Sheep CRC Practical Wisdom Notes

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SHEEP CRC
Sheep CRC Practical Wisdom
Know it. Do it.

Sheep CRC genomic test for maternal breeds —what are the benefits?

By Stephen Lee, University of Adelaide and Julius van der Werf, University of New England

Key points

- Genomic tests increase ASBV accuracy and, therefore, rate of genetic gain.
- Currently, there are modest potential increases in rate of genetic progress available through genomic tests for maternal ram breeders who already conduct extensive performance recording.
- The accuracy increase is highest when there are limited measurements available, for example in young animals.
- Maternal ram breeders can also benefit from the ability to include hard-to-measure carcase traits such as eating quality.

Figure 1. Border Leicester

Introduction

Genetic gain in sheep breeding programs can be made by identifying and selecting the best animals. Greater genetic gain is achieved when those animals can be more accurately selected and mated at younger ages.

Australian Sheep Breeding Values (ASBV) are based on performance and pedigree information, but can now also include DNA marker information from the Sheep Genomic test. This genomic test increases the accuracy of selection of young animals, especially for traits that are generally measured later in life, or not measured at all.

What increase in genetic gain can genomic tests offer?

Genomics has the potential to deliver increases in the rate of genetic gain for the maternal breeds that can use genomics (currently Border Leicester).

Although increases for standard traits are modest, more importantly, the Sheep Genomic test generates breeding values for three new and important carcase traits: Lean Meat Yield (LMY), intramuscular fat (IMF) and shear force (ShearF5), the latter two are associated with eating quality. Breeders who use an Sheep Genomic test are receiving Research Breeding Values from

Sheep Genetics for these traits with accuracies typically between 40% and 50%. This is sufficient accuracy to make selection decisions.

If initial selection is based on traits such as post weaning weight, post weaning eye muscle depth and post weaning fat, which can be readily recorded, but may have unfavourable genetic correlations with hard-to-measure traits such as eating quality, then there is a risk that genetic merit for eating quality may decline.

Breeders are already adopting the use of genomics as a tool to screen young rams, so they can improve both traits. Testing approximately 20% of the ram drop and incorporating carcase trait ASBVs into selection will allow producers to simultaneously improve eating quality (through higher intramuscular fat) and lean meat yield.

Also, as the genomic tests continue to improve, a greater amount of variation in hard-to-measure, but economically important traits, such as number of lambs weaned, will improve. This is expected to result in substantial increases in genetic gain for maternal breeders that use genomics in the future.

Which animals should be tested and when?

Test the best 20% of rams

For many ram breeders who are already recording considerable performance and pedigree information, much of the potential gain from genomic tests can be obtained from testing a relatively small percentage of the ram drop. Rams that have poor ASBV and index values when identifying candidates for genomic testing are unlikely to be selected in the sire team and therefore breeders can focus on the top 20% of rams.

Testing 20% of the ram drop is expected to give approximately 80% of the potential genetic gain compared with testing the entire ram drop for rams first selected at 6 months.

Table 1. Proportion of possible additional genetic gain achieved compared with testing 100% of the ram drop for first use of rams at 6 months old.

Proportion of ram drop tested	Proportion of possible genetic gain
5%	27%
10%	61%
15%	79%
20%	87%
30%	94%

Test more rams than you will need

Test more rams than you need as replacement sires so that the test results can be used to narrow your selection. Testing only the number of replacements that you need means you have already made your selection and the genomic tests will add no more gain than what you could achieve without them.

Test from a number of progeny bloodlines

Sample animals from a number of progeny bloodlines or family groups to widen your pool of future sires, to maintain sufficient genetic diversity and avoid future inbreeding.

How are ASBV accuracies increased with the genomic test?

The value of the genomic information depends on the increase in ASBV accuracy compared with conventional performance recording at the time of selection.

The increase in ASBV accuracy is highest for traits that are measured later in life; increases tend to be smaller for traits where animals have had performance recorded prior to genomic testing. Traits that increase more in accuracy will have a relatively higher boost in genetic gain when using genomic selection. Table 2 shows the increase in ASBV accuracy when genomics is used for several important traits when first use of rams is at 6 months old.

Table 2. Accuracy of some ASBVs for rams selected for use at 6 months old.

Trait	Without genomics	With genomics
Birth weight	0.52	0.62
Weaning weight	0.63	0.71
Post weaning weight	0.64	0.71
Post weaning eye muscle depth (C)	0.64	0.67
Post weaning fat depth (C)	0.68	0.69
Post weaning WEC	0.60	0.61
Yearling greasy fleece weight	0.15	0.27
Number of lambs weaned	0.14	0.16
Maternal $ Index	0.39	0.43

Take home messages

- The Sheep CRC Sheep Genomic test increases ASBV accuracy, especially for young rams and for traits that are measured later in life.
- More accurate selection will increase genetic gain.
- Young rams can be used with more confidence, and using more young rams in the stud reduces generation interval.
- General testing recommendations for the ram breeder:
    - Test animals prior to selection.
    - Test more animals than you need, about 20% of the ram drop.
    - Consult with an advisor to optimize your testing strategy.

Further information

Sheep CRC website: www.sheepcrc.org.au, then choose Genotyping tests

Sheep CRC Practical Wisdom notes:

- Genomics and DNA testing: new tools for ram breeders to accelerate genetic gain.
- Sheep CRC genomic test for Merinos—what are the benefits?
- Sheep CRC genomic test for terminal breeds—what are the benefits?
- Breeding towards a poll flock with the Sheep CRC Poll test.

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