



Sheep CRC Practical Wisdom Notes

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Using selection decisions to improve ASBVs – Climbing to the top of the tree

By Tom Granleese, University of New England and Clara Collison, Sheep Genetics

Key points

- The Yates family own Barwon Poll Dorsets and Kubura White Suffolks at Yerong Creek.
- Mark Yates' breeding program has historically focussed heavily on structural correctness, and he is very happy with the current visual style and conformation of their sheep
- To complement visual correctness, Mark aims to move the flock average ASBVs for both studs into the top 20% of LAMBPLAN
- The current rate of genetic gain is not fast enough to achieve this without making changes to the breeding program
- The strategy will be to use artificial insemination with top ranking, highly accurate sires in LAMBPLAN to double the current rate of genetic progress
- Genomic testing will be used to further enhance rates of genetic gain

Introduction

The Yates family own and run the Barwon Poll Dorset and Kubura White Suffolk studs at Yerong Creek in southern New South Wales. Stud Principal Mark Yates, together with his family have held the studs since the 1940s, have previously focussed heavily on structure and visual correctness of their sheep. Mr Yates is an active member of LAMBPLAN, recording pedigree and taking objective measurements to generate Australian Sheep Breeding Values (ASBVs) for the flocks.

Given the industry demand for high genetic merit terminal rams, Mr Yates is now looking to increase the ASBV flock averages for their studs. Selection strategies have been planned to help the studs increase their rate of genetic gain and to propel both studs into the top 20% of the terminal LAMBPLAN population for both Carcass plus and the new Lamb Eating Quality index. He has received assistance to model the likely outcomes from the Sheep CRC's Tom Granleese, LAMBPLAN's development officer Clara Collison and Mr Yates' service providers, Elise Bowen and Murray Long.

Mr Yates is very conscious of changing markets and demands of the prime lamb industry and is looking to restructure his breeding program to meet these industry demands. He is aware that ram buyers are demanding rams with high ASBVs and in particular increased emphasis on new eating quality traits. However, he is not willing to compromise on the 80 years breeding that he and his family have put into achieving visually correct sheep. Mr Yates is now hoping to transform his traditionally correct sheep by breeding high performance rams with high value ASBVs. Mr Yates is looking at using all available technologies to achieve this.

Where can genetic improvement be made?

Selecting rams with high ASBVs

Mark Yates has placed heavy selection emphasis on visual traits while traditionally having less of a focus on ASBVs. As a result he has bred a very “correct” flock of sheep in both studs but was not satisfied with his rate of genetic gain as recorded by LAMBPLAN. In 2014 Mr Yates made a conscious decision to increase rates of genetic gain. Despite increasing rates of genetic gain by 4 points per year on the Carcase+ index, Mr Yates is still not satisfied with his current rates of genetic gain. The new RAMping Up diagnostic reports developed by AGBU, NSW DPI, Sheep CRC and Sheep Genetics, assisted Mark to identify the areas where improvements could be made. As a result, he is now looking to double his rate of genetic gain over the 2018-2023 period.

The good news!

Good structural rams with high ASBVs are available

Visually correct rams that have high ranking ASBVs in the LAMBPLAN population are often made available by stud breeders. Hence Mr Yates can increase the ASBV merit of his studs without sacrificing the visual and structural correctness of his flocks. If he is to double his rates of genetic gain over the next five years he will need to source these genetics from outside his flocks.

How to get there and how long it will take

Using at least 4 to 7 years’ worth of top-ranking outside sires is the minimum

Modelling has shown that to double the rate of genetic gain in both the Barwon and Kubura studs, outside rams or semen will be required for at least 4 to 7 years (or 2 generations) to increase their flock average into the top 20% of the LAMBPLAN population. The genetic merit and ranking of the ram team that Mr Yates uses will determine how quickly his stud can move into the top 20% of the terminal population.

The modelling output in Figure 1 demonstrates that if any stud ranks in the 70th percentile, the fastest the studs’ average ASBVs can reach the 20th percentile is by using rams teams that rank in the top 1% of the LAMBPLAN population each year. This is assuming that the entire ram team is replaced in the first year of breeding, which may be impractical. Because nearly all studs have overlapping generations (i.e. different aged ewes and rams) the time taken will vary depending on generation interval (Figure 2). **Sheep CRC website:** www.sheepcrc.org.au, then choose Genotyping tests.

Once the Kubura and Barwon studs have ram progeny with ASBVs in the top 10% percentile of the LAMBPLAN population then those rams can be selected in the nucleus rather than sourcing outside genetics. Genetic progress can then continue to be made either using more external genetics and/or internal genetics. Faster progress will be made if rams that are ranked in the top 1-10% are used.

Mr Yates will be selecting rams that rank in the top 10% for both the traditional Carcase Plus index and the new Lamb Eating Quality selection index. These rams need to have highly accurate ASBVs and also pass Mr Yates’ stringent visual correctness protocols. An added bonus will be these sires providing high linkage to the LAMBPLAN population. Large-scale AI programs, accessing high ranking semen will be required to move his flock average into the top 20%.

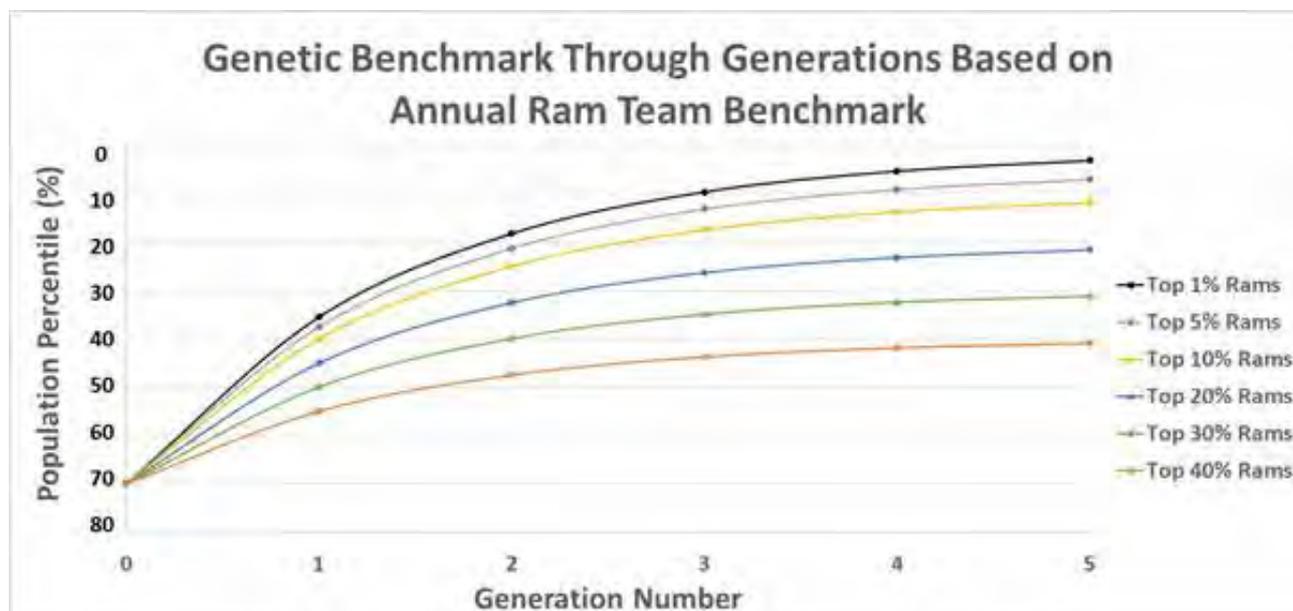


Figure 1: Genetic progress through generations by selecting rams from certain LAMBPLAN percentiles year-on-year (note lower the percentile the higher ranked)

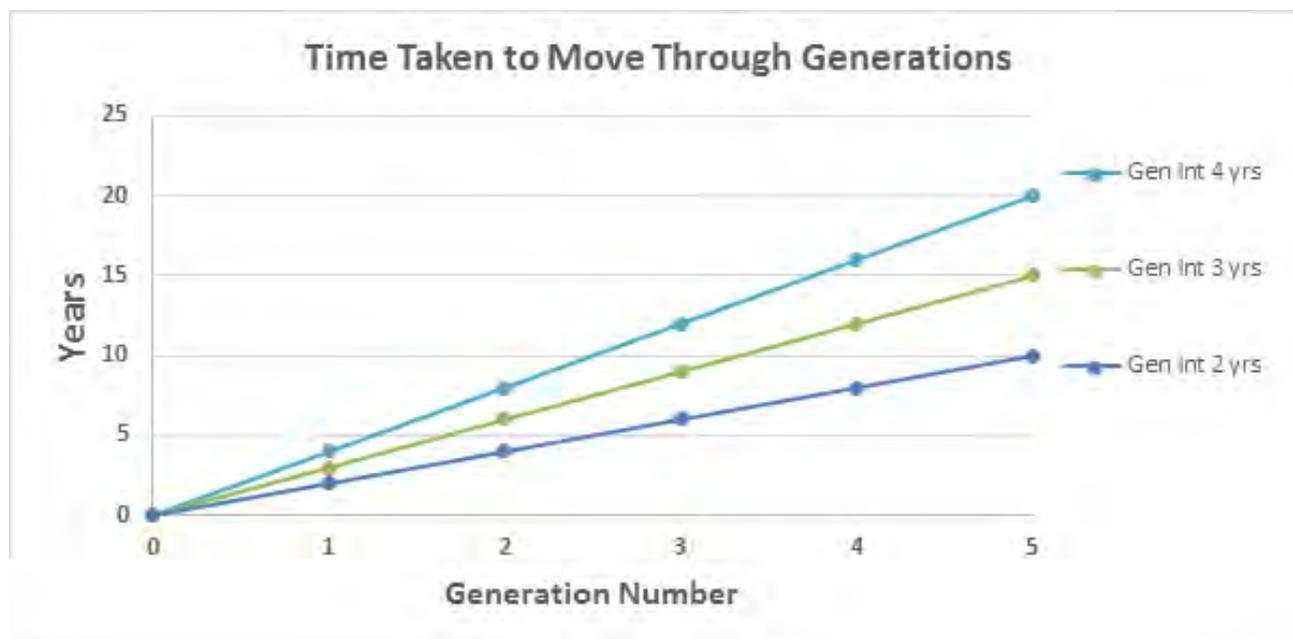


Figure 2: Years required to move through generations depending on generation interval

Figure 1 shows that when high ranking rams are mated to lower ranked ewes, genetic progress is rapid in the first couple of generations. Hence Mr Yates' goal of doubling the rate of genetic gain is very feasible. Thereafter, genetic gain slows as the "gap" is much smaller once entering final 20th percentile. Good genetic gain can still be achieved providing good pedigree records, complete drop objective measurements are made and grouping structures are sound. Mr Yates will also look to use the mating software package "Matesel" to further tweak breeding programs to enhance complimentary matings between individual rams and ewes.

Once rams that are born in the Barwon and Kubura nucleus rank in the top 10%, Mr Yates will begin to use genomic testing on ram selection candidates to maintain higher rates of genetic gain. Research suggests that genomic testing the top 20% of ram selection candidates (based on ASBVs) can lift rates of genetic gain by up to 30% for indexes that include hard-to-measure traits such as intra-muscular fat, tenderness and lean meat yield. Mr Yates is keenly following advice from the latest research and will continue to look for ways to improve his rates of genetic gain.

Currently, the generation interval for Kubura and Barwon studs is between 3.2-3.5 years. If this generation interval was kept constant it would take 7-17 years depending on what ranked ram teams are used in the future (Figure 2). However when such highly-ranked rams are used, it is likely that more young progeny will be retained in the nucleus which would help decrease the generation interval. If the generation interval was to decrease by a full year, it would take 5-13 years for Barwon and Kubura studs to reach the top 20% average of the LAMBPLAN population for ASBVs (Figure 2). Accurate selection of high-performing young ewes and rams can be facilitated by using genomic selection. Genomic selection in terminal breeds will also become more important as meat eating-quality traits, such as intra-muscular fat and shear force, become characteristics meat processors will pay a premium or penalty on.

Summing Up

Breeding structurally correct sheep that rank in the top 20% for ASBVs is possible. To achieve this, Kubura and Barwon studs will need to select ram teams that rank at least in the top 10% of the LAMBPLAN population for the average flock ranking to climb into the top 20%. This will take at least 4-8 years making it a medium-term project.

Take home messages

- Breeding structurally correct sheep which rank highly in genetic evaluation is possible
- With only a few current sires ranking in the top 10%, utilising outside genetics is imperative to lift flocks up to the top 20% and beyond
- Lifting your flock to the top 20% of population can be achieved in as fast as 2 generations
- Consult with an advisor to optimize your measuring and mating strategies

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.
- Mark Yates 0427 203 524 mark@barwonstud.com.au
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