'MERINO BENCHMARK' - DEVELOPING ON-STUD ACROSS-FLOCK PERFORMANCE EVALUATION

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SUMMARY

Across-stud performance evaluation in the Merino industry has been slow to develop due to the industry structure and costs involved in making the required adjustments. In 1996 eight breeders from all mainland states of Australia formed an across-stud evaluation scheme - MERINO BENCHMARK. The breeders in conjunction with NSW Agriculture have now developed the evaluation to provide a practical and efficient breeding and marketing system. Quality assured data and accurate comparisons of animals from different genetic types have been achieved. The group has doubled in size and has established procedures that will allow it to be the basis of an expanding across-stud service.

Keywords: Merino, breeding, across-flock, genetic groups, benchmark

INTRODUCTION

A survey of NSW ram breeders (Casey and Hygate 1992) showed that 28 % of stud progeny had sire pedigree and 6 % had sire and dam pedigree. In the majority of flocks pedigree was not captured in the performance records. Of the progeny bred, only 17 % were sired by rams from another stud but not all were single sire mated. Therefore, while the Merino industry has a very high level of within-stud evaluation, the low level of pedigree recording and suboptimal across-stud linkage (Miraei Ashtiani and James 1992) has severely restricted to the introduction of across-stud evaluation by a high proportion of ram breeders. For many individual breeders the cost involved in establishing sire and/or dam pedigree and the recording that is the basis of across-flock evaluation in other industries would be very significant.

The ram breeding industry as a whole has not been convinced that across-flock evaluation based on-stud has an industry benefit, can be achieved in practice or their fellow ram breeders can be relied on to accurately carry out the recording. Individual breeders also feel that across-stud evaluation has the potential to threaten their marketing and business returns.

Thus, a multi-option approach to genetic evaluation is the most suitable approach to providing the range of needs at the best price. A range of genetic evaluation options are in place and are providing benefit to the breeders using them. Those wishing to conduct within-stud evaluations can use the services provided by fleece measurement laboratories using RAMPOWER 2000 software to obtain genetic performance information (Estimated Progeny Values and Index) in combination with the breeders' choice of other records. For breeders who want to obtain more complex within-stud evaluation or across-stud evaluation, several consultancy services are available to provide such extended services. Some consultants are now servicing the small but growing number of breeders who wish to regularly obtain across-stud evaluation with a number of other studs. Breeders who see a

benefit in on-stud across-flock evaluation and can develop the necessary recording will encourage the required technology and the demand that will increase participation by further breeders.

METHODS AND RESULTS

Development of across-stud evaluation. The short period of sire referencing in the mid 1980s, and more significantly, Central Test Sire Evaluation (CTSE), has introduced many ram breeders to the benefits of across-stud evaluation. CTSE has continued to grow from a single site in 1987 to 12 sites across Australia in 1999 (Swan *et al.* 1998). Breeders have obtained practical experience in the conduct of across-flock evaluation. They have obtained the benefits from being consistently able to make genetic gain from using proven high performing sires and/or selling semen from a sire which had performed well in CTSE.

In the early 1990s NSW Agriculture's consultancy service to Merino breeders - Advanced Breeding Services - experienced significant demand from ram breeders wanting to link their on-stud evaluation to other flocks. As a result, two forms of across-flock evaluations were carried out, (i) combined studs' analysis for breeders who regularly traded in rams or semen, and/or (ii) linked analysis that compared (benchmarked) sires evaluated on-stud with those in CTSE, in some cases both Medium and Fine. The majority of these across-flock evaluations were carried out so the breeders involved could accurately purchase semen. A significant number of breeders also used their linked analysis to benchmark the performance of their semen sires and/or flock rams and thus convey an industry value to clients. CTSE was commonly a valuable component of these different analysis - providing linkage between flocks, additional animals to the results, and/or an industry benchmark.

Merino Benchmark operation. As the number of breeders obtaining the different forms of across-flock analysis increased, it became apparent to the breeders involved that a joint analysis between several breeders could significantly improve the breeding and marketing value they obtain. They also recognised that efficiency and accuracy of their analysis could be improved. Thus, in 1996 eight stud breeders formed a cooperative group - MERINO BENCHMARK - to develop across-stud evaluation (Litchfield *et al.* 1998).

To ensure the development was practical, breeders from a wide range of studs were involved. The group had a large range in pedigree recording (full pedigree to limited sire pedigree), size of flock (14,000 to 350 ewes), type of linkage with other flocks (sire linkage outward only, inward only or a combination), environment (low rainfall pastoral, high rainfall pastoral, and mixed farming - both summer and winter rainfall) and genetic performance for fleece weight, fibre diameter (superfine to medium) and body weight. Some of the studs were old and well established, others were new. Some studs were self contained parent studs, others daughter studs, multi-source studs, or group breeders. All the studs, however, had in common some across-flock evaluation experience to ensure they could make a well informed input into the development process. The group's aim was to produce an accurate comparison of animals between flocks that was of practical value to breeders who wished to benchmark performance, buy and/or sell superior animals. The breeders established the need to compare animals from all genetic types, to be benchmarked to an industry standard (e.g. CTSE) and report relative to each stud's personalised index as well as standard indexes for marketing.

Firstly stud records were made available to NSW Agriculture to research a relevant analysis and then in conjunction with breeders, develop an appropriate result format. The breeders developed quality assurance standards (that will be maintained through an auditable manual) and liaised with industry bodies to ensure they used data and reported results in a responsible form. Three annual reports (private and public) have now been produced. An improved breeding and marketing system has resulted. The majority of members were primarily involved to improve their genetic progress, and they have done so. In addition the increased value of members trade in rams and semen within and outside the group has far out weighed the across-stud analysis and reporting costs incurred by breeders. These returns however have not been evenly spread between members.

In 1998 the eight foundation members felt that the development process and their experience with the results indicated the output was both accurate and relevant, and therefore membership could be extended to other breeders who would contribute to further development. The only restriction on new members was that their stud breeding program and recording system met the quality assurance standards of the group.

Merino Benchmark data and analysis description. The recently completed MERINO BENCHMARK analysis (99A) contained data from 15 studs, 4 Fine-wool and 6 Medium-wool CTSE sites. In total 104,541 animals were involved (a range of 290 to 14,258 among studs), 1,084 sires were progeny tested in 285 year/site/sex groups. The studs contributed, on average, 5.8 years of data (range 3 to 10). Measured trait performance across year-site-sex groups were, GFW 1.9 to 9.5 kg, FD 15.2 to 23.4 μm, CV of FD 16.6 to 25.9 % and BWT 22.3 to 76.9 kg.

Previous analysis of data used in the initial MERINO BENCHMARK report (Atkins *et al.* 1998) identified the need for logarithmic transformation of fleece weights, fibre diameters and body weights to account for the dependence of the variance on the mean across measured groups. Each stud flock, Medium and Fine CTSE were analysed separately by BVEST. From the sire solutions, a total of 98 sires (9 % of the total sires, contributing 12.5 % of the total progeny) were identified that provided genetic linkage across flocks. Of these link sires, 36 were represented in 2 or more studs, while 62 provided links between a single stud and either or both of the CTSE schemes.

The de-regressed sire solutions for link sires were used to identify differences between flocks which were used as the basis for identifying genetic groups, that is, groups of flocks that differed significantly for 1 or more traits. The analysis identified 5 genetic groups each containing between 1 and 6 studs and CTSE schemes. Each genetic group was analysed separately and the animals from groups combined using an estimated genetic group effect and weighted solution for sires producing progeny in more than 1 group. In total 15 % of animals had full pedigree and 31 % had sire only pedigree - the remainder had no pedigree - although some still contributed to linkage by later becoming parents.

The need for genetic groups in the analytical model was demonstrated for a set of research data by Atkins *et al* (1999). In the MERINO BENCHMARK analysis, the average progeny values for sires used in each stud had a range of 12 % for clean fleece weight and 0.9 μm for fibre diameter. Without genetic groups in the model these differences shrink to 4.5 % and 0.45 μm respectively. The effect on the relative performance of animals in different studs is significant. The elite animals, which are

at present of most interest to breeders using across-stud analysis, are dramatically affected.

DISCUSSION

Many breeders will continue to have a low level of pedigree recording and sub-optimal genetic linkage between studs. Therefore the full range of genetic evaluation options will need to be maintained for the foreseeable future. The inclusion of a great deal of on-stud data - much of it that is not relevant to across-flock analysis - into a central data base will not assist across-stud evaluation and will result in inefficiencies and inaccuracies. However, the continued development of viable across-flock recording (CTSE and across-stud) will help to overcome the major limitations to widespread use of across-flock recording - linkage between studs, recording of pedigree and the interest from a wider group of breeders. Quality control both on-stud and by data processors is critical to achieving industry acceptance. A great deal of data preparation and further research will need to be undertaken to ensure accurate pedigree, identification of unlinked groups and improved processing procedures to account for genetic groups effects. Unless these take place, breeders will not be satisfied with the performance of introduced rams and ewes. Poorer than expected performance will result in dissatisfaction and set back the confidence that has been developing in across-flock evaluation.

Analysis procedures that will allow cost efficient data processing and wider use of an across-flock data-base are critical to increasing the use of across-stud evaluation. These procedures have been developed during the recent analysis. The MERINO BENCHMARK group will now have the opportunity to obtain a Benchmark report when each additional set of their data is added with only a very small increase in time (and cost) relative to their with-in flock reporting. No time delay will be experienced due to waited for a scheduled across-flock analysis. Breeders outside the group will also be able to benchmark to the groups industry standard. The opportunity exists to allow other relevant service providers to carry out this form of reporting. Breeders with the required quality assurance who wish to become members could be introduced into the next group analysis and obtain full group benefits.

At present the considerable value of across-flock evaluation is largely limited to ram breeders, with a trickle down of the genetic progress to commercial flocks. The use of across-stud evaluation to market flock rams will provide a major opportunity for commercial wool growers to increase genetic progress in the short term by identifying superior rams from a single stud or from a range of studs. The competition between studs for ram sales that will result will be the biggest test for the fledgling across-stud evaluation groups. Ram breeders - such as those in MERINO BENCHMARK - who are interested in progressing across-flock evaluation will be best positioned to take up this challenge.

REFERENCES

Atkins, K.D., Gilmour, A.R., Thompson, R., and Coelli, K.A. (1998) *Proc. 6th Wld. Congr. Genet. Appl. Livest. Prod., Armidale, Australia.* **24**: 3-10

Atkins, K.D., Mortimer, S.I., and Casey, A.E. (1999) *Proc. Assoc. Advmt. Anim. Breed. Genet.* **13**:58

Casey, A.E. and Hygate, L.C. (1992) NSW Agriculture Animal Industries Report 2, 28pp

Litchfield, J., McLaren, J.G., Cox, R.J., Brennan, C.W., England, P.J., Willis, W.K., Vizard, A.L., Sandilands, C.W. (1998) Merino Genetic Benchmarking. In AASMB 1997 Yearbook: pp.77

Miraei Ashtiani, S.R. and James, J.W. (1992) *Proc. Aust. Assoc. Anim. Breed. Genet.* **10**: 476

Swan, A.A., Coelli, K.A., Casey, A.E. and Atkins, K.D. (1998) Merino Superior Sires. Central Test Sire Evaluation Results. No.5 - 1998. 32p