

Using Breeding Values for genetic benchmarking in EP Merino sheep enterprises

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RESEARCH

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Location: Minnipa Ag Centre

Rainfall

Av Annual: 325 mm
Av GSR: 241 mm
2012 Total: 253 mm
2012 GSR: 185 mm

Livestock

Enterprise type: Commercial sheep flocks

Social/Practice

Time (hrs): Additional time required for additional measurements and data entry
Clash with other farming operations: standard practice
Labour requirements: Some additional labour may be required depending on the type of measurements taken

Economic

Infrastructure/ operating inputs: Computer software and some data collection equipment is required
Cost of adoption risk: Low

objectives have had measured success in most key traits.

- **This technology has the potential to greatly increase production and profitability through long term improvement to genetics.**

Why do the trial?

Sheep Genetics Australia (SGA) is the Australian Wool Innovation (AWI) and Meat and Livestock Australia (MLA) genetic evaluation service, which calculates Breeding Values through MERINOSELECT and LAMBPLAN to assist with more accurate breeding and selection decisions. Using these tools in addition to visual selection has the potential to optimise genetic progress, which in turn will significantly improve livestock productivity and profitability. Breeding Values take into account all known environmental differences (e.g. age of dam, birth date and nutrition), all available pedigree information and any correlations between traits. The value of an animal's genes for most production traits cannot be visually measured, however Breeding Values provide livestock producers with a unique tool for the best estimate of genetic merit.

A well-defined breeding objective will assist sheep producers to set a clear direction for their breeding program and allow them the optimum use of the SGA system. This benchmarking tool uses a combination of pedigree, raw data collation from the animal and its relatives and environmental factors to generate Flock Breeding Values (FBVs) and Australian Sheep Breeding Values (ASBVs), which provide livestock producers with a description of the potential

genetic value of a breeding animal for each trait (e.g. greasy fleece weight, eye muscle depth, body weights etc.). ASBVs are breeding values provided by SGA when there are genetic linkages between flocks, which allow these figures to be benchmarked across flocks Australia wide. The gains through genetic and production improvement and subsequent increase in profit margin are significant incentives for involvement in the SGA system.

There has been limited uptake of new and more efficient technology in the livestock component of mixed farming enterprises on Eyre Peninsula (EP) in recent decades. The aim of this project is to promote the recent advances in sheep genetic research and assist livestock producers improve their system. Breeding Values have the potential to increase productivity and profitability of a livestock business, and can also be used in conjunction with other associated technologies to increase labour efficiency.

The Minnipa Agricultural Centre flock breeding objectives aim to increase body weight, fleece weight, reduce breech wrinkle and maintain micron (fibre diameter).

Key messages

- **Merino sheep at Minnipa Agricultural Centre are being used as a practical demonstration and focus for discussion to assist ram breeders and buyers to gain an understanding of the Sheep Genetics system MERINOSELECT and Breeding Values.**
- **Breeding Values are used as a tool for benchmarking in a sheep enterprise and should be used in conjunction with visual selection.**
- **Minnipa flock breeding**

Table 1 Average raw measurements and Australian Sheep Breeding Values (ASBVs) of the 2010 and 2011 hoggets (11-13 months old) in the Minnipa flock

Type of measurement	Year of drop	Fleece weight	Fibre diameter (μm)	Body weight (kg)	Eye muscle depth (mm)	Breech wrinkle (score 1-5)
Av. raw	2010	3.4 kg **	18.0	50	30.8	2.6
Av. ASBV	2010	+8.5%***	-0.8	+1.4	0	-0.1
Av. raw	2011	3.6kg**	18.6	47.1	34.6	2.1
Av. ASBV	2011	+11.0%***	-0.6	+2.5	-0.2	-0.1
Av. Australian ASBV*	2011	+9.8%***	-0.9	+2.9	+0.2	****

*Australian average for medium Merino flocks in the SGA system for the 2011 drop hoggets

**Raw measurement of hogget greasy fleece weight (kg)

***ASBV presented as a percentage of clean fleece weight

****Breech wrinkle is an objective score only and therefore has no national average

How was it done?

The three-year project 'Best Practice Wool Innovations on Eyre Peninsula' began in 2011 using the Merino sheep flock at Minnipa to demonstrate the genetic benchmarking process that leads to the creation of MERINOSELECT Breeding Values by SGA. Measurements began on the flock in 2010 to register the sheep in MERINOSELECT and benchmark the original flock figures to track changes over the duration of the project, resulting in 4 years of genetic data.

Throughout the year a program of measurements are carried out on the Minnipa flock including sire and dam pedigrees, birth weight and date, sex and birth type (single or multiple), breech and body wrinkle scores, body weights over several age stages, fat and eye muscle scans, wool characteristics, wool weights, pregnancy scans, visual classing scores and physical abnormalities.

Measurements are taken from the ewes and wethers for each drop and submitted to SGA at hogget

age (at approximately 12 months old). Wethers are sold off after their first shearing and breeding ewes are visually and objectively classed before being admitted into the breeding flock. If flock size needs to be reduced further, ewes are selected using their ASBVs.

To increase the accuracy (linkage) of the Breeding Values from the Minnipa flock, sires are selected based on ASBVs with emphasis on traits that correlate with the flock's breeding objectives, however sires are required to also be visually sound. Sires are sought locally from EP studs or from the Turretfield Research Centre for genetic linkage purposes.

Previous results for comparison are presented in EPFS Summary 2010, p 143 and EPFS Summary 2011, p 145.

What happened?

Measurements were submitted to SGA for the 2010 and 2011 drop hoggets and have been analysed through MERINOSELECT, generating ASBVs for these 2 years, which are presented with

the average raw data figures in Table 1. Comparative results for the 2012 drop will be generated at yearling age. The ASBVs are expressed as the difference (+ or -) between an individual animal and the benchmark to which the animal is being compared. For some traits a positive ASBV is desirable (e.g. weight or eye muscle depth) and for other traits a negative is more desirable (e.g. fibre diameter). For example, an ASBV of +6 for hogget weight means that the animal is genetically better by 6 kg at this age than an animal with an ASBV of 0 (0 kg). As rams contribute half the genetics of their progeny (the ewe the other half), the resulting progeny will be on average 3 kg heavier than the animal with an ASBV at hogget age if a ram is mated to ewes of equal genetic merit.

Results have varied in the 2 years of hogget ASBVs due to lack of linkage in the Minnipa flock, however the average ASBVs of sires selected over the duration of the project shows improvements in most traits, which is presented in Table 2.

Table 2 Average Australian Sheep Breeding Values (ASBVs) of the sires used in the Minnipa flock

Year joined	Clean fleece weight (%)	Fibre diameter (μm)	Body weight (kg)	Eye muscle depth (mm)	Breech wrinkle (score-5)
2010	+12.7*	-0.5	+2.7	-0.3	-0.1
2011	+16.2*	-0.2	+3.9	-0.5	-0.2
2012	+16.0*	-0.2	+7.0	+0.4	-0.2
2013	+18.9*	-0.3	+7.4	+0.5	-0.2

*ASBV presented as a percentage of clean fleece weight

What does this mean?

Minnipa flock breeding objectives aimed to increase body weight, fleece weight, reduce breech wrinkle and maintain micron. The project has had measured success with most of these objectives, however with increased data accuracy through better linkage and more measurements we hope to see improvement in all key traits. This technology has the potential to greatly increase production and profitability through long term improvement to genetics. However, there has been some hesitation from the industry in its uptake, with many breeders and buyers yet to see the benefits of the SGA system. For effective use of the new technology, it needs to be closely aligned with visual selection

and breeding objectives in each individual flock in order to see significant outcomes. It also needs to be understood that improving genetics is a slow process and a long-term investment for the sheep enterprise rather than a method of increasing the businesses profit margin immediately.

Education about this genetic evaluation service and how it can be beneficial for sheep breeders and producers is the next step towards genetic improvement for the industry. The Minnipa project is assisting the sheep industry understand this new technology and helping to provide information and a demonstration of how to overcome the issues that come with uptake of the technology and involvement in the SGA system.

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