



Sheep CRC Precision Sheep Management Information Sheets

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Economics tell the story

Enhanced genetic improvement in the commercial flock will come from judicious choice of rams and purchasing rams based on their commercial value to the flock. A new tool, the Ram Value Calculator, has recently been developed to allow producers to quickly calculate the benefits of a ram in their particular flock.

Precision management, particularly through the application of improved selection of replacement animals on measured performance, can have an even more substantial impact on the productivity of Merino flocks.

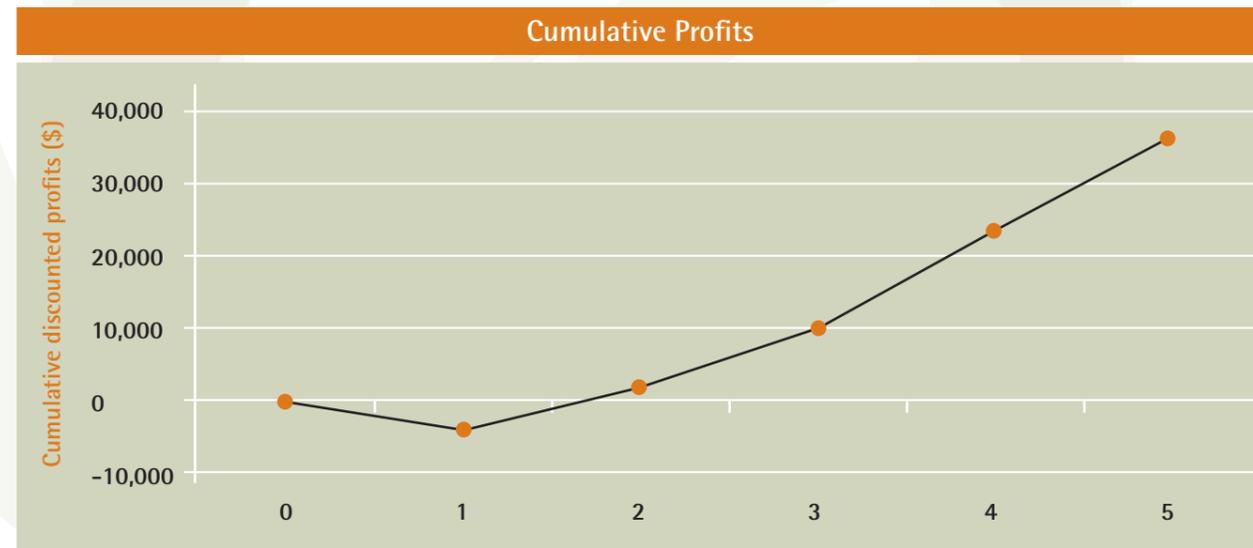
Over a 10-year time horizon, increases in profit of 28%, 24% and 16% are possible in specialist fine wool, medium wool and dual purpose broad wool production flocks respectively, over and above genetic improvement from the stud. However some would argue that precision management is too difficult and too costly for commercial reality.

While the gains in profit 10 years into the future look promising, the short-term return on investment is also very attractive. The graph below shows the cumulative profits (cumulative returns less cumulative costs in the actual year they are realised) over the first five years in a fine wool flock. By year two, the cash flow is already positive and the profits accumulated steadily per year from then.

The exciting news, is that an investment in precision management now equips the enterprise for the next series of precision strategies, such as

- Precision ewe management;
- Selecting on reproduction;
- Monitoring growth in finishing lambs etc.

If the investment in capital and equipment has already been made, the addition of other activities to achieve further benefit becomes more attractive.



For more information

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E-stud: reaching new heights

Long-term genetic progress in the Australian sheep flock depends on the responses achieved in studs. Maximising genetic progress relies on accurately determining the genetic merit of rams and ewes that are available for selection.

The two most important considerations for the ram breeder are:

1. Using the variability within a flock to determine the production (or phenotypic) differences between animals.
2. Using relationships among animals from a pedigree to increase accuracy of predicting the breeding value (or genotypic) differences between animals.

Variability within a Merino flock of sheep

(from Atkins, Richards and Semple 2006)

Trait	Production level of flock:			Heritability
	Average	Top 25%	Bottom 25%	
Wool traits:				
Fleece weight (kg)	4.6	5.3	3.9	High
Fibre diameter (µm)	20.4	18.9	21.9	High
Staple strength (N/ktex)	35	42	28	Moderate
Meat traits (crossbred lambs)				
Growth rate (g/day)	284	357	200	High
Fat depth (mm)	10.6	8.9	12.5	Moderate
Reproduction				
Lambs weaned per ewe joined	0.86	1.43	0.28	Low
Profitability traits				
Fleece value per ewe (\$)	\$54	\$82	\$37	Moderate
Carcase value per ewe (\$)	\$33	\$56	\$12	Low

This variation indicates the massive scope for selection and genetic improvement within studs. Such potential exists because most of the production traits are not only variable but highly heritable and relatively cheap to measure. However the lowly heritable traits are also highly variable but more difficult to measure. These especially, can be helped with pedigree records.

Selection in any one generation will not reduce the potential to use variation in the future because variation is always regenerated in the next drop of animals.

Maximising flock gains: a two piece puzzle

The gains from genetic improvement and Precision Sheep Management (PSM) are additive. Taken together, an enhanced genetic strategy plus a precision production strategy can achieve a total gain in profit of 26%-49% depending on the farming scenario.

The three stages of improved genetic performance:

- 1 Basic genetics**
 Most commercial ram breeders manage the process of basic genetics through selection. Average grade rams are bought from a recognised source and the average industry rate of genetic gain is anticipated.
- 2 Enhanced genetics (e-stud)**
 Improving ram selection through choosing enhanced genetics from available data. Superior rams are purchased from one or more ram sources using breeding values supplied through Sheep Genetics and a selection index, that reflects an individual commercial breeding objective, is implemented on farm.
- 3 Commercial ewe selection**
 By using additional measurement as part of a precision management process in the flock, additional value can be extracted through breeding and selection of replacement ewes (and wethers), optimising flock structure. The precision strategy can be applied to both basic and enhanced genetics models.

Identifying individual animals

Maximising genetic progress relies on identifying individual animals. A substantial improvement in breeding value accuracy can be obtained from applying more accurate selection. Most studs already know the worth of individual animal data and record some level of individual animal performance and pedigree. Investment in PSM makes the job easier, and the data more accessible and valuable.

RFID and associated hardware and software:

- Simplifies data collection
- Saves labour
- Improves data accuracy
- Incorporates and uses historic and repeat measurements
- Enables accurate culling decisions and fine tuning of breeding decisions
- Accelerates genetic gain
- Easily handles large volumes of data
- Provides data to allow animals/groups of animals to be managed differentially/flexibly
- Lessens animal handling and animal stress



Value of pedigree records to the ram breeder

Having access to the pedigree, or relationships among animals, increases the efficiency of selection leading to higher rates of genetic progress. If we know the animals sire and dam, then we have access to the performance of other relatives including parents and progeny (sisters/brothers etc). This extra pedigree information improves genetic accuracy over that achieved from measuring individuals.

Pedigree records have another important role. They provide the genetic link needed to calculate breeding values to compare sheep of different drops - a critical need for ram breeders at selection time.

Sire pedigrees allow better comparisons to be made between proven sires and young rams. But it is the female pedigree in addition to the sire pedigree that makes the comparison of animals across years more precise - a great aid in comparing the breeding values of adult ewes against potential replacement hogget ewes.

Commercial value of flock rams

Improvement in breeding value accuracy can translate into improved profits within the stud. It can also be passed on to clients through flock rams that lift industry productivity and profitability.

The benefits of improved selection accuracy on the value of flock rams is shown below, taken from results from the QPLU\$ breeding lines at Trangie. Additional response from more accurate selection on phenotype (two stage selection in rams and ewes) added \$136 (or 20%) to the commercial value of the ram. But recording pedigree added a further \$135 in value through greater genetic progress.

Stud selection strategy	Commercial flock ram value (\$)	Investment in value (\$)
Ram and ewe performance records	\$522	-
Two-stage records in rams + additional records on ewes	\$658	+\$136
Pedigree records	\$793	+\$135

Depending on the gains being achieved in the stud, the QPLU\$ responses suggest that up to \$136 extra commercial value per flock ram sold could be achieved from using pedigree information in ram breeding programs.

Combining the benefit of genetics and PSM

The 10 year affect of enhanced genetic and precision production is shown in the table below as applied to a 3000 head breeding flock of 20 micron wool Merinos selling surplus animals as hoggets, cutting 3.9kg clean wool per breeding ewe, 80% reproduction rate. Other scenarios will lead to different outcomes.

Trait	Basic genetics	Enhanced genetics (e-stud)	Enhanced genetics and ewe selection
Clean fleece weight (kg)	4.01	4.07	4.29
Fibre diameter (µm)	19.6	19.4	19.0
Gross margin per DSE (excluding farm)	\$29.76	\$30.86	\$32.20
Additional farm profit in year 10	\$12,300	\$19,900	\$29,100