WETHER TRIALS AND THEIR ROLE IN MERINO BLOODLINE EVALUATION

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SUMMARY

Combined analyses of wether trial data have provided commercial Merino producers with reliable estimates of differences among bloodlines, based on the performance of their client flocks. The evolution of wether comparisons as a vehicle to obtain information on bloodline differences is briefly described along with the substantial changes in the genetic evaluation environment since the inception of the combined analyses. A future combined analysis of wether and ewe productivity trait data with genomic flock profiling may well represent the next step in the evolution of wether trials in Australia.

INTRODUCTION

Merino wether trials started as small scale commercial producer production competitions in several locations from the late 1970s. Simultaneously, resource flocks (such as D flock, Mortimer and Atkins 1989) showed that large differences existed among Merino studs and bloodlines that ram buyers could access when purchasing flock rams. Although a single wether trial provided little or no information on bloodline performance an innovative across-trial analysis was devised that combined all available data to produce reliable estimates of differences among studs, based on the performance of their client flocks (Hygate and Atkins 1988). At that time, there was no comparative across-stud performance information available in the public domain.

This paper will review the use of combined analyses of wether trial data to provide commercial Merino producers with information on Merino bloodline differences and briefly describe the evolution of wether trials as a vehicle to obtain information on bloodline differences. Given the changes in the genetic evaluation environment since the inception of the combined analyses, a future role of the combined wether trial analyses will be proposed.

THE BEGINNINGS

While resource flocks were demonstrating to commercial producers the large differences that existed between Merino bloodlines in wool production traits, wether trials became widespread and were used as a basis for regional breeding extension activities. In contrast to the resource flocks, wether trials had several practical advantages. Wether trials were located in a range of environments and were able to more cost-effectively collect wool production data on a wider range of bloodlines, albeit the bloodlines were represented by teams of wethers selected from commercial flocks. As importantly, the identity of the bloodline represented by each team was publicly reported, whereas non-disclosure agreements prevented this happening with the resource flocks. It became apparent that the data from wether trials could be useful in genetic evaluation of bloodline sources.

Following the pilot study of Hygate and Atkins (1988), the first attempt to comprehensively report on Merino bloodline performance was provided by Atkins *et al.* (1992). Their report used data from 48 wether trials, conducted in NSW between 1981 and 1991, and included robust estimates of performance in wool production and quality traits. Key features of the wether trials analysed were the wide distribution of trials across all regions of NSW, random sampling of teams of wethers and an average of at least 10 wethers per team. Regional variation in, and economic evaluations of bloodline

performance, as well as guidance on interpretation and application of the results, were provided. The limitations of this form of bloodline evaluation were noted: potential for inaccurate description of the ram source; occurrence of non-random selection of wethers; and the historic nature of the data.

INFORMATION DELIVERED

The first across-trial analysis published by Hygate and Atkins (1988) reported on records of greasy fleece weight, fibre diameter (FD) and yield, and the derived trait of clean fleece weight (CFW). This initial publication was a 'proof of concept' using data from 12 wether trials across NSW, flagging a range of opportunities which were to become part of the future analysis and reporting of wether trial comparisons – now known as Merino Bloodline Performance.

Table 1 summarises the number of wether trials, teams and bloodlines represented in the across-trial analyses since 1992. Bodyweight and assessments of wool quality (inferred from wool type) were included in the analysis reported in 1992. Subsequently, stability traits (relative change with age in CFW and FD) were analysed and reported. The 2005 and later reports, plus supporting information, are accessible via the web (www.merinobloodlines.com.au).

Table 1. Summary of wether trials, bloodlines and teams represented in the Merino Bloodline Performance reports since inception

Year of published report	Number of wether trials contributing data	Bloodlines			Number of teams
		High and Medium Accuracy	Low Accuracy	Total	
1992	48	53	80	133	988
1995	54	61	83	144	1,110
1996	76	73	113	186	1,417
1998	67	75	117	192	1,184
2000	68	65	131	196	1,365
2005	58	71	95	166	1,182
2007	63*	137	85	222	1,087
2010	57*	145	123	268	1,285
2014	23*	71	1	72	922
2016	26*	77	0	77	457
2018	25	73	0	73	482

* Data from both ewe productivity trials and wether trials contributing to these reports.

Initially, economic analyses were reported using gross margins with different price periods selected to reflect a range of market scenarios (low to high micron premium; current versus long term average prices). Gross margins were reported on a per head and per dry sheep equivalent (DSE) basis to allow for differences in size and hence stocking rate.

Early attempts to model the whole farm economic impacts of differences between bloodlines were reported by Wilson *et al.* (1996). Their analysis, and that of Coelli *et al.* (2000), included the extrapolation from wether data to modelling of ewe enterprises. The 2010 analysis saw a change from gross margin to gross income, with gross income being calculated with a greater emphasis on income

from meat (ratio of fleeces to surplus sheep sales of 2.5 to 1, compared with earlier reports where the ratio was 4:1) (Martin *et al.* 2010). Grassgro™ (Moore *et al.*1997) has been used to model the financial performance of the bloodlines since 2014. Using base parameters for wether production systems at Bookham, Narrandera and Woolbrook (replaced by Armidale in 2018), the livestock production parameters were the outputs of the bloodline analysis. Three different price scenarios (median, 30th percentile and 70th percentile) can be simulated across the three environments.

Bloodline parameters and financial performance have also supported delivery of other activities such as the 'Merino Breeding & Selection' workshops (Hatcher and Bayley 1999), and the tool 'Bloodline benchmark' (Coelli *et al.* 1997). Other products that support the Merino Bloodline Performance analyses include the guidelines for the conduct of wether comparisons and on-farm genetic evaluations (Martin *et al.* 2005) and software (Sheep Wether Comparison – SWC) that supports collection and reporting of wether comparison results at individual sites, and facilitates provision of quality data to the across-trial analysis (Semple 2005).

CHANGES IN THE EXTERNAL ENVIRONMENT

Since the first wether trials were published, there have been significant changes to the Australian Sheep industry. The collapse of the reserve price scheme and a significant increase in value of surplus sheep has seen breeding objectives for a significant proportion of the sheep industry change to a more dual purpose (meat and wool) focus. This has generated increased interest in traits such as growth, carcase and reproductive performance, leading to the breeding ewe flock evaluations mentioned earlier. Sheep Genetics now runs MerinoSelect, the national genetic evaluation service (Brown *et al*. 2007) for Merino ram breeders, while a range of on-farm technologies have made the monitoring of animals and flock management easier.

The delivery network for wether trials has also changed significantly. The reduction in public sector extension by the state departments across the country has meant that the location and duration of wether trials is now largely in the hands of grower groups.

WHERE TO NEXT?

The need for wether trial information as the major source of across-flock differences in Merinos is less urgent today as more Merino studs participate in MerinoSelect. However, there are still many ram sources either not enrolled in MerinoSelect or that have inadequate or unreliable linkage with other flocks. A key question is "Do wether trials represent the only source of data in continuing to provide reliable and comparable bloodline differences for ram sources not available through MerinoSelect?"

Genomic flock profiles (Swan *et al*. 2018) are a relatively new source of data that provide information on the breeding value of flocks for various traits, including previously expensive or difficult to measure traits. Flock profiling combined with the range of phenotypes that can be recorded within wether trials, as well as the important forum for interactions between producers and service providers that wether trials promote, offer new opportunities for commercial evaluation of Merino bloodlines. For both adult CFW and FD there is good agreement between the genomic breeding values obtained from flock profiles of the single bloodline teams of the Peter Westblade Memorial Merino Challenge 2016-2018 (S. Martin, C. Wilson and T. Granleese, unpublished data) and the bloodline deviation estimates from an analysis of the 4 challenges conducted between 2010 and 2018 (Figure 1).

An innovative combined analysis of information from wether trials, ewe productivity trials and flock profiles can provide valuable and accurate information on across-stud differences in addition to that which is available in MerinoSelect.

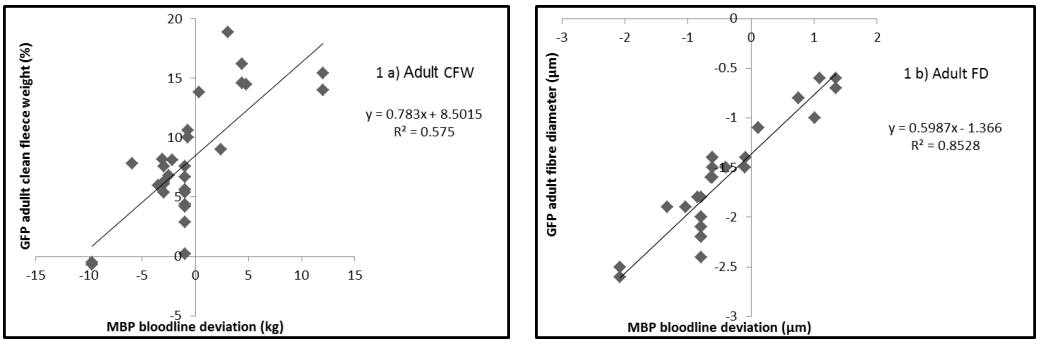

Figure 1. Relationship between mean bloodline deviations and genomic flock profile of single bloodline teams of the Peter Westblade Memorial Merino Challenge 2016-2018

ACKNOWLEDGMENTS

Merino Bloodline Performance and earlier reports were funded in part by Australian Wool Innovation and its predecessors. These reports were only possible due to the diligent efforts of the Committee members of the contributing wether trials in collecting data and making it available for further analysis. The efforts are acknowledged of current and past staff of the various state Departments of Agriculture, particularly NSW, in liaising with and supporting those committees in providing useable data for analysis, and in the conduct and reporting of the analyses.

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