

Making the most of mutton

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Introduction

Australia processes about 15 million mutton carcasses per year. The Australian mutton industry is based on surplus sheep from the wool and sheepmeat industries. Mutton is derived from older animals, with permanent incisors (teeth). Hoggets, a category within mutton, are animals with one or two permanent incisors, 10–18 months old.

This by-product image of mutton means that little effort is put into ensuring that older sheep are suitable for the mutton market. Simple gross margin analysis shows that sheep sales for mutton can be up to 26% of gross income – but usually it is 5–25%.

Because sheep are not produced in large quantities by many other countries, the mutton market is one in which we have relatively little competition. Mutton is usually the cheapest source of meat protein available on world markets. Therefore it has the potential, compared to other meats, for development of new markets in developing countries with limited resources. Consumption is very price sensitive and other meats can be easily substituted for it.

Domestic markets

The Australia consumption of mutton is declining. Table mutton constitutes only 3% of total domestic consumption. There are three main domestic sectors:

Manufacturing. Consumption has moved toward manufactured meat products such as processed smallgoods, meat pies, sausage rolls and dim sims.

Retail. Hoggets are often sold as whole or half carcasses through meat retailers. Better quality mutton is also utilised by the retail sector.

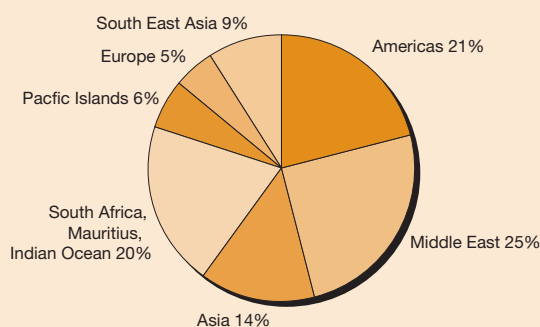
Hotels, restaurants and institutions (HRI). A range of mutton cuts are used in Asian, Indian and Middle Eastern style restaurants and in fast food like doner kebabs and souvlaki outlets.

Export markets

About 70% of Australian mutton in both volume and value is exported as frozen boxed product. Australian mutton is exported to about 70 countries with a variety of cultures and eating habits. There is also a growing market for live sheep exports to the Middle East.

Australian mutton exports 1999 – quantity

source ABARE



Preferred mutton specifications

All major export and domestic abattoirs in NSW were surveyed for their preferred specifications.

Export

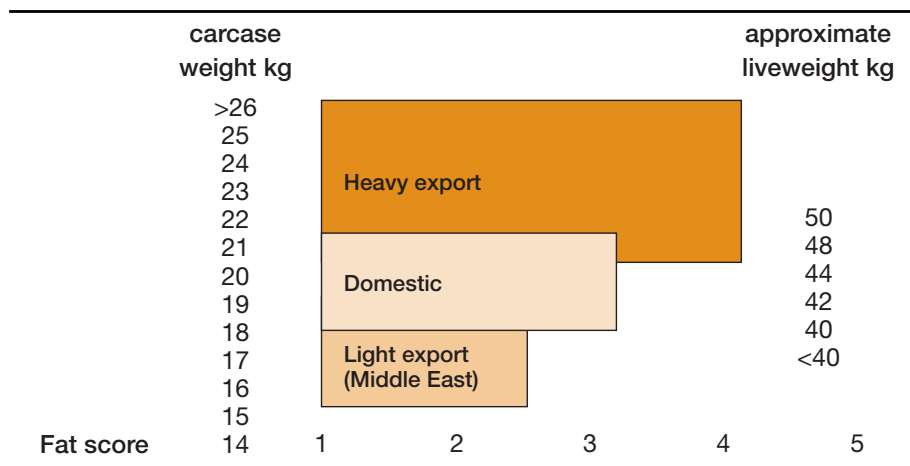
Heavy Export: More than 20kg carcass weight, fat score 1 to 4

- Exporters prefer mutton carcasses to be as heavy as possible. Price is usually 25% higher per kg carcass weight than the domestic market. Occasionally there is a premium for carcasses more than 24kg.
- Heavy carcasses reduce processing costs per kg of mutton, as slaughter costs are incurred on a per head basis.
- Heavier carcasses achieve higher boning ratios at the same fat level.
- Heavier carcasses have more potential for value adding. Light carcasses are usually sold whole while medium weight carcasses are broken '6-ways' into legs, middles and forequarters. Sixway mutton is packed 1–1.5 carcasses per box and exported to many markets including USA, Canada, South Africa and Asia. Heavier carcasses may be boned into high value primal cuts from the leg and loin destined for markets such as the European Union.
- Exporters accept animals out of specification at certain times of the year to maintain abattoir throughput.
- Hoggets are purchased by exporters at mutton price, as hoggets are not differentiated in the export market.

Identify the market specifications you are attempting to target.



Figure 1: Mutton specifications





An export boning room in northern NSW

Light export: 14–16kg carcase weight, fat score 1 or 2

- This is a low value commodity market supplying the Middle East. It is not recommended for producers to target this market, however, it is important to the sheepmeat industry, as it does provide an outlet for lighter weight mutton. Some 80% of this market is supplied as frozen whole carcasses. Throughout the year, demand varies with climatic conditions in the Middle East.

Live sheep

Sheep need to have four permanent teeth or less for the Middle East live sheep trade. Weight specifications vary and depend on seasonal supply. Typically, sheep should be as heavy and as fat as possible. A minimum of 50kg liveweight seems to be preferred for wethers and 40kg liveweight for hoggets. Ram lambs and wether lambs are also required at certain times of the year.

Sheep destined for live export should be healthy and free of disease and must be vaccinated against scabby mouth. The first vaccine is preferably given at lamb marking and the second just before shipping. CLA vaccinated sheep are also preferred. Wool length should not exceed 25mm as longer wool reduces loading.

Most potential exist for sheep producers to improve mutton values by targeting the Heavy Export Market. Sheep producers can do this by ensuring that sale sheep are as heavy as possible.

Domestic

17–21kg, fat score 1 to 3

- Lighter sheep, less suitable to the heavy export trade.
- Used for smallgoods – the use of mutton in this trade is driven by price.
- Heavier carcasses with good conformation are used as table product.
- Well finished hoggets are used in the domestic retail and HRI trade. Hogget price is usually 25% higher per kg carcase weight than mutton of export specification.
- Domestic abattoirs use mutton to top up daily kill numbers to fully utilise labour and capital resources.

The importance of mutton to a sheep enterprise

Merino enterprise gross margin (GM) income is made up from:

- the sale of wool
- surplus sheep – wether weaners and ewe hoggets
- cast for age sheep (CFA)

The proportion of GM income from mutton sales depends on wool price-fibre diameter and the contribution from sale of surplus sheep.

Table 1 shows that the contribution of mutton sales to gross income is significant. However, the major source of income for any Merino enterprise is from wool. The proportion of income from CFA mutton ranges from 6-21% and increases as fibre diameter increases and wool price decreases. Table 1 assumes a mutton sale price of \$1.00/kg, 42% dressing percentage (DP) and an 85% weaning rate. See Appendix 1 for more details on the assumptions used in these GM budgets.

There is potential for higher income by improving the value and weight of mutton. Table 2 shows that price has the largest impact on the value of CFA sheep. The price range of 75c/kg to \$1.25/kg carcass weight represents the low and high extremes in mutton price. If CFA sheep can be marketed 7kg heavier, then value is improved by about \$2-\$4/head.

The physical market influences price at the time of sale. Seasonal price trends indicate greater demand for mutton in autumn and early winter. If these price trends exist in your region, aim to take advantage of this when marketing CFA sheep.

Table 1: The contribution to gross margin of mutton sales for different Merino enterprises

	% income		
	Wool	Surplus sheep	CFA Mutton
19µm ewes	66	28	6
19µm wethers	89	–	11
21µm ewes	53	38	9
21µm wethers	82	–	18
23µm ewes	55	34	11
23µm wethers	79	–	21

Table 2: The value in \$/head of CFA sheep with varying price, liveweight – 42% dressing percentage is assumed

	75c/kg Dressed Weight		\$1.25/kg Dressed Weight	
19µm	42kg	48kg	42kg	48kg
	\$13.23	\$15.12	\$22.05	\$25.20
21µm	45kg	52kg	45kg	52kg
	\$14.18	\$16.38	\$23.63	\$27.30
23µm	48kg	56kg	48kg	56kg
	\$15.12	\$17.64	\$25.20	\$29.40

Note: A 4% increase in liveweight for every 1µm increase in FD occurs in Merinos, based on combined wether trial data. At Fat Score 3, the standard reference weight in 19µm flocks is 48kg, 21µm – 52kg and 23µm – 56kg.



Processing mutton on an inverted slaughter chain

Mutton price is also determined by the ability to meet market specifications.

As a rule of thumb, price improves by 20–25% for mutton carcasses more than 20kg carcass weight. For example, using dressing percentages from Table 3 on page 14:

- 47kg liveweight wether fat score 2
41% DP – 19.3kg carcass @ 90c/kg = \$17.37
- 54kg liveweight wether fat score 3
43% DP – 23.2kg carcass @ \$1.20/kg = \$27.84

Managing liveweight and fat score to meet a higher priced market specification improves the price received per head and enterprise profitability. Improvement in the price per head of sheep sold should be kept in context of the whole enterprise, as mutton price is the smallest contributor to enterprise gross margin returns.

The benefit/cost in obtaining the extra liveweight should be calculated. The cost of supplementary feeding to improve liveweight in the above example (\$7/head) may not be covered by the extra income from the sale of higher value mutton if pasture conditions are poor.

Sheep feeding requirements to improve liveweight will vary according to the quantity and quality of available pasture. Grazfeed® – an easy to use computer program – will help accurately assess the need and cost of supplementation.

With some planning producers of mutton sheep can improve returns by ensuring that mutton specifications are met. This applies to Merino enterprises across all micron categories.

However, as wool price increases with decreased fibre diameter, the increased return from mutton is proportionally less of total gross income.

Breeding to improve mutton production

The potential exists to increase the emphasis of meat traits in a Merino breeding program. Adult sheep will then have more chance of meeting export carcass weight specifications of more than 20kg.

Selection for body weight will result in heavier progeny, as the trait is moderately heritable. The effect of the environment on the higher body weight needs to be considered. For example, some traditional fine wool bloodlines are grown in areas with low pasture production or quality. This may limit higher body weights.

To set a practical breeding objective for a flock, first determine the relative importance of the wool and meat traits that will improve profitability. Wool is normally the major contributor to gross margin income. Therefore, for most Merino breeding objectives, fibre diameter and fleece weight will have considerably more emphasis than meat traits – such as body weight, leanness, muscling, meat colour, tenderness and pH.

As a breeding program increases emphasis on meat production, the reproduction rate will also become more important. Higher reproduction rates generate more animals for sale. To harness this genetic potential for more live lambs, high levels of management are required.

For example, consider the increase in effective stocking rate resulting from the improved reproduction rate. Genetic improvement in reproductive rate will be slow, as it is not as heritable as other traits such as fibre diameter, fleece weight or body weight. Compromises in genetic progress sometimes have to be made when setting and implementing a breeding objective.

The genetic relationships between traits – as well as the trait's heritability – should be considered when establishing the relative balance between traits. The relationships with other traits may be used to advantage. For example, a favourable relationship exists between body weight and reproduction rate.

The heritability of traits and relationships between traits are reflected in estimated breeding values (EBVs). EBVs provide breeders with an assessment of performance, with adjustments for heritability and relationships with other traits.

Adjustments for the performance of relatives and early age effects can also be accounted for in an EBV, thus providing one easy-to-use value for each trait.

The key issue for any sheep breeding program is to establish clearly the value that different traits make to the profit for the enterprise. Once confident of this balance, you can establish this as an index to consistently apply your objective to the animals' EBVs. EBVs and the index a breeder identifies as suitable for the flock can be used to select replacement ewes and rams. Merino Genetic Services (MGS) and Advanced Breeding Services (ABS) are systems that can help breeders accurately select for both meat and wool traits. See Appendix 6.



Merino wethers hoggets, ready for the mutton market

Commercial breeders can attend a breeding and selection workshop run by State Departments of Agriculture. These workshops will help you to establish the relative value of the products your flock is producing – and therefore the balance of emphasis on traits that will maximise your return. During the workshop, each breeder establishes their objective and a selection index.

Ram breeders can use software such as Object to assist them develop a breeding objective based on commercial value of production, or the desired target. Object, and tools such as Total Genetic Resource Management (TGRM), enable a breeder to consider a range of breeding strategies so their objective can be achieved most efficiently.

Both programs remove the very difficult task of accounting for the effects of the value of production, heritability and relationships between traits. A breeder can quickly examine the sensitivity of changing one or more of the components, so that they can be confident in developing an objective for the future – not just the present. Information about these programs is available from State Departments of Agriculture and Meat & Livestock Australia.

Live assessment of sheep for sale

When assessing sheep for sale select those animals closest to the required carcass weight and fat score specifications. More accurate appraisal of the live sheep helps the producer and their agent to target specific markets.

The traditional approach of visually assessing sheep, as a mob runs through the drafting race, often results in drafts of sheep with a wide range in carcass weight and fat scores.

The successful marketing of mutton to specification requires a professional approach. Being a good assessor means being able to accurately estimate the eventual carcass weight, fat score and skin quality. These skills can be improved by experience and regular abattoir feedback. It is essential to use scales to record liveweight and to develop fat scoring skills.

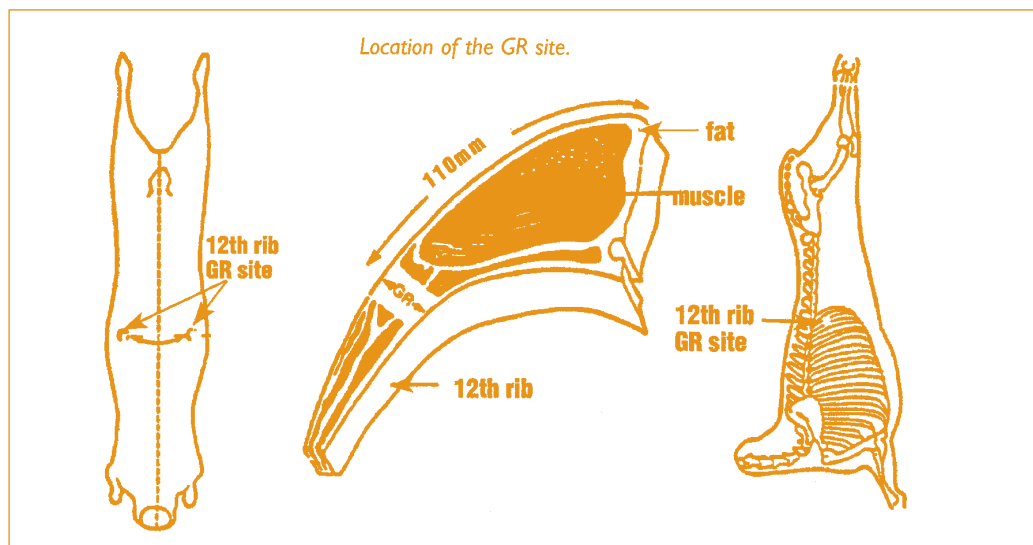
Fat scoring sheep

Fat scoring is a skill that is best learnt by practice and feedback on actual carcass fat levels. It is also of great benefit in managing the flock when feeding and marketing sheep.

Scores are based on actual soft tissue depth at the GR site. The GR site is 110mm from the midline over the 12th rib. The best site to feel when assessing fatness is over the long ribs where the GR site is measured on the carcass. Fat scores vary from fat score 1 (leanest) to fat score 5 (fattest).



Fat scoring over the long rib



Location of the GR Site

Estimating carcass weight

The guide to carcass weight is liveweight adjusted by an estimated dressing percentage (DP). For example:

Carcass weight
= liveweight x dressing percentage
= 50kg x 42%
= 21kg

Liveweight can be accurately and quickly measured using a set of sheep weighing scales. Scales are essential, as most people underestimate live weights by 10–25% when simply guessing.

The dressing percentage of sheep varies from 35–50% with an average of 40–45%.

Important factors affecting dressing percentages

Time off feed before live weighing. Dressing percentage increases by:

- around 1% after four hours off feed
- about 2% after 12 hours
- around 4% after 24 hours off feed

Fatness. Leaner sheep have lower dressing percentages. Dressing percentage falls by an average of around 2% for each decrease in fat score.

Skin weight. This varies according to:

- short woolled and freshly shorn sheep have a higher dressing percentage than woolly sheep
- a 75mm skin, just too wet to shear, holds 0.2–0.5kg of water
- a thoroughly saturated skin, with 50–70mm wool, holds 2kg of water



Ticketed export mutton carcasses with weight and fat information

Sex. Rams dress out about 1.5% lower than ewes at the same fat score. It is difficult to accurately assess ewes in mid to late pregnancy for carcass weight. A ewe carrying twins could be 8–10kg heavier due to the weight of the pregnancy.

Processors prefer non-pregnant animals, so planning is required to avoid marketing pregnant ewes for slaughter. Avoid joining ewes if they are going to be slaughtered prior to lambing. This has the added advantage of allowing ewes to gain maximum bodyweight before marketing, as there are no nutritional demands of pregnancy.

Breed. The breeding of sheep can affect fat cover and dressing percentage. Crossbred sheep tend to have higher dressing percentages than Merinos by about 1.5–3.5%.

Carcass trim and temperature. This varies with:

- Carcasses trimmed to the AUS-MEAT standard trim, or HSCW – remove thick skirts, kidneys, kidney knob, channel, udder and cod fat. These will have a dressing percentage about 1.5–2% lower than if these trimmings were not removed.
- Chilled cold carcass weights are around 3% less than hot weights.

The table below refers to Merino sheep, around 2–3 hours off feed, with an average wool length of about 50mm.

The percentages given are estimated for hot standard carcass weight (HSCW).

Table 3: Fat score and dressing percentage

Fat score	1	2	3	4	5
Dressing %					
Wethers	39	41	43	45	47
Ewes	38	40	42	44	46

Marketing system

Producers have a range of options when it comes to marketing stock. To choose the most appropriate method you need to know the advantages, disadvantages, cost and likely returns associated with each method. See Table 4.

Hints on negotiating a sale with processors

The following are some hints on negotiation of sheep sales. Once you have established a relationship with a processor, feedback is usually available upon request.

Carcase Weight. Mention highest and lowest and proportions of weight ranges – such as “60% over 25kg, 30% in the range 21–25kg, 10% below 21kg”.

Table 4: Description of various marketing methods

	Advantages	Disadvantages
<p>Paddock sales Stock are inspected on the vendor’s property by the buyer and are sold straight out of the paddock. Price is generally negotiated on a dollars per head (\$/hd) basis.</p>	<p>Minimal selling costs. Minimal transport and handling. Buyers know in advance the number and type of stock to be delivered to the abattoir. Limited marketing skills required.</p>	<p>Limited competition and carcass feedback. Inefficient for buyers if small numbers are sold. Potential for difficulties in agreeing on weights unless stock are weighed and fat scored before negotiations. Skin may be undervalued.</p>
<p>Saleyard auction Most sheep are sold through the saleyard auction system on a \$/head basis.</p>	<p>Wide competition and accessibility. All stock types and lots of any size can be sold. Vendors can set a reserve price and can compare quality and price. No marketing skills required. Immediate sale.</p>	<p>Transport cost and saleyard dues must be paid. No negotiation between buyers and vendors. Limited feedback for the vendor, no carcass feedback. Generally vendors have to accept the price on the day because of the level of costs incurred, whether or not sheep are sold. Stress caused by transport and handling may reduce meat quality. Market signals may be distorted.</p>
<p>Over the hooks Stock are delivered direct to the abattoir and may be sold with or without an agent. Change of ownership takes place at the abattoir scales.</p>	<p>Subjective appearance values do not affect the price received. Producers receive clear market and price signals relating to carcass and skin quality and are provided with carcass feedback. Minimal transport and handling (reduces incidence of bruising). Flat rate or grid for price.</p>	<p>Unless AUS-MEAT accredited, variation exists between abattoirs for carcass trim, hot or cold weight and feedback. Must be able to accurately assess stock to avoid grid penalties and deliver what the processor wants.</p>

If you feel uncomfortable about your ability to quote dressing percentages accurately, talk in liveweight terms, 2–3 hours off feed.

Fatness. This is critical in sheep which are delivered across a price grid which contains fat penalties. It is best to give an indication of average fat cover, as well as the percentage which may fall outside the specification.

Breed. Indicate breed, either Crossbred or Merino.

Sex. This characteristic will dictate the base price in the mutton market but may also be valuable to the processor as an indication of possible fat levels.

Payment base. Obtain an agreement in writing after having negotiated the price and also validate this with delivery of the stock (see confirmation of transaction example next page).

Hot weight vs cold weight. Most price grids are based on hot weights, but a few are on cold. If cold weight is nominated then be sure you know what the allowance is for shrinkage – this can vary from 2.5–3.7% in mutton. You need this information to compare prices between processors.

Carcase trim. The carcass weight and dressing percentage can vary depending on the trim the processor employs:

- Standard trim – kidneys and channel fats removed
- Non standard – usually for lamb – where the kidneys, channel fat and diaphragm are left intact

Delivery. If the transaction is over-the-hook, in most cases you will be responsible for delivery to the processor. If sold in the paddock the purchaser will be liable for the transport, in most cases.



Sheep penned for saleyard auction

Numbers. Normally sheep are sold in deck loads of 120–130 head and therefore the exact number is not known until they have been loaded for transport. However, be as accurate as possible when discussing numbers. Do not agree on 400 and then send 300 – this is the quickest way to create problems with stock budgeting at the abattoir.

Delivery date. Agree on a delivery date and kill date and stick to it. If you can not load on a certain date spell the reason out to the buyer.

Payment terms. Most payments are made in 7–28 days. Request a cheque or direct deposit into your bank account. You will need to send a tax invoice with your ABN for payment, or make GST arrangements through your livestock agent.

Small lots. Occasionally it might be feasible to consolidate smaller lots from several owners with similar sheep and negotiate a deal. As with a single owner lot, a confirmation of transaction document should be raised as well as a ‘dispatch summary’ detailing the different brands and numbers from each owner.

Confirmation of transaction. Having completed negotiations it is always a good idea to confirm the details in a written form. An example of one being used currently in the industry is shown.

Fax to:	John Smith Perry’s Abattoir, their town 1234 5678
Fax from:	Bert Green “Green Hills” your town Phone: 1234 5678 ABN 10 9 87 654 321
Dispatch details for:	
transport	8/2/2001
Kill	9/2/2001
Cull ewes all Merino	220 head
Ewes are all on green feed	
Confirmation of details regarding consignment:	
Price	\$0.80 cents/kg (cold weight)
Weights	18–24kg
Penalties	Under 16kg
Payment	One cheque to Bert Green at 14 days
Levy	Accounted for by yourselves and deducted
Contact as above	Bert Green 5/2/2001

Management to improve the value of mutton

Planning

The essence of improving the value of sheep for mutton is one of planning.

This involves:

- identify your target market specifications
- identify sale sheep well in advance of the time of marketing
- establishing their current liveweight and fat score
- set realistic growth rate targets to sale date

Growth rates of adult sheep are unlikely to exceed 100g/day under ideal grazing conditions.

Planning a grazing management strategy is required to provide the sale sheep with sufficient pasture to achieve the desired weight specification. Consideration needs to be given to other issues such as:

- providing the highest quality feed to higher priority stock such as young growing sheep
- avoiding grass seed contamination

There are a number of management practices that optimise the production of mutton from cull ewes. These include the time of weaning, the condition of the ewe at weaning and the length of time for ewe bodyweight recovery before sale.

Weaning lambs later than 14 weeks after the start of lambing gives no advantage to the growth rate of lambs, compared to lambs weaned at 20 weeks. By weaning at 14 weeks, ewes have time to recover body condition before sale. This weight and fat replacement can be achieved on moderate levels of pasture after weaning. Where nutrition is limited during lactation twin rearing ewes can lose up to two fat scores, or around 16kg in body reserves, supplying milk to their lambs.

Identify the ewes to be sold early, preferably before lambing. This allows them time to increase liveweight by allocating them to a slightly better lambing paddock, which can result in ewes being 3kg heavier at weaning. Lambing on a 75% digestible pasture (30–40% clover fertilised), instead of 70% with the same herbage mass, gives an improvement in ewes of: 40gm/day. Over 84 days this equals 3.3kg.

Under adequate pasture conditions, weight and fat loss is likely to be half to one fat score or 5–8kg liveweight in twin rearing ewes. It will be about a half fat score in single rearing ewes. In a dry year, ewes may not reach optimum weight by sale time if weaning is carried out too late.

Identify sale sheep early and set realistic growth rate targets to meet market specifications.



Identify sale ewes early, for this allows time to increase liveweight before marketing

For ewes to recover a weight loss of 8kg or about one fat score, they will require pastures that provide at least 1000kg green dry matter per hectare. The ewes will require an intake of 1.27kg of pasture, on a dry matter basis, per day to achieve a growth rate of 80 grams per day. At this growth rate it will take the ewes 100 days to recover the lost body weight and fat score. In normal seasons paddock feed should be adequate to provide this desired growth rate as long as the 1000kg green dry matter is available. (See Appendix 3.)

As well as assessing the quantity and quality of pasture that ewes are grazing, monitoring the liveweight and fat score of ewes provides information for better informed management decisions. All these examples highlight the same issue. Early identification of sale animals, plus allocation to better pastures, will result in carcass targets being achieved more regularly and on time. You can improve the mutton value of animals substantially if you start factoring in seasonal variation in prices plus some management changes, such as shearing sale animals earlier.

Grass seed contamination

Contamination of carcasses by grass seed is a serious industry problem. Grass seeds pierce the skin and can lodge in the muscle. Mutton products contaminated by grass seed are unsaleable on the export market, which results in heavy trimming of carcasses at the abattoir.

Grass seed is such a serious problem at certain times of the year that processors will avoid purchasing sheep from districts with heavy infestations of grass seed. Price discounts are likely.



Trimming for grass seed and disease can significantly reduce producer returns. The carcass at left has been trimmed for grass seed, while the one at right is having a cheesy gland removed

Where possible, sheep identified for sale should not be grazed in paddocks with grass seed. However if this is not possible the following management strategies will help to reduce the problems caused by grass seed:

- increase grazing pressure before seed set to reduce the quantity of seed produced
- spell cleaner paddocks ready for grazing during seed fall
- consider pasture topping or slashing
- shearing before seed set reduces seed pick up
- do not allow grass to set seed in high traffic areas around yards and troughs

Cheesy gland

Cheesy gland – *Caseous lymphadenitis* (CLA) – is a bacterial disease of sheep that is responsible for the majority of sheep carcass condemnations in Australian abattoirs. The disease causes abscesses containing a ‘cheesy’ fluid in the lymph nodes, lungs and other internal organs.

The average prevalence of CLA appears to have decreased in Australian sheep carcasses in the past 20 years, however it can be an important source of loss to the processor and producer.

Less than 1% of carcasses are condemned for CLA. However, CLA lesions are now trimmed from the carcass to pass animal health inspection regulations. Substantial trimming and loss is incurred in a mob with high levels of CLA infection – for example, up to 50% of sheep.

Trimming occurs before the scales, so producers marketing sheep direct to the works are not paid for any trim. Processors also keep note of producers supplying lines of sheep with CLA and grass seed contamination. Some buyers factor in a price reduction of up to a 15% to sheep from unknown and unreliable sources to cover possible CLA losses.

The main recommendations to control CLA is to adopt an effective vaccination program using 6-in-1 vaccine. (Appendix 5.)

When does it pay to shear sheep sold for slaughter?

Many factors influence the value of sheepskins. These include wool length, breed, grass seed damage, burr contamination, flystrike, lice damage, over crutching and excessive use of branding fluid and spray markers.

The majority of Merino skins are not processed into wool on skins. This is due mainly to the poor quality of skins from older animals.

When sheep are being sold at times other than around normal shearing time, the decision must be made to either shear before sale or sell them in the wool. If sheep are shorn before sale then the grower will be paid on the sale of the wool – but bare shorn pelts are worth very little.

Premature shearing yields less wool per sheep and lower value wool with short staple length. The value of sheep skins increase as wool length increases, so there is a point at which premature shearing becomes uneconomic compared to selling sheep in the wool.

Study market reports for skins and wool prices to establish the price for short staple wool.

The most appropriate shearing strategy can be decided using information from your past wool records and using current wool prices. A detailed example is in Appendix 4.



As a rule of thumb, it is unlikely that you will recover the cost of shearing wool less than 50mm in length

Quality assurance procedure to improve carcass and skin value

Procedure

Vaccination. Vaccinate near the edge of the pelt (behind the ear for example) so a possible blemish can be easily trimmed from the pelt or the carcass. Do not vaccinate along the back, shoulder or inside the hind leg, as these are high value parts of the carcass/skin.

Cheesy gland. A comprehensive CLA (cheesy gland) vaccination program across all age groups will ensure carcass trimming losses are minimal due to CLA.

External parasites. Control lice, flystrike, fleece rot and dermatitis to maximise skin value.

Drenches, dips and antibiotics. Observe the correct withholding period for any treatments used.

Other parasites. Regular worming of dogs for Hydatids will also help control other parasites such as *Cyberurium Ovis* (sheep measles). Do not allow dogs access to raw meats and offal from sheep.

Burrs and grass seed. If possible graze sheep in paddocks free of burrs and grass seed. Consider spray topping to escape the grass seed set period if practical.

Pregnant ewes. Pregnant ewes will have lower dressing percentages and lighter carcass weights as nutrients are partitioned off to foetal growth rather than liveweight gain. Pregnant ewes are more likely to suffer from stress during transport and holding prior to slaughter, adversely affecting meat quality.

Control point

Records of dates and mobs treated should be kept and supplied to the processor, if required.

Keep record of sheep treated, treatment dates and application rates. Supply record to processor if required.

Keep a record of dog parasite treatments. Remove dead sheep.

Ensure ewes and rams are separated before marketing sheep.

Procedure

Crutching. Ensure that sheep destined for market are free of faeces and stain. Do not overcrutch as this reduces skin value. Bung hole crutch only. This includes a blow inside the back legs but not a full crutch over the tail. Crutch/dag at least four days before consignment to avoid stress. Do not send sheep with unhealed or infected wounds.

Shearing. Calculate expected wool values (and wool cut with possible length discounts) and subtract shearing costs to decide if shearing before consignment is more profitable.

Spray markers. Spray markers and raddles used to identify sheep for sale are best applied on the wig or nose of sheep, not in the middle of the back. Skin processors use lower temperatures than wool scours, so traces of the mark remain in the processed skin.

Assessment for sale. Weigh and fat score all sheep. Identify and draft those sheep that meet target specifications. Weigh 2–3 hours off feed and use estimated dressing percentage to calculate dressed weight.

Loading. Move sheep quietly to avoid stress and move slowly in hot weather. Avoid bruising by muzzling dogs and do not pull sheep by the wool. Do not use electric prodders. Observe recommended trucking density.

Curfew times. Keep sheep off feed and water for at least 12 hours before trucking to minimise faecal staining in transit. If coming off very lush feed, consider feeding good quality hay for two days before loading.

Control point

Record dates of crutching.

Summary

1. Identify the market specifications you are attempting to target.
2. Discuss with the processor their preferred buying methods.
3. Most profit making potential exists by targeting the export market by ensuring sale sheep are as heavy as possible.
4. A 20–25% improvement in price can be gained by targeting export specifications.
5. Set realistic mutton growth targets to meet these specifications.
6. Identify potential sale sheep well in advance of marketing to allow sufficient time to increase body weight.
7. Weigh and fat score all mutton sheep before sale.
8. Choose the most appropriate marketing method that suits your location.
9. Minimise grass seed contamination through planning and grazing management.
10. Consider an appropriate shearing strategy to maximise wool and skin value.
11. Adopt an effective cheesy gland vaccination program.
12. Quality assurance practices should be adhered to at all times.
13. Returns from CFA sheep contribute around 5–10% of total enterprise income.
14. Wool income, the number of surplus animals marketed and mutton value are the three main drivers of GM income.

Appendix 1 Example Gross Margin Budget

Flock size:1000 Merino ewes 21µm

Income					Budget \$	Your Budget \$
Wool						
	no.	class	kg /hd	\$/kg		
Shear	960	ewes	5.10	\$3.29	\$16,107.84	
	20	rams	6.00	\$3.29	\$394.80	
	408	ewe hoggets	3.80	\$4.46	\$6,914.78	
Crutch	1388	adults	0.40	\$1.95	\$1,081.30	
Sheep sales						
	no.	class	\$/hd			
	177	CFA ewes	\$12.01		\$2,125.77	
	4	CFA rams	\$12.93		\$51.72	
	425	weth weaners	\$25.00		\$10,625.00	
	191	ewe hoggets	\$35.00		\$6,685.00	
Fodder						
		tonnes	type value per tonne			
Hay		0	lucerne hay @ \$0.00		\$0.00	
Fodder crop grain		30	oats @ \$90.00		\$2,700.00	
A. Total income:					\$46,686.22	
Variable costs					Budget \$	Your Budget \$
Sheep health						
	no.	class	cost(\$)		repeats	
Drenching following DrenchPlan						
Broadspectrum	1388	adults/hoggets	\$0.20	2	\$555.20	
	900	lambs	\$0.12	4	\$432.00	
Dipping	1388	adults/hoggets	\$0.38	1	\$527.44	
Jetting	1388	adults/hoggets	\$0.21	1	\$291.48	
	425	ewe weaners	\$0.10	1	\$42.50	
Vaccinate – 6 in 1	1388	adults/hoggets	\$0.33	1	\$458.04	
	900	lambs	\$0.33	2	\$594.00	
Mules + mark	900	lambs	\$0.87	1	\$783.00	
Scanning	960	ewes	\$0.75	1	\$720.00	
Wool selling costs						
Shearing	1368	ewes/hoggets	\$3.15	1	\$4,304.41	
	20	rams	\$4.65	1	\$92.93	
Crutching	1368	ewes/hoggets	\$0.50	1	\$685.37	
	20	rams	\$1.50	1	\$30.00	
Wool tax			2.00%		\$489.97	
Commission, warehouse, testing charges			5.26%		\$1,288.37	

Wool – cartage	40	bales	\$9.41	\$376.40	<input type="text"/>
– packs	40	packs	\$7.00	\$280.00	<input type="text"/>

Livestock selling costs

Livestock					
cartage	797	sale sheep	\$1.50	\$1,195.50	<input type="text"/>
Commission on sheep sales			4.50%	\$876.94	<input type="text"/>

Fodder

Supplementary feed – 2 kgs of oats/hd/week over 3 weeks @ \$120/tonne					
	960	ewes	\$0.14	3	\$414.72
Grazing crops	20	hectares	@ \$180.00 per ha	\$3,600.00	<input type="text"/>
Agistment	0	hectares	@ \$0.00 per ha	\$0.00	<input type="text"/>
Pasture					
maintenance	525	hectares	@ \$30.00 per ha	\$15,750.00	<input type="text"/>

B. Total variable costs				\$33,788.27	<input type="text"/>
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REPLACEMENTS:	4	rams	\$750.00	\$3,000.00	<input type="text"/>
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C. Total replacements:				\$3,000.00	<input type="text"/>
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	excl. pasture costs	incl. pasture costs	
GROSS MARGIN (A-B-C)	\$26,547.95	\$9,897.95	<input type="text"/>
GROSS MARGIN/EWE	\$26.55	\$9.90	<input type="text"/>
GROSS MARGIN/DSE	\$12.64	\$4.71	<input type="text"/>
GROSS MARGIN/HA	\$50.57	\$18.85	<input type="text"/>

Limitations of gross margins

This gross margin analysis considers only Merino enterprises, as they provide most of the sheep slaughtered for mutton in Australia. These figures are to be used as a guide only. The GM budget has provision for you to calculate your own budget.

Gross margin analysis does not show the affect of the significant profit driver of stocking rate, which is necessary for a whole farm analysis, and stocking rate varies throughout the year depending on lambing time.

Caution should also be used with DSEs (dry sheep equivalents) as a basis for planning. The difficulties arise due to the seasonal nature of pasture availability and flock energy requirements. A late winter/spring lambing will generally match feed requirements to weaning with reliable pasture availability better than autumn lambing.

Lambing time options, the effect of stocking rate and the variability of GM across different years can all be examined in more detail using models such as Grassgro®. Grassgro is a computer based model developed by CSIRO, which predicts pasture growth/availability and subsequent animal performance. It can be accessed through Departments of Agriculture, CSIRO and other agricultural advisors.

Gross margin assumptions

Body weight for the different micron classes (19, 21 and 23) has been obtained from Wether Trial data supplied by Alan Casey and Steve Semple of NSW Agriculture. The data shows the average body weight of wethers decreases by about 4% for every 1µm decrease in fibre diameter.

1. 19µm = 48kg (range ± 2.4kg)
2. 20µm = 50kg
3. 21µm = 52kg (calculations based on 21.3µm weighing 52kg and rounded to nearest kg ±3.9kg)
4. 22µm = 54kg
5. 23µm = 56kg (range ± 5.6kg)

It was assumed that the body weight of CFA ewes is the same as for the wethers. DSE value was adjusted slightly to reflect the above weight differences for the three microns classes.

The sale value of the wether weaners and ewe hoggets for 19µm and 21µm flocks has been calculated assuming they will be sold as replacements – wethers at \$25 and ewes at \$35.

The sale value of the wether weaners and ewe hoggets for the 23µm flocks has been calculated assuming they will be sold for meat – wethers and ewes the same value – \$21.

When calculating the 19µm and 21µm wether gross margins the purchase price of replacement (\$25) is the same as the sale price of the wether weaners in the ewe enterprise.

Clean fleece prices are an average of the sales throughout the 1999–2000 season at Sydney. The clean fleece is multiplied by 90% to calculate an average clip price, which includes skirtings, bellies and locks (at right).

The fibre diameter of the hoggets wool for each of the three micron categories was a micron finer than the adults.

Wool tax was at 2%.

Micron category	Fleece price (\$/kg clean)	Clip price (\$/kg clean)
18	14.18	12.76
19	11.29	10.16
20	7.51	6.76
21	5.54	4.99
22	4.72	4.25
23	4.32	3.89



The cost of transport is a significant factor in calculating the Gross Margin on the sale of sheep for mutton.

If the transaction is over-the-hook, in most cases you will be responsible for delivery to the processor. If sold in the paddock the purchaser will be liable for transport, in most cases.

A reliable operator is also important in ensuring livestock arrive at the works or yards in the best possible condition.

Appendix 2

Dressing percentage calculation

A. Weight of live sheep _____ **kg**

1. **Fat score**
apply the percentage from
table below _____ %
2. Adjust for **breed** _____ %
3. Adjust for **sex** _____ %
4. Adjust for **skin length** _____ %
5. Adjust for **time off feed** _____ %
6. Adjust for **season** _____ %
7. Adjust for **non-standard carcass** _____ %

B. Dressing percentage _____ %

A. Liveweight X B. Dressing percentage = carcass weight

_____ X _____ % = _____ **kg carcass weight**

Fat score and dressing percentage*

Fat score	1	2	3	4	5
Dressing %					
Wethers	39	41	43	45	47
Ewes	38	40	42	44	46

* same as Table 3, page 11

Appendix 3

Does it pay to feed for increased weight?

You should carefully consider what feed you allocate to the different classes of stock. Weaned lambs and hoggets will grow more quickly than older sheep and will probably provide more income. Small changes in pasture mass and digestibility can have significant impact on carcass weights. For example, in Southern Australia for three months wethers were on:

- 700kg DM/ha green at 73% digestibility (fertilised country) instead of
- 600kg DM/ha green at 68% digestibility (unfertilised)

This results in an extra 4kg liveweight. The 4kg would also increase fat score by a half score, giving an improvement of 1% in dressing percentage. That is:

- 50kg, fat score 2, dressing 41% equals 20.5kg carcass
- vs
- 54kg, fat score 2.5, dressing 42% equals 22.6kg carcass.

The same logic applies to ewes during lambing.

Before lambing identify the ewes to be sold. Allocating the ewes to a slightly better lambing paddock can result in them being 3kg heavier at weaning. Lambing on a 75% digestible pasture (30–40% clover fertilised), instead of 70% with the same herbage mass, gives an improvement in ewes of 40g per day. Multiplied by 84 days of lactation, this gives an advantage of 3.3kg, along with the improvement in dressing percentage.

Supplementary feeding can be considered where pasture quality and quantity is limiting weight gain, however it is usually uneconomic to do so. Grazfeed®, a simple CSIRO computer model, will help accurately assess the cost of supplementation.

All these examples highlight the same issue, early identification of sale animals, plus allocation to better pastures, will result in growth rate targets being met more regularly and on time. If factors such as seasonal variation in prices and some management changes, like shearing sale animals earlier, you can improve the mutton value of animals substantially.

Appendix 4 To shear or not to shear...that is the question

The recommendation has been made not to shear CFA mutton sheep unless they have 50mm of wool length.

There may be other circumstances that would influence the decision to shear. To do this you will need information on your own sheep from past years and the current wool prices.

The table below was calculated for an example medium wool flock. It allows you to calculate the expected dollar return from wool if sheep are shorn, and compare this with the price likely to be received if they are sold in the wool, or 'over the hooks' plus skin value.

Note: While the table below is worked for a range of staple lengths, all you need to work with is the staple length of the culls you are interested in. All figures are GST exclusive.

Our conclusion for this producer, whose culls have 50mm of wool, is that the net return from shearing would be \$5.41/head. If current wool-on skin prices offered at the abattoir are less than this, then shearing is a better financial option for the producer.

Table A: Medium wool flock – example

Staple length (mm)	Clean fleece weight kg	Ave wool price (\$/kg clean)	Gross value (\$/hd)	Shearing cost (\$/hd)	Service charges (\$/hd)	NET VALUE \$/head
10	0.35	4.38	1.53	3.00	0.13	-1.60
25	0.87	4.38	3.81	3.00	0.33	0.48
50	1.73	5.24	9.07	3.00	0.66	5.41
75	2.59	5.40	13.98	3.00	0.99	9.99
100	3.46	5.50	19.03	3.00	1.32	14.71

Calculating the net return from shearing vs selling the wool

Step 1 From last year's records obtain:

- A** Mean fibre diameter of fleece lines _____ micron (μm)
- B** Mean staple length of fleece _____ centimetres (cm)
- C** Total weight of clip sold x yield %
(eg 1500kg x 68%) _____ kg clean wool
- D** Number of sheep shorn to provide that clip _____ No. sheep

Step 2 Calculate the average weight of wool cut per head

$$E = \frac{C \text{ total wool weigh} +}{D \text{ total number of sheep shorn}} = \text{_____ kg clean}$$

Step 3 Calculate what weight a cm of wool contributes to fleece weight.

$$F = \frac{E \text{ wool cut per head}}{B \text{ staple length}} = \text{_____ grams}$$

Applying the calculation to your culls:

Step 4 Measure staple length on CFA sheep.

$$G = \text{_____ cm}$$

NB. At shearing, 5mm of wool will remain on the sheep

Step 5 Calculate the weight of wool per cull

Multiply the weight of one cm of wool (**F**) by the measured length (**G**)

$$H = F \times G = \text{_____ kg wool/cull}$$

Step 6 Determine the wool type using (**A**) micron and (**B**) staple length,

(you can obtain the AWEX ID from your wool broker)

Step 7 Obtain a fleece price quoted on this type from recent sales

$$I = \text{_____ c/kg clean}$$

Step 8 Multiply fleece price I by 0.87 (the average value of all wool from a Merino sheep is 85% to 90% of fleece value)

$$J = I \times 0.87 = \text{_____ c/kg clean}$$

Step 9 Calculate the gross value of wool on the culls

$$K = H \times J = \text{_____ c/kg clean}$$

Calculating the costs incurred in shearing, testing and sale of wool

Step 10 Use known shearing costs of \$3/head, plus service charges of 15c/kg, plus cartage for wool to find = **L**

Step 11 Calculate net return (gross value of wool less costs incurred)

$$K - L = \$\text{_____ net return/kg}$$

Step 12 If this figure is greater than the expected abattoir price for the skin, then the sheep should be shorn. If not, selling sheep in the wool is likely to yield higher returns.

NB. Payment of wool tax has not been included in the costs for this example.

If no information from previous year's records on fibre diameter and fleece weight is available then the following table provides a prediction of clean fleece weight for different sheep types.

Table B: Predicts clean fleece weight (kg) from Merino sheep (based on fineness of wool, staple length and weight of animal) and for crossbred lambs

Wool type	Body weight		Staple length			
	kg	cm	cm	cm	cm	cm
		1.0	2.5	5.0	7.5	10.0
Merino fine wool	30	0.17	0.43	0.85	1.28	1.71
	45	0.22	0.55	1.09	1.64	2.18
	60	0.28	0.70	1.40	2.08	2.78
Merino medium wool	30	0.21	0.53	1.06	1.59	2.12
	45	0.27	0.68	1.3	2.04	2.72
	60	0.35	0.87	1.73	2.59	3.46
Merino strong wool	30	0.24	0.59	1.19	1.78	2.37
	45	0.30	0.76	1.52	2.27	3.03
	60	0.39	0.97	1.93	2.89	3.86

Second Cross Lambs** 1cm of staple equals 286g of clean wool

Source. R Hegarty, NSW Agriculture

Caution:

- * While a systematic approach was used in deriving the estimates presented in the final table, substantial assumptions have been made regarding the average number of fibres per cm² of skin. This number varies enormously between individual sheep within a flock and between flocks of similar fibre diameter. The values presented in Table A are mean values from literature and best estimates in the absence of published data. Validation between predicted and measured fleece weights suggest the predicted values will underestimate the weight of wool recovered from stock of any given wool type, weight and staple length. Bias in this direction will favour fellmongers and will lead to recovery of more wool than predicted.
- ** There is insufficient data to generate a full description for Crossbred sheep as done for Merino fleeces. A simple relationship of wool weight to staple length derived from second cross ([Border Leicester x Merino] x Poll Dorset) wether lambs of 40–60kg liveweight is presented in Table B.

Appendix 5 Cheesy gland (CLA)

How CLA spreads

Shearing. The majority of infection occurs through shearing cuts. Holding sheep under cover for more than an hour following shearing almost doubles the risk of CLA infection. This is thought to be due to:

- Crowding increases the proximity of uninfected sheep and infected sheep that often have open CLA wounds following shearing.
- Sheep with lung lesions cough onto the shearing cuts of nearby sheep.
- Protection from wind and sunlight prolongs the survival of CLA bacteria and slows the drying and sealing of shearing cuts.

Dipping. Dip wash becomes contaminated by abscesses damaged at shearing and bacteria are spread to open shearing cuts on uninfected sheep.

Recommendation to avoid CLA

Management strategies. Implement management strategies to decrease the spread of the disease. For example:

- Let sheep out of count-out pens and yards as quickly as possible after shearing.
- Disinfecting shearers combs and cutters on completion of shearing a sheep that has had a CLA lesion ruptured should help to reduce the spread to other uninfected sheep in the mob.
- If possible, avoid dipping off-shears till shearing cuts have healed – usually 2–3 weeks. Plunge or shower dipping should be done before six weeks of wool regrowth to increase the chance of lice eradication through thorough wetting and minimising the risk of chemical residues in wool.



More profit is lost as a carcass is trimmed for cheesy gland

A CLA vaccination program

A 6-in-1 vaccination program incorporating a CLA vaccination substantially reduces levels of infection in thoroughly vaccinated flocks.

- Lambs should be vaccinated twice about 4–6 weeks apart, preferably at marking followed by a booster at weaning. This provides immunity prior to the first shearing.
- Adult boosters should be designed to give maximum protection at shearing so should be given every year as close as possible to shearing, but not at shearing.

This adult vaccination should be given at a time when it is practical to provide good protection:

- for clostridial diseases covered by 5-in-1, eg pre-lambing
- for CLA spread at shearing. More than six months between CLA vaccination and shearing will lower the chance of a successful CLA vaccination program

If most of the risk factors for spread of CLA cannot be avoided at shearing/dipping then a vaccination program is likely to pay off economically by:

- improving abattoir access and price when selling direct to the abattoir
- recovering the loss of up to 0.25kg clean wool per sheep that field trials have shown are the result of CLA infection

Appendix 6 Further breeding advice

Merino Genetic Services

Selection for genetic traits is now made easier for the Merino producer, with a dual focus on wool and meat production, with the new genetic information system Merino Genetic Services (MGS). MGS provides the breeder and the commercial producer with the opportunity to select for animals that meet the individual breeding requirements of their production system. The system provides estimated breeding values (EBVs) on growth, muscling, fat, wool quantity, quality and reproductive traits. For the Merino producer, this increased ability to select for dual purpose animals will allow greater returns from both wool and meat sales.

Apart from the individual EBVs that are provided to the producer, MGS has also created a number of indexes with Merino meat production in mind.

Depending on the individual needs of the producer, customised indexes can be designed to ensure that those animals, with the best genetics for a specific production system, can be found. Membership of MGS also allows the producer to become involved in other breeding management systems such as Total Genetic Resource Management (TGRM). This program helps a breeder design breeding and joining projects to best utilise the genetics within their flock, and effectively source outside genetics that will have the most impact.

MGS is a service operated through the office of LAMBPLAN, through Meat & Livestock Australia (MLA).

For further information phone LAMBPLAN on (02) 6773 2948 or fax (02) 6773 2707 or www.lambplan.com.au

Advanced Breeding Services

Advanced Breeding Services (ABS) is a NSW Agriculture unit based at Orange that provides technical consultancy support to Merino breeders, in particular Merino ram breeders. ABS provides an integrated service assisting the breeder to meet their personal objectives. A range of options are catered for, from the development of mating allocation systems, through to design and summary of sire evaluation. The service focuses on the particular requirements of the breeders and the breeders clients.

ABS can assist ram breeders to work through alternatives to optimise progress in sheep quality and their market acceptance. Achievable gains can be predicted and progress monitored with 'year by year' genetic progress reports.

Data processing which is outside the range of on-farm or fleece measurement systems is a speciality service. Processing includes pedigree records (full or sire), sire evaluation, combining groups/year/site and additional traits. Fibre diameter variation and visually assessed traits can be accounted for to ensure all traits in the objective are considered. ABS works cooperatively with fleece measurement labs, professional sheep classers and performance recording suppliers to service breeders requirements. Phone 02 6391 3812

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