RELATIVE FINANCIAL PERFORMANCE AND ECONOMIC VALUES FOR MERINO FLOCKS WHERE SURPLUS PROGENY ARE SOLD AS LAMBS OR HOGGETS

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SUMMARY

A computer simulation was undertaken to compare financial performance in two hypothetical Merino flocks, either with average reproduction and growth or with high reproduction and growth, involving different options for selling of surplus progeny (i.e. as lambs, as hoggets or retain wethers to 5.5 years age). Financial outcomes improved when offspring were sold as lambs. High reproduction was beneficial only where surplus progeny were sold as lambs and gained the meat premium. Relative economic values that could be incorporated in the weighting of breeding values in a selection index were also estimated. In all cases considered the relative values of reproduction and liveweight were lower than for reduction of average fibre diameter and, or, increased clean fleece weight. Increased body weight had low or negative values, except in the flock and option where a high number of heavy weight lambs were sold, due to effects on potential stock numbers.

Keywords: Merino lambs, income, relative economic values

INTRODUCTION

Sustained moderate to low wool prices together with relatively high lamb prices has increased interest among Merino breeders in the meat commodity. A computer simulation (Abbott 1992) found that reproductive rate generally resulted in small positive or negative changes in profitability over a wide range of market circumstances and flock structure had little impact on relative economic values for clean fleece weight, fibre diameter, liveweight and reproductive rate, except at high prices for meat and low prices for wool. Recent economic circumstances involve premium prices for lamb and greater interest in disposal of most surplus stock as lambs rather than retention to hogget age or as adult wethers. These circumstances were not fully considered in the original simulation and are assessed due to current relevance.

MATERIALS AND METHODS

Market circumstances and costs relevant to the 1997/98 season (moderate wool and high lamb prices) were used to assess financial performance and determine economic values for three hypothetical flocks with three optional structures, as follows:

Flock 1. Average lamb weaning and average growth rate.

- Option 1. Sell all progeny, other than breeding ewe replacements, as hoggets.
- Option 2. Sell all progeny, other than breeding ewe replacements, as lambs.
- Option 3. Sell surplus ewe progeny at hogget age and retain wethers until 5.5 years.

Flock 2. High lamb weaning and high growth rate (Options 1, 2 and 3).

The computer model (Abbott 1992) evaluated the financial effect of a modest genetic change (1 %) in the expression of each of four traits (clean fleece weight, average fibre diameter, liveweight and

reproduction) by summing the changes in gross margin which would follow the introduction of genetically superior seedstock for one mating only. Future changes in gross margin for the 20 years after the introduction were discounted by 5 % per annum to produce a net present value for each trait. When a superior ram injects genes into a self-replacing flock the genetic change is dispersed through the flock until diluted by subsequent matings. After 20 years little genetic change remains and its economic impact is even less important when one considers the discounted value of future cash flows.

Wool production of the breeding ewes in the hypothetical flocks averaged 4.0 kg for clean fleece weight, 22 λm for fibre diameter and 57 kg for body weight. Grazfeed™ (1998) was used to estimate the energy required from feed for each lamb weaned between mating and sale at 9 months age and to hogget shearing. The program adjusted the number of breeding ewes to produce an equal total DSEs from all stock types combined. In the case of lambs sold, the DSE allowance (Lambfi) involved the extra feed costs for ewes during pregnancy, of ewes and lambs during rearing (3 to 4) months, and lamb growth to 9 months age and sale weights of 34 kg in Flock 1 (DSE = 0.995) and 42 kg in Flock 2 (DSE = 1.276). In the case of lambs retained to hogget age, the allowance involved the required energy intake between 9 and 18 months of age (Flock 1 DSE = 1.252 and Flock 2 DSE = 1.133). For the previous 3 months their energy requirement was included in Lambfi. Adult ewes and wethers (if retained) were culled at age 5.5. years and survival within age groups was 0.95 for weaners, 0.96 for hoggets and reduced to 0.93 for 4.5 year olds. Weaning averaged 80 % for Flock 1 and 100 % for Flock 2 with highest values occurring among the oldest ewes.

The clean wool values used for each micron unit between 19 λm and 28 λm were the 1997/98 season averages and were $1.42, $1.03, $0.58c, $0.81c, $0.19c, $0.14c, $0.20c and $0.12 per clean kg, respectively. Average wool price in 1997/98 was $6.84 per clean kg which is intermediate relative to the peak in 1988/89 ($9.89c) and low of 1992/93 ($4.79c) or the current market (Australian Wool Exchange 1999a). Staple length discounts reduced from –0.6 % of value for 19um wool to –0.1 % for each micron between 24 to 28 λm in accord with trends reported in Pricemaker (Woolmark 1998). Wool selling costs were derived from the Sheep's Back to Mill (Australian Wool Exchange 1999b) and amounted to 10.8 % of gross wool value. The values used for livestock sales was $1 per kg liveweight for lambs, $0.50 per kg live weight for hoggets and $0.34 per kg for culls at 5.5 years (Meat Research Corporation 1997; F@RMING Online). These values seem realistic while sheep numbers remain low. Livestock selling costs included transport, yard fees, commission, insurance and transaction levy, and when combined amount to about 15.5 % of the gross value of livestock sales. Other costs included were shearing ($3.20 per head for lambs and ewes and $4.74 for rams), crutching ($0.54 per head for all sheep), drench (all sheep twice at 0.006 x body weight), dipping (all sheep once at 0.0056 x body weight), vaccine ($0.14 for adult sheep and $0.28 for weaners), marking and mulesing ($0.45 for each lamb weaned) and ram owning and maintenance based on $500 purchase price adjusted for deaths ect.

RESULTS AND DISCUSSION

Table 1 details the flock structures and financial performance of the two Flocks and three Options considered. Wool income ranged between 89 % of the total income for Option 3 in Flock 1 to 58 % for Option 2 in Flock 2. Gross margins were highest for Option 2 when as many lambs as possible were sold. The lamb sale Option 2 improved the gross margin by 10.3 % (Flock 1) and 20.6 %

(Flock 2) over Option 1 (hogget sales) and 7.4 % (Flock 1) and 16.5 % (Flock 2) over Option 3 (wethers retained). Comparing the two flocks, high reproduction and growth was not an advantage unless surplus progeny can be sold as lambs and gain the meat premium.

Table 1. Flock composition and financial performance

	Flock 1			Flock 2		
Characteristic	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Breeding ewes	3,178	4,020	2,116	2,559	3,292	1,695
Adult wethers shorn	0	0	2,739	0	0	2,771
Lambs sold	0	1,921	0	0	2,246	0
Hoggets sold	1,428	0	192	1,634	0	314
Adult (cfa) sold	697	882	1,102	561	723	1,018
Wool (clean kg)	24,195	23,960	27,566	22,002	20,604	26,153
Fibre diameter (λm)	21.2	21.4	21.5	21.1	21.3	21.4
Wool income ($)	152,378	146,783	171,614	139,403	126,119	163,250
Sheep income ($)	41,214	68,035	20,338	44,366	90,223	21,882
Gross margin ($)	137,084	151,200	140,772	133,297	160,728	138,009

The net present value of a 1 % increase in each trait over the 20 year period (NPV) was divided by the NPV for clean fleece weight and this figure is reported as the relative economic value (REV) of each trait. The value of a 1 % change in the mean expression of each trait can be converted to the value of a one unit change by dividing the relevant REV by 0.04 (clean fleece weight), 0.22 (fibre diameter), 0.57 (liveweight) and 0.01 Flock 2 or 0.008 Flock 2 (lambs weaned) (Abbott 1992) and scaled to the current value of clean fleece weight. For example, using Flock 1 – Option 2 and the 1997/98 average wool price, the relative value of increase of a kg of clean fleece weight is $6.84, a micron reduction is $3.05, an extra kg of liveweight is $0.02, and an extra lamb is $9.92.

Table 2. Relative economic values ($) for a 1 % increase in each trait

	Flock 1			Flock 2		
	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3
Clean fleece wt.	1	1	1	1	1	1
Fibre diameter	-2.56	-2.45	-2.42	-2.58	-2.44	-2.42
Liveweight	-0.19	0.04	-0.38	-0.11	0.32	-0.34
Reproduction	0.12	0.29	0.08	0.10	0.35	0.06

REV's for reproduction and liveweight were all lower than for clean fleece weight and average fibre diameter. However, the flocks under consideration have relatively valuable wool (21 to 22λm) and the micron premium was relatively high. Reproduction was most important where surplus progeny were sold as lambs and gain the meat premium. The value of increased body weight was highest for Option 2 of Flock 2, where a high number of heavy lambs were sold, and low or negative in the other cases. The negative effects arise because the increased body weight of sheep leads to a reduction of adult numbers when the total flock DSE value is held constant.

This simulation may clarify for Merino producers the issue of genetic improvement of reproduction and growth in order to take advantage of slaughter lamb premiums. The heritability of hogget fibre diameter and fleece weight is high and generally it is considered that acceptable improvement of

these traits can be achieved on the basis of individual performances (Olivier *et al.* 1994; Barnett *et al.* 1998) as provided for in fleece testing services using Rampower (Ponzoni 1991; Brash and Rogan 1997). Heritability of weaning outputs is low to moderate, involves important maternal influences, and requires the benefit of pedigrees, relevant adjustments and BLUP breeding values to maximise genetic improvement (Snyman *et al.* 1997); as can be provided by Lambplan™ or Rampower. Selection on adjusted body weight is a simple alternative that can be used as an indirect indicator of potential weaning outputs (Snyman *et al.* 1998). Improvement of reproduction rate can sometimes be achieved through changes in management such as 'flushing' of ewes for mating (McInnes and Smith 1966), accelerated lambing (Schoeman 1990), later lambing (Fuller 1996) and culling dry ewes (Cloete and Durand; Lee and Atkins 1996). This paper suggests that extra lambs may not be a major benefit unless marketed prior to hogget age to gain the slaughter lamb premium. It also suggests that increases in liveweight alone may have a negative effect on profit, except with specific flocks structures and market conditions, due to the effect of size and consequently energy intake of sheep in the improved flock. The relative economic value of increased liveweight and reproduction can be over estimated when it is assumed that fixed resources are under-utilised and that feed costs are the only expense likely to rise.

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