

## COMMERCIAL FLOCK GENETIC PROFILING AND TOOLS FOR RAM SELECTION

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### SUMMARY

Using Australian Sheep Breeding Values (ASBVs) to select rams and drive genetic gain has been estimated to add \$2.20 per ewe per year to flock returns. Despite the benefits, the Sheep Cooperative Research Centre (CRC) research identified barriers to adoption of ASBVs amongst some ram breeders and ram buyers. Investments in training, computer applications and genetic profiling have strategically addressed these barriers and made ASBVs simpler to use.

### INTRODUCTION

Whether you are a stud breeder or commercial sheep producer, selecting rams that will deliver improvement in the flock is one of the most important business decisions you make. As the sheep industry moves from a focus on wool production to a balance between wool and meat; genetic improvement incorporating reproduction, carcass and disease resistance traits becomes much more complex (Rowe and Banks, 2015).

Australian Sheep Breeding Values (ASBVs) generated from pedigree, phenotype and genomic information are an important tool for predicting genetic performance and selecting breeding animals. The value of ASBVs in predicting genetic merit has been well documented and demonstrated over many years. This information has been collated in "Using ASBVs – What's in it for me?" (Ramsay, 2012).

Genetic gain is cumulative and the improvement has been valued at \$2.02 per ewe joined per year in terminal breeds using ASBVs participating in LAMBPLAN. Genetic gain in leading Merino flocks, using MERINOSELECT ASBVs, has been estimated at \$2.20 per ewe joined per year, but much less in non-participating flocks (Rowe and Banks, 2015). Despite the benefits of using ASBVs for selection, reluctance to uptake the technology has been observed in both the stud and commercial sectors, particularly for Merinos. In 2011, the Sheep CRC undertook research to understand the barriers to adoption of ASBVs and develop strategies to address these barriers. Some of the key reasons for not adopting ASBVs for ram selection included;

1. A lack of awareness and understanding of ASBVs amongst commercial ram buyers
2. No simple method by which to benchmark the genetic merit of a commercial flock
3. Complexity in using ASBV information to set a breeding objective and selection criteria
4. A lack of confidence amongst ram breeders to explain and promote ASBVs to their clients
5. A lack of advocates for ASBVs amongst key influencers such as stock and station agents, sheep classers and processors

The CRC has undertaken a range of research and development activities to address these barriers and increase the use of ASBVs for ram selection.

**Ramselect training workshops.** The RamSelect training workshop was developed to increase the knowledge, skills and confidence of ram buyers and industry influencers to use ASBVs for ram selection. The workshops, hosted by ram breeders, had the added benefit of building the confidence of breeders to discuss and promote ASBVs with their clients. The workshop is based

around a series of practical exercises to describe a breeding objective, set benchmarks for ASBVs and grade rams for their suitability. Assessment of the genetic potential of the ram is combined with visual assessment for conformation and other traits that do not have ASBVs, to come up with an overall grade and estimated value. The workshop concludes with a mock ram auction.

Since 2012, 150 workshops have been delivered to 3000 participants across Australia. Evaluation data showed that participants valued the workshop highly and would recommend it to others. Despite the success of the workshops, the selection process requires confidence in using ASBV figures, which are expressed as deviations from a zero base, have differing directionality, units and scales. For commercial ram buyers, who generally only look at ASBVs during the ram selling season, it can be difficult to remember all the details from one year to the next. In response to our experiences with the workshop and feedback from participants, the CRC embarked on a new project in 2015 to develop a state of the art computer application that would simplify the process of using ASBVs for ram selection and purchase.

**A new web based application –Ramselect.com.au** The Sheep CRC worked with Telstra, Pivotal Labs in San Francisco, Sheep Genetics and NSW Department of Primary Industries to develop a web based application to search and rank rams for purchase. RamSelect.com.au accesses sale catalogues generated by ram breeders. The catalogues and ram data is automatically updated every day from the Sheep Genetics database.

The user sets criteria for a ram search in terms of number, breed, type, sale type and location. The application initially ranks rams according to one of the standard industry indexes (eg the Dohne Index). The user can then adjust the emphasis placed on traits in the breeding objective by moving a simple set of slider bars that use plain English descriptors rather than complex trait names. The ram list re-ranks as emphasis on traits is modified. ASBV details can be accessed and reviewed at any time. The slider bar settings can be saved for future use. The ranked ram list can be saved, printed or downloaded in preparation for the ram sale.

RamSelect.com.au was first used in the 2015 ram selling season with 145 breeders listing 12,000 rams. This included 18 Dohne breeders listing 1400 rams. Several hundred ram buyers visited the site each week to search for and rank rams for their breeding objective.

**Benchmarking the commercial flock-genetic profiling** Participants in RamSelect workshops consistently expressed concerns about how to set benchmarks for ASBVs for the key profit drivers such as fleece weight, fibre diameter and growth. For ram buyers who have previously purchased rams with ASBVs, it is possible to develop a list of tag numbers and search the Sheep Genetics database for the ram ASBVs. The team average provides a useful basis for informing future ram purchases and driving improvement in key profit drivers. However very few producers currently keep tag records or ASBV details for rams in their team.

For commercial producers that have not purchased rams using ASBVs previously it can be difficult to know where your flock sits relative to others and where to target ram purchases. To address this issue, a new method for genetic profiling of the flock is under development at the CRC. The Genomic Test, based on a blood card or tissue sample, was developed to provide genomic estimates of breeding values. The test works by comparing 50,000 genetic markers with thousands of other animals that have been tested and also have extensive trait measurement. This information is combined with phenotypic and pedigree data to improve the accuracy of ASBVs for individual animals in the Sheep Genetics database. Recent research has found that the Genomic Test can also be used to estimate flock average breeding values. The idea is to randomly sample 20 ewes from the youngest age group and develop a genetic profile for the flock. Flock average ASBVs can currently be generated for Merino, Border Leicester, White Suffolk and Poll Dorset flocks. This information can then be used to set benchmarks for future ram purchases. For traits where positive improvement benefits flock performance (eg fleece weight and growth) producers should look for rams with ASBVs greater than the flock average. Where a reduction in trait value

is a benefit (eg fibre diameter) then ASBVs less than the flock average will be a benefit to the business.

Prediction of breeding values from genomic tests is not currently available for Dohnes as there are inadequate numbers of animals genotyped to form a reference population. The Sheep CRC will continue to genotype Dohnes with pedigree and trait measurements, so genomic testing is available in the future.

**Enhancements to the Ramselect app.** In August 2016 RamSelect Plus will be launched for the upcoming ram selling season. RamSelect Plus will include additional functionality;

- to select which index is the starting point for ranking rams
- to benchmark search results against the national database
- to upload and manage your current ram team data and track progress over time
- to upload your flock genetic profile test results to assist in setting search criteria

## **CONCLUSION**

Delivery of the RamSelect workshop and subsequent development of RamSelect.com.au and flock profiling has successfully addressed the key barriers identified by industry stakeholders in the 2011 needs analysis. It is fully anticipated that RamSelect.com.au and flock profiling using genomic technology will become major tools for driving genetic gain across the sheep industry, using the power of ASBVs.

## **REFERENCES:**

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