MERINO FLOCK PRODUCTION CHARACTERISTICS HAVE A MAJOR IMPACT ON WHOLE FARM PROFIT

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SUMMARY
We used Agriculture Western Australia's Model of an Integrated Dryland Agricultural System to compare the profitability of Merino flocks whose production characteristics were derived from Western Australian wether trial data. Differences in fleece weight, fibre diameter and live weight between flocks resulted in differences of up to $96,000 pa in whole farm profit.
Keywords: Wether trial, benchmarking, flock comparison, farm profit, MIDAS

INTRODUCTION
Wether trials are one of the few means available to commercial woolgrowers for assessing the genetic merit of their flocks. The amalgamation of wether trial data to produce bloodline comparisons (Coelli *et al.* 1996, 1998) or linked analyses across sites (Clarke and Windsor 1999) allows trial participants to benchmark their own flock performance across a wide section of the wool industry.

Economic analysis of bloodline performance indicated a difference in gross margin of $10.40/DSE (Coelli *et al.* 1998) which equated to a range of net farm income from -$8 to $136/Ha (Sackett 1998).

Gross margin analysis or farm profit analysis based on wether performance alone does not represent the different classes of sheep which make up a typical Merino flock and does not consider the other enterprises which compete for resources and contribute to farm profit. This study used a whole farm mathematical model to investigate the influence of differences in flock production characteristics on whole farm profit.

MATERIALS AND METHODS
Wholefarm profit was calculated for a typical farm running a self replacing flock of sheep based on the genotypes represented in the linked WA wether trials (Clarke and Windsor 1999). Several steps were involved:

Flock performance. Calculation of clean fleece weight (CFW) and fibre diameter (FD) for other classes of stock on the farm from the wether trial results (Table 1). Estimates of the CFW and FD for different age groups of animals was based on results from the Katanning Base Flocks (J. Greef pers. comm.). Mated ewes were assumed to cut 10 % less wool which was 2 % finer than wethers of the same age (adapted from Turner and Young 1969).

Table 1. Scaling factors used to calculate CFW & FD for different age groups and for ewes from 2.5 year old wether data from wether trials

Age at Shearing	CFW	FD
Lambs	-70%	-8.5%
Hoggets	-10%	-8.5%
2.5yo	From trial	From trial
3.5yo	-2.3%	+2.6%
4.5yo	-4.4%	+3.9%
5.5yo	-4.9%	+5.2%

Fleece values. Calculation of fleece value for each class of stock from CFW and FD. The value of clean fleece wool by fibre diameter was based on price received at Fremantle during 1993 to 1997 inclusive and a regression equation of clean fleece value and fibre diameter was developed.

$$\text{Price} = 12351.7 - 1277 * FD + 46.4 * FD^2 - 0.568FD^3 \quad (r^2 = 0.97).$$

The clean fleece price was reduced by 10 % to approximate a sweep-the-board price which allows for a proportion of shorn wool being pieces (8 %), bellies (8 %) and locks (4 %). The sweep-the-board price was then further reduced by 4 % for wool tax and 15c/kg for selling costs to achieve a net in the bank, sweep-the-board clean price (NIB-STB). Fleece value was calculated by multiplying the CFW by the resulting NIB-STB price.

Calculation of sale sheep values. The sale price of ewes was based on selling the ewes as breeders for a set price per head but the sale price of wethers (as shippers) was based on a price per kilogram of liveweight (LW). This approach over-estimates the impact of LW on the sale price of wethers but it under-estimates the impact of LW on the sale price of ewes.

Feed intake. Calculation of energy requirements and intake capacity of each class of stock based on liveweight of animals using Australian Feeding Standards (SCA 1990). The different liveweight of wethers measured in the wether trials was represented by altering the standard reference weight (SRW) for each team. This approach assumes that both energy requirement and intake capacity increase proportionately with increased liveweight and that conversion efficiency is not altered.

Farm Profit. Calculation of wholefarm profit using the Great Southern version of MIDAS (Morrison *et al.* 1986, Young 1995). MIDAS is a wholefarm optimising model that calculates the most profitable rotations, crop area and stocking rates given productivity of crops, pasture and sheep, feed requirements of sheep and costs of producing crops and running sheep. For this analysis the model was constrained to the same flock structure for each team, selling ewes at 5.5 years and wethers at 2.5 years. The flock was a self-replacing flock lambing in July/August with shearing in January and sheep sold off-shears in January.

The farm profit calculated by MIDAS includes an operator allowance, depreciation, repairs and maintenance, professional fees, rates, telephone and electricity. It also includes an interest cost on holding assets. This cost is equivalent to having an interest only loan to finance the purchase of machinery and livestock.

RESULTS

Farm profit ranged from $4 000 to $101 000 per annum (Figure 1). The most profitable flocks all cut more wool than the average (Figure 1). None of the most profitable third of flocks was more than a micron broader than the average. Six of the eight most profitable flocks combined an above average wool cut with a fibre diameter that was average or finer.

Farms running the most productive flocks are predicted to have an optimal crop area about 8 % less than the average. Running the least productive flocks means that a 13 % increase above the average crop area would be required to maximise farm profit.

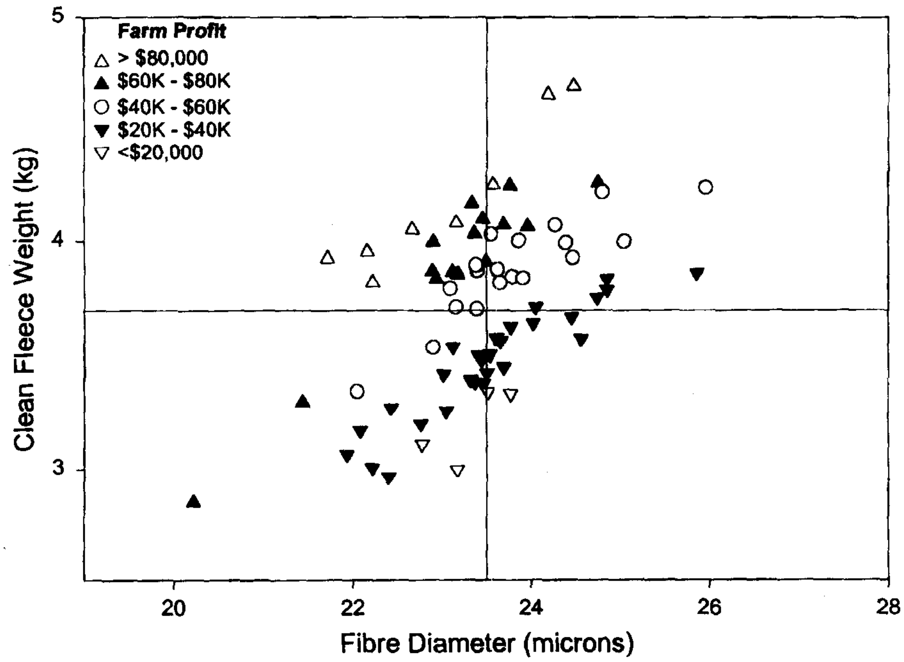

Figure 1. MIDAS whole farm profit derived from wether trial production characteristics.

Net value of the 4 tooth wether fleece accounted for 94.4 % of the variation in wholefarm profit. Including liveweight accounted for a further 3.2 %. Using fleece value of the whole flock (by including different age groups and ewes) accounted for a further 2.1 % and including crop area only made a small impact (0.2 %). This probably underestimates the influence of optimising crop area as crop area is closely correlated to fleece value and would be accounted for as a fleece value effect.

DISCUSSION

These results emphasise the importance of Merino flock production characteristics to farm profitability and the viability of the wool production. This highlights the opportunity available to many Western Australian woolgrowers to increase farm income by identifying and acquiring genetically superior animals. The high mobility of commercial woolgrowers between ram sources (Pope *et al.* 1996) will, if supported by good decision making tools, help to maintain the economic viability of their wool enterprises.

Farm profit ranged from $4,000 to $101,000 or $5.50 - $105 per winter grazed hectare and this corresponds closely to the -$8 to $136/Ha estimate derived from the data of Coelli *et al* (1998) by Sackett (1998). Using wholefarm analysis increases the accuracy of predicting the profitability of different genotypes. The majority of this increase in accuracy comes from calculating the fleece value of the whole flock rather than just the fleece value of the wethers. Not accounting for the fleece value of the whole flock underestimates the profitability of finer flocks because in these flocks the premium received for the hoggets wool is greater than the premium received in broader flocks.

An implication of the way energy requirement and CFW have been calculated from team LW and team CFW is that heavy cutting sheep (of the same LW) have a higher wool growth efficiency. This contrasts with heavy sheep which we have assumed achieve this by eating more per head while having the same conversion efficiency of energy into LW. This means the level of feed utilisation per kg does not vary between genotypes of sheep and that comparisons of relative performance of genotypes are valid across a range of stocking rates. These assumptions need to be examined in detail to ensure the economic implications of wether trials are calculated correctly.

These data support the conclusion that differences in the genotype and performance of Merino flocks have an important effect on farm profitability and also show that poor flock performance cannot be fully compensated for by changes to the farm enterprise mix. This highlights the importance of genotype selection as a significant farm business decision.

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