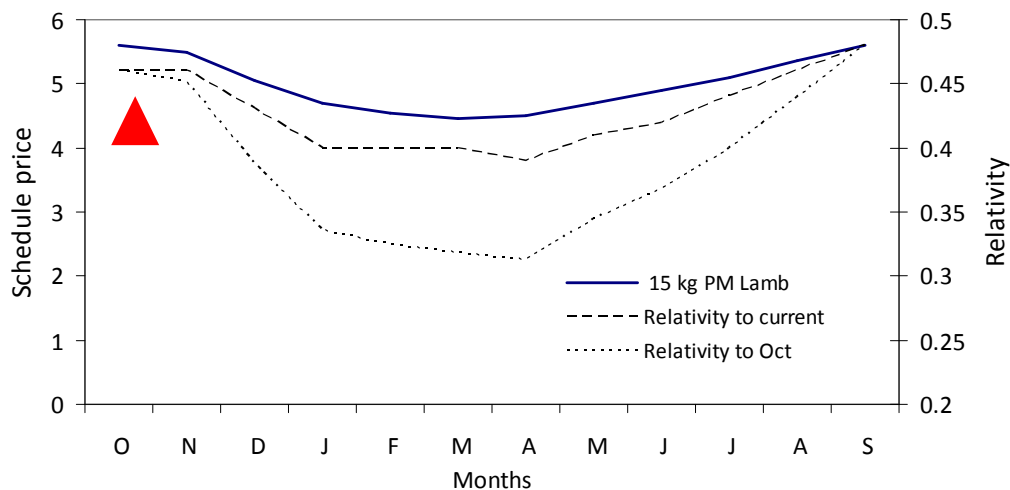
Figure 4. The relativity between store price and an November sale price of lamb.

However, the important relationship is the relativity to the valuation point. This is shown relative to a November valuation in the dotted line. This demonstrates that a finisher would be prepared to pay a higher relative price for lambs that are supplied in August than in March. If the store producer elected to sell the lamb shorn in August at a 30kg and it would have a value of $73.80.

This contract reduces between-party risk, that is the risk that one party might gain at the others expense.

The main risk is in determining an equitable schedule of relativities. These are however already operating in the market and can be assessed from analysing the market data. The objective of this contract is not to achieve a better relativity than the average. The objective is to remove the variability from the average because this is what causes one party to suffer at the expense of the other. Removing this enables both parties to concentrate their systems on breeding and finishing and lessens the need to employ third parties to procure stock and make the deal.

Conclusions and summary

A Store producer is currently incentivised to carry lambs through to sale because the penalty for selling through the auction during dry years is high. The cost of auctioning stock, whilst perceived as minimal is significant. If the parties could be focussed on the end value of the hogget through either of the contracts suggested above they could focus on optimising their systems and eliminate the need for others to negotiate equity between the parties.

The merino industry would benefit from a greater overall lamb output which in the situation described flows through to hogget fleeces. This would be further improved as there would be less incentive to use terminal sires for early sale of terminal lambs.

References

Marshall P.R., McCall, D.G. and Johns, K.L. 1991. Stockpol: A decision support model for livestock farms. *Proceedings of the New Zealand Grassland Association* 53: 137-140.

Merino Monitoring Group. The merino monitoring group data is only available in consolidated form in projects that the group participates in such as this report. Data has been collected on 18 to 23 farms (depending on the year) over a 10 year period from 1999 to 2009.

Ogle G.I. 2004. Drought Strategies for dry merino properties. *Merino NZ Inc Technical report.* pp16.

Appendix 1. Sheep, beef and dairy grazing pricing assumptions

Sheep

Prices / kg												
Works ($/kg Cwt)	O	N	D	J	F	M	A	M	J	J	A	S
15 kg PM Lamb	5.88	5.78	5.3	4.93	4.78	4.67	4.72	4.93	5.14	5.36	5.62	5.88
24 kg Sheep	2.7	2.54	2.33	2.17	2.05	2.06	2.22	2.32	2.42	2.52	2.64	2.82
Store ($/kg Lwt)	O	N	D	J	F	M	A	M	J	J	A	S
Ewe Lamb	2.47	2.43	2.17	2.07	2.05	2.01	2.03	2.12	2.16	2.3	2.47	2.65
Ewe Hogget	2.7	2.71	2.55	2.37	2.1	1.87	1.8	1.73	1.85	2.14	2.58	2.7
MA Ewe	2.12	2.14	1.96	1.38	1.34	1.31	1.32	1.38	1.49	1.61	1.97	2.06
Ram Lamb	2.65	2.54	2.28	2.22	2.15	2.1	2.13	2.22	2.26	2.41	2.64	2.7
Ram Hogget	4.06	4.22	4.14	2.42	2.39	2.43	2.69	2.86	3.04	3.21	3.48	3.7
MA Ram	7.11	6.99	7.32	8.04	8.12	8.13	8.41	7.9	7.72	7.44	7.42	7.29
Wether Lamb	2.7	2.66	2.28	1.97	1.91	1.87	1.84	2.02	2.16	2.36	2.58	2.82
Wether Hogget	2.23	2.25	1.96	1.88	1.96	1.92	1.89	2.07	2.21	2.41	2.47	2.35
MA Wether	1.88	1.96	1.7	1.53	1.72	1.73	1.75	1.58	1.65	1.71	1.74	1.65

Wool price and cost of shearing

Merino Hogget	12.25	$ / kg Clean
Merino Adult	12.25	$ / kg Clean
Shearing Costs		
Lambs	3.00	$ / head
Hoggets	5.65	$ / head
Adults	6.75	$ / head

Animal health

Sheep	$ / hd / yr	Beef	$ / hd / yr
Ewe Lamb	2.40	Heifer Calf	12.00
Ewe Hogget	2.40	1-Year Heifer	8.00
Ewe	3.65	2-Year Heifer	7.00
Ram Lamb	2.40	Cow	12.00
Ram Hogget	2.40	Bull Calf	18.00
Ram	5.00	1-Year Bull	8.00
Wether Lamb	2.40	2-Year Bull	7.00
Wether Hogget	2.40	Bull	20.00
Wether	2.00	Steer Calf	7.00
		1-Year Steer	8.00
		2-Year Steer	7.00
		Steer	7