Australian Wool Education Trust

CASE STUDY 3 : GOING FINER – GROWER INITIATIVES TOWARD FINER WOOL PRODUCTION[1]

Synopsis

This case study examines a wool producer's integrated management approach toward the production of finer wool. Alistair Lade runs 11,000 Merinos on the Glenrannoch property which is situated on Strathbogie Ranges (Central Victoria). He employs goal setting, on-farm fibre testing, breeding and culling programs, and other farm management changes, all designed to achieve significant improvements in wool productivity and profitability.

Central to this case study is Alistair's use of sheep coats as part of his broader sheep management program. Coating or rugging sheep is not a mainstream practice in Australia yet it still attracts significant attention within sectors of the wool industry. Sheep coats have been applied to Australian sheep for many years, the earliest coats being fashioned from hessian, fertilizer or feed sacks. Contemporary coats come in a wide range of designs generally using synthetic UV-stable materials imported from overseas.

Discussion on the coats is timely given Australia Wool Innovation's (AWI)(2004) scoping study into Australian sheep coating practices as a part of AWI's broader assessment of its Research and Development strategic directions. Sheep coats are used in Australia for both paddock-run and shedded sheep for reasons relating to wool quality and cleanliness, animal health and animal welfare.

AWI (2004) described the grower approaches as either strategic or tactical.
Strategy 1 – constant use for shedded sheep.
Strategy 2 – coating newly shorn sheep.
Strategy 3 – coating sheep with approximately 2 months wool growth.
Tactical use – coating for incidence of high dust / vegetable matter.

Research shows that the producers of fine / superfine wool tend to benefit the most from coating sheep in the sense that the quality improvements in fine wool translate to higher prices /kg for the wool which offsets the significant annual costs and effort associated with the sheep coats. The medium wools tend not to achieve the same price premiums. Hatcher, Atkins and Thornberry (2003) questioned the viability of coating the medium-wool sheep, even with significant price improvements.

The case study focuses on Alistair's tactical uses for the coats. Younger sheep are coated straight off-shears to minimize the risk of death due to severe weather conditions Protecting the wool also minimizes the discounts applied at sale to wool contaminated by dust and vegetable matter. In the longer term, the aim is add extra value to the "Glenrannoch" wool clip and develop the "Glenrannoch" brand further in its own right.

[1] Author of The Glenranoch Story is Alistair Lade (Glenrannoch). Synposis, discussion and editing by Peter McSweeney (The University of Melbourne). Case commentary written by Dr Bob Richardson.

Student Learning Objectives

As a result of analyzing the case study, you will gain an understanding of:

- an example of the innovations available to growers for fine-wool production.
- the importance of having an integrated animal management strategy.
- the benefits and costs woolgrowers consider in decisions to adopt initiatives such as sheep coats.

The "Glenrannoch" Story

As told by Alistair Lade

Enterprise Background

The "Glenrannoch" farming enterprise consists of the original family property farmed for four generations plus adjoining land. The farm is situated on the southern end of the Strathbogie Ranges in Central Victoria (30km East of Seymour and 22km North of Yea). At an altitude of 600m above sea level, the property enjoys annual rainfall of 850mm, with temperatures ranging from –5 C to 40 C.

A total area of 994 ha is currently farmed (437ha owned, 557ha leased) with a grazing area of 850ha. 75% of the grazing area is sown down to mainly Porto Cocksfoot and Sub Clovers. Stock consists of 11,000 fine wool merino sheep (September / October lambing) and 300 beef cattle (August / September calving). The enterprise capacity consists of about 14,500 dse requiring 1.75 labour units. This is based on 17 dse grazed per ha producing 55kg wool / sheep grazed ha.

Goals And Performance

Since 2000 Glenrannoch has been focusing on two related goals. We decided (i) to expand the Merino flock at the expense of beef production and (ii) to improve the quality of our fine wool. As a result, cattle have been scaled back from 35% of the total business to between 10 and 15%. This decision has largely been driven by sheep outperforming beef over the longer term. The cattle enterprise had only been more profitable than sheep once in the last 20 years, despite some years of low wool prices. Rather than diversify, we decided to specialize.

The move to finer wool has also been taken one step further. With the introduction of On Farm Fibre Testing technology there were a lot of farms going to fine up. Our aim was to make sure we went considerably finer so we didn't get caught up with the average. We wanted to keep producing a premium wool; the premium being critical to business profitability. The goal was to value – add on the farm by dropping the average micron by two as quickly as possible, while only losing a little in fleece weight and at the same time increasing the lambing percentage.

Table 1 : Flock Performance And Goals

FLOCK PERFORMANCE	1970's	late 1980's	1995	2000	AIMS set in 2000	2004	AIMS set in 2005
WOOL TYPE	SPINNERS	BEST TOP MAKING	BEST TOP MAKING	BEST T M SPINNERS	SPINNERS	SPINNERS BEST T M	SPINNERS
Adult Micron	18	20	19	18.5	16.5	16.8	15
Adult Fleece Weight (kg)	3	4.8	4.5	4.6	4	4	4
Adult Body Weight (kg)	40	60	52	55	55	50	55
Lambs Born / Ewes Mated	65%	100%	89%	90%	100%	85%	100%
DSE / Ha	8	12	18	17	20	16.5	18
Kg Wool / Sheep Grazed Ha	20	41	53	65	70	55	60
$ / Greasy kg	$5	$4	$10	13	$15	10	$20
$ Gross / Ha	$100	$164	$530	$845	$1050	$550	$1200

6 years down the track, we still have work to do on lamb survival, yet the fleece results have come out well. The flock's average fibre diameter has dropped by two and a half microns during the past five years to around 16 microns (Table 1). Also over the last 15 years, we have doubled stocking rates and nearly trebled wool per hectare.

The risk, however, in aiming for the ultra fine market is that "the finer you go, the heavier the discount" if you stuff it up." As the staple strength of the ultra fine wool gets below 40 newtons/ktex then the discounts applied by the wool buyers increases. If the staple strength gets below 28 newtons/ktex then the price offered by the buyers is often similar to that of the broader wools. The percentage of mid-breaks must be kept as low as possible. These characteristics are very important for the speed at which the ultra fine wool can be spun without breaking.

In developing a fine wool strategy, coating the sheep was adopted as a method of maximizing the value of the ultra fine wool that was cheaper than putting them in sheds. 5000 of the 11,000 flock are coated. In our view, coating the sheep and running them on improved pastures costs less than a tenth of the cost of putting them in sheds.

Although nutritional changes and parasites can adversely affect paddock produced wools (particularly staple strength), and are more easily controlled in sheds, they were also manageable out in the paddocks.

Management Changes And Micron Testing

Changing from autumn to spring lambing allowed us to increase our stocking rates. We carry pregnant ewes and dry wethers and hoggets through winter. In Spring when there is plenty of feed available, there are plenty of mouths to eat it.

We also changed most of the shearing from September to February/March. Shearing at this time has increased tensile strength and decreased mid breaks in the wool. This change moved away from shearing in the wettest and coldest time of the year. However, this change has lead to more dust penetration in the fleeces and a loss of a style grade from Spinners to Best Top Makers despite the wool tests not changing very much.

The lambs are born in September/October. They are first shorn in early September with 11 months wool. They are next shorn in the following June with 9 months wool. Their third shearing is then in March with 9 months wool. The sheep are all coated after the September and June shearings. The young sheep are therefore shorn three times in their first 2.5 years. After this they are shorn every March with 12 months wool and they are not coated unless a severe cold snap is forecast.

Micron testing is not a new idea on Glenrannoch. Rams and replacement sheep have been micron tested for almost 50 years. Individual traits such as fibre diameter, clean fleece weight, coefficient of variation of fibre diameter and body weight are measured. Using pedigree information the genetic merit of these traits is calculated for individual sheep. The genetic merits of each trait is combined in a weighted index. At Glenrannoch we use a 30% micron premium + ss index. Using this index we would expect to reduce our average micron by two, hold staple strength and have a small reduction in fleece weight over a 10 year period.

Table 2 : Optical-Based Fibre Diametre Analyser (OFDA) Results 2005

OFDA AUG 2005		10	11	12	13		14	15		16	17	18 +	
MOB		PURPLE	ORANGE	WHITE	BLUE		LEMON	GREEN		PINK	BLACK	BROWN	*mob average*
GR Rams	*56*		1	24	21		9	1					*13.2*
GR E & W (incl Flk)	*224*			8	75		87	37		13	4		*14.4*
GT Flk E & W	*319*			5	50		143	92		25	3	1	*14.8*
GR & GE Mxd	*9*				1		3	4		1			*14.9*
GE Rams	*44*			9	21		14						*13.6*
GE RBN E	*151*			6	42		53	38		8	2	2	*14.6*
GE Flk Ewes	*752*			3	61		274	309		89	16		*15.1*
GE Flk Wethers	*741*		1	8	131		306	231		53	11		*14.7*
	2296		**2**	**63**	**402**		**889**	**712**		**189**	**36**	**3**	
						467			*1601*				*228*

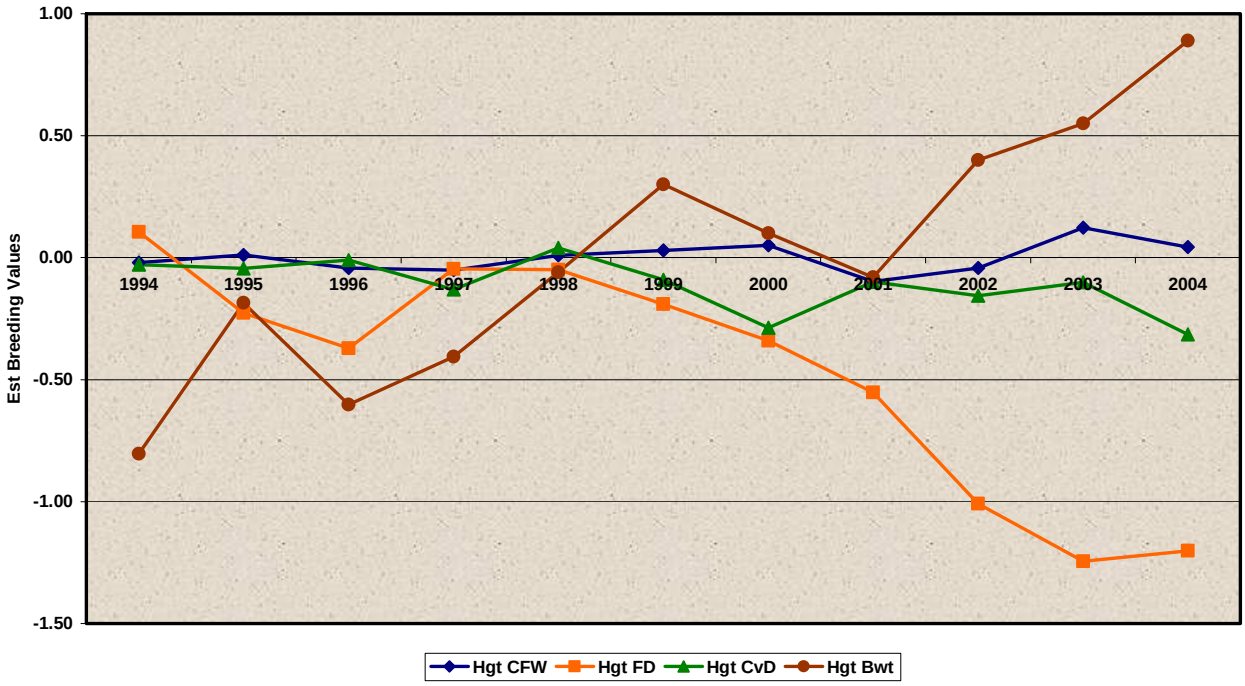
In 2000, every sheep on the farm was tested for micron diameter and fleece weight and then ranked on their fleece value based on these two measures. With the fleece values ranging from $15 to $150 and considering each sheep cost the same to run, it was not hard to work out which sheep to cull. Now, annually we test all the hoggets with 11 months wool, plus all of their sires. We then cull the broadest 15%.

Through this process, the micron range in the flock has been reduced from 14 through to 26 microns, to 11.2 through to 18 microns (Table 2).

Breeding Program

The breeding program consists of artificial insemination (AI) as well as embryo transfer (ET). AI has been used for the past 20 years. We use the highest ranking sires from Australian performance tested rams as well as the top rams from Glenrannoch. We've been doing full pedigree recording in the stud for 15 years (Figure 1). This requires ewes to be mated with a single ram and after lambing the mother of each lamb is identified and recorded.

Figure 1 : Genetic Progress



Hgt CFW = Clean fleece weight at 11 months
Hgt FD = Fibre diameter at 11 months
Hgt CvD = Coefficient of variation of fibre diameter at 11 months
Hgt BWT = Body weight at 11 months
Est. Breeding Value = Estimate of the genetic merit of Glenrannoch hoggets compared to the average of the 15,000 sheep in the Merinotech (Vic) database calculated in 2005 (0=average).

Dams and sires for about 400 lambs annually are recorded. The sires only are recorded for another 500. By identifying the top dams and sires, we are able to predict progeny performance more effectively. The great thing about genetic gain is that any gains are permanently achieved within the flock and can be improved upon every year.

The embryo transfer program involving the top 20 selected ewes results in 80 - 100 lambs from these elite ewes annually. The very top ewes are identified using our selection index and their previous lambing record. These ewes are super ovulated using hormone injections. They are inseminated with semen from the selected ram. After six days, before the fertilized embryos attach to the uterus wall, the embryos are flushed out with a saline solution. Usually an average of 8 fertilized embryos per ewe are obtained (can range from 0 to 25 per ewe). These fertilized embryos are then placed inside the uterus of surrogate ewes that have had their breeding cycle synchronized similar to the donor ewes. We expect about 70% of these embryos to be successfully born.

With the breeding and management program, we've been able to make steady gains over the last 10 years. In my view, I also believe it is feasible to drop another two microns in the next 10 years. We're certainly getting a lot of younger sheep below 14 microns and most of our older sheep are now 17 micron or below.

The Glenrannoch program has benefited from our involvement in two breeding groups. Towards 13 Micron started in 2000 and involves a group of six breeders working with CSIRO Armidale (NSW), aiming to get a reasonable number of our adult flock below 14 microns in eight years. We are also a part of Merinotech Victoria which runs a database consisting of 15,000 sheep and is linked into most of the major sire reference programs in Australia.

Coating

A key element of the move to finer wool has been the use of coats on 5000 young sheep. The coats have minimised dust penetration in the fleece, kept vegetable matter (VM) below 0.5%, reduced the amount of tender wool along the backline and slightly increased yields. Coating the sheep has improved the style grade of the fleeces from Best Topmakers to Spinners types. This is helping to value-add on the farm.

With the young sheep being shorn around September during the wet, cold winter months, the risk of exposure and deaths due to hypothermia is quite high. Coating straight off shears nearly eliminates this risk. The warmth the coats have provided during winter has actually increased fleece weight by about 0.3kg per sheep annually and has reduced feed requirements. The latter being an added bonus that was not anticipated. The introduction of the coats had ramifications for the day-to-day running of the farm and labour requirements, and many management decisions have to be made (Table 3).

There are many issues to confront. With the higher stocking rates and running bigger mobs, more dust gets into the fleece, particularly along the backline, which results in the finer fleeces from the younger sheep being discounted.

On the other hand, with more coated wool being available, there is scope to develop better lines of wool. As part of the cycle we class every sheep each year and sheep with “off-type” or strong fleeces are culled. This means that the sheep that remain on the farm have fleeces that would achieve worthwhile premiums when coated. Also most of the fleeces of these young sheep are 16 micron or finer.

Coat Quality And Coat Fit

After talking to other growers that had used sheep coats a list of different suppliers was made. The coats selected to be used at Glenrannoch were supplied direct from the importer in the northern suburbs in Melbourne. This location was convenient as coats could be collected as needed. They were also the lowest cost. The coats are manufactured in China and are made from polyester. With the current design, the coats sit well on the sheep and cover the fleece well. However, they do not last much more than two or three years. They then become quite brittle and tear easily as they get exposed to the sun and rain. However they did allow the wool to “breathe”. The elastic around the neck and the tail often broke after one year. Coats made from nylon have been tried. These last longer but are quite slippery on the sheep and often need adjusting.

Table 3 : Sheep Coating Management Considerations

Issue	Glenrannoch approach
Which sheep to coat? (Age? Fibre diameter?)	All sheep less than 2 years old as most were less than 17 micron.
How many sheep to coat?	About 5000 comprising of 2 age groups.
What period to coat for?	Straight after shearing and kept on for 9 months until their next shearing.
Where to get the coats?	Locally, Northern suburb of Melbourne.
What sizes of coats were needed and how many were needed?	Total of 8000 to coat 5000 young sheep (1500 ‘A’, 2000 ‘B’, 3500 ‘C’, 1000 ‘D’).
How long would the coats last?	Hopefully 2-3 years.

Issue	Glenrannoch approach
How often would the coats need changing?	2 to 3 changes over the 9 months as the sheep grows and the fleece grows.
What is the best way to adjust coats that are a bit big?	Elastrator rings around surplus coat above the tail.
How do you crutch sheep that have coats on?	Carefully inside the leg straps if small crutch needed. If full crutch, then temporally take off leg strap.
When and where is the best place to take off the coats prior to shearing?	In a VE machine just prior to shearing.
Will I need to fix up yards and fences, and clean up paddocks?	Sharp objects (nails, barbwire, broken mesh on gates and dead branches). Some bush paddocks are unsuitable to run coated sheep in.
Would the coats need washing each year?	We have a high enough rainfall to keep the coats clean enough so that they don't need washing.
Is it worthwhile to mend the torn coats?	Minor tears are repaired using a second hand industrial sewing machine.
Can you mate ewes with coats on?	As long as all the ewes in the mob are coated, the rams mate successfully.
What extra wool clip preparation is needed for coated wool?	The wool classer needs to have had experience with coated fleeces. One extra shed hand is used in the wool room and one extra person is used removing and/or putting on coats.
Marketing of coated wools?	Getting sufficient quantity of coated wool allows buyers to have 'processable' lots otherwise it would be blended with uncoated wools and premiums would be minimal.

Choosing the right size coat for the sheep requires some thought. Holding the coat over the back of the sheep gives you an idea of the size that you need. After some trial and error, using close fitting coats straight off shears proved to be the best option resulting in very few coats falling off. Usually a stock of 50% extra coats of varying sizes is needed to cater for the different sizes of sheep within each mob and any replacements that may be needed.

Labour And Coating Techniques

Young sheep need their coats changed more regularly, with up to two or three changes in the first nine months as they grow. Changing the rugs can be time consuming. Usually one person can put rugs on 100 sheep per hour, and keep up with 3 shearers. However, swapping the rugs over can take twice as long. At the first change it is best to go up two coat sizes and adjust the baggy ones using elastrator rings over the tail and sometimes at the top of the neck. It is important that the rings are placed on the mid line of the coat otherwise the coat tends to slip to one side. The rings also help gather in the coats when the elastic breaks. A VE sheep handling machine (pictured above) is used which assists coat changing with other management activities such as drenching and classing.

Planning the timing of coat changes can reduce the number of coats required. If the older, larger sheep have their coats changed first, then the coats that have just come off can be used for the younger, smaller sheep. Once the leg straps get tight, the coats need to be changed. Any delays can cause the leg straps to cut into the back leg producing raw wounds.

Crutching sheep that are coated requires extra care. If the sheep only need a light crutch, the shearer can pull leg strap away from the area being crutched. This a little more difficult for the bottom back leg. If a larger crutch is required, then the leg strap needs to temporally taken off. Extra payments can be negotiated with shearers if this is required.

The best time and place to remove the coats prior to shearing is just before the sheep are shorn. The VE machine is operated in covered yards attached to shearing shed. The coats can also be removed in pens behind the catching pens. It does not take much to get the coated wool dirty outside in dusty or muddy yards. One person can take off about 100 coats per hour.

Sharp objects that can catch and tear the coats in the yards need to be removed or repaired. Particular attention should be given to gateways and narrow areas like drafting races. If these are not fixed then expect a large number of damaged coats. Fences around the farm need inspection for loose ends of wire. Barbed wire is a disaster, especially if it is about belly height. Dead branches and scrub can be a problem. Some paddocks therefore may not be suitable for grazing coated sheep.

In some areas the coats may need to be washed after several uses. At Glenrannoch, the high rainfall keeps the coats clean and they do not require washing. If washing is needed in my view an old commercial washing machine may be suitable. Another option could be to negotiate with a local dry cleaner or commercial cleaning company.

It is certainly economical to mend some of the torn coats. We bought a second hand industrial sewing machine and a local lady with sewing experience can repair the slightly torn coats for under $2 each. At mating it is worth separating coated and uncoated ewes as rams favor uncoated ewes if they have a choice. Rams feet can tear the coats at mating if the coats are getting brittle.

Shearing Implications

In speaking to wool buyers for advice on clip preparation and changes to shed practices, their view was that the classer should focus on differences in uniformity of style, character, length and strength of the wool. We now class the wool into bins with 1 to 2 micron difference unlike out earlier attempts at using bins in ½ micron increments.

During shearing we employ an extra shed hand to help class the wool properly. This costs another 8c for every kilogram of wool (in a 3 stand shed shearing 500 sheep per day). However this can be recouped with better prices received. Also an extra person is required to remove coats prior to shearing and put on new coats straight after shearing.

The uncoated necks are separated as soon as the fleece is thrown onto the wool table. Fribs and any seedy pieces are removed. The uncoated portion of the legs is also removed and skirted. The necks are sold as a separate fleece line, as are the legs. Removing the necks and legs helps minimize the amount of pieces getting mixed up with the coated wool. Minimal skirting is then required around the remaining coated wool. This skirting removes short or discoloured wool. The coated fleece wool is then classed and put into the appropriate bin for pressing. It is essential to keep the wool room tidy and regularly kept swept to the coated wool as clean as possible.

The marketing of the relative small amounts of coated wool produced on individual farms makes it difficult to achieve processable quantities. Buyers will not pay significant premiums for coated wool if they just blend it back with the bulk of uncoated wool that they purchase.

In the ideal world, growers with coated wools should work together to market parcels of wool that can be processed separately. There is also scope to combine their marketing and promotion efforts.

Summary Of Costs And Returns

The increased dollar value of the coated wool depends very much on the prices on the day the wool is sold. The value can be calculated using the relevant premiums and discounts for the following measurements. By my estimates, we could achieve an extra $3 to $4/kg with the improvements in the coated wool (staple strength, style grade). The extra wool cut (0.3 kg) would return an extra $6 / sheep. The extra annual gross return for each coated sheep should be $13 to $16.

Offset against this are the annual costs of the coats and operating costs which is estimated at $10.50 / sheep / year. This includes:

- the cost of the coats spread over 2.5 years including some mending) was $2.50.
- the extra labour needed to put on, change and take off the coats during the year is estimated at $7 / sheep.
- the extra costs for crutching and wool preparation came to $1 / sheep.

This should result in an extra return between 20% and 50% on money invested in the coating operation. The value of sheep saved from dying due to hypothermia after shearing is not included in the above figures. In some years it would nearly zero, but in other years it could be quite high.

Where To Now?

During the next year, we face a tough decision: the coats only last two or three years and will need to be replaced soon. And to coat 5000 sheep, you need to have about 8-10,000 different sized coats in total.

It's a fairly substantial capital outlay and we are at the stage now where we really need to see if we **can** realize the premium with rugged wool that will cover the costs and provide a reasonable profit.

Low wool prices during the past few years had been tough, nevertheless, in my view the wool market tends to go in three year cycles. Although this happens to be the sixth year without an increase in prices, there are encouraging signs of improving prices for fine wool in the future.

My plan at this stage is that I will still keep coating most of the young sheep that are shorn in June and September for survival during the wet and cold months, but I will only keep coats on the finest half of these young sheep at the scheduled first coat change, 2-3 months after shearing. I am also considering using the coats that have a neck extension. It is amazing how much wool is in the neck once it is thrown onto the wool table. It would be good to have this wool covered by coats as well.

References

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Australian Wool Innovation, (2004), A scoping study into the current and potential future use of sheep coats, Project EC691, Public report version.

Hatcher, S., Atkins, K.D., and Thornberry, K.J., (2003), Sheep coats can economically improve the style of western fine wools, Australian Journal of Experimental Agriculture, 43: 53-59.

Discussion Questions

1. "Where to now?" Summarise the for and against issues facing Alistair in his decision to continue with the coats.

2. In terms of the **four** described by AWI i.e. strategic, tactical etc in its scoping study on the use of sheep coats, how would you categorise Alistair's use of the coats?

3. Bearing in mind that Alistair is introducing a range of initiatives simultaneously, what **financial analysis techniques** are appropriate for the adoption of the coats?

4. Comment on the role **sensitivity analysis** may have in an analysis of the returns and costs associated with the continued use of the sheep coats.

5. While Alistair's program toward 'going finer' has yielded improvements in the attributes of his wool, the improvements have not translated to premiums received in the price of wool. What do you consider are the main reasons for this?

Case Commentary

Written by Dr Bob Richardson, Formerly Dean, Faculty of Land and Food Resources, The University of Melbourne

This case study provides an excellent example of the challenges faced by specialist superfine wool growers in improving productivity and profitability of their sheep enterprises. The strategy involved here includes wool measurement and an individual sheep information management system, careful genetic selection, the use of coats on a major part of the flock and very different production management systems from traditional woolgrowing. The interactions between these elements of the strategy are critical to gaining greater management control of product quality. Such control has historically been quite limited in most of the wool production system in Australia with wool quality at the mercy of the seasons.

The key decision underlying this case seems to be the shift to finer micron. While this may be the best long term goal for Alistair Lade given his climate, soils etc., there has been a long standing debate in the industry about whether shifting the whole merino clip finer is wise; the jury is still out! Moving to superfine microns has implications for other quality attributes of wool including management of tensile strength, position of break, dust and VM management. It thus has attendent production management implications.

Advances in knowledge on sheep genetics and wool measurement underpin the practical applications evident in this case. As Alistair points out, tensile strength in wool becomes more important at finer microns; this necessitates active management of sheep nutrition at critical stages of the production cycle (weaning, lambing, season break). In young sheep, with extra nutritional requirements for growth, as well as wool production, sheep coats appear to play an important complementary role. This is evidenced in the 0.3 kg. per head fleece weight gain attributable to the use of coats on young sheep.

Partial analysis of coating, based on reported costs and estimated benefits, appear to indicate that it is an attractive investment at the margin for a superfine specialist. This has not yet been reflected in significant adoption of sheep coating. For the future much would seem to depend on whether a price premium for coated wool emerges in the wool market. The chances of this happening will be increased if wool exporters have access to sufficient volumes of coated wool to enable them to build complete consignments of such wool to tight measurement parameters. This could be assisted if producers of superfine coated wool coordinated their sales timing working jointly with leading wool brokers.