ECONOMIC EVALUATION OF MERINO BLOODLINES INCLUDING RISK CONSIDERATIONS

K.D. Atkins and K.A. Coelli

CRC for Premium Quality Wool & NSW Agriculture
Agricultural Research & Veterinary Centre, Orange, NSW, 2800

SUMMARY

Production information for a large number of Merino bloodlines from combined analyses of commercial wether trials was used to evaluate gross margin per dry sheep equivalent for alternative ram sources. Quarterly market prices between 1993 and 1996 were used to examine the impact of production traits on both average economic value and variation due to market volatility. Fleece weight and fibre diameter were the dominant influences on economic value, both traits having an approximately equal contribution on the average but markedly variable contributions within individual sale periods. Coefficient of variation in gross margin across periods was used as a measure of market risk and it was concluded that variation in price had little influence on risk associated with using individual bloodlines except for the few bloodlines finer than 20μm.

Keywords: Merino bloodlines, wool, economic evaluation, risk

INTRODUCTION

Consumer requirements for apparel products have moved consistenetly towards lighter weight garments, which means wool of finer fibre diameter. This trend has been reflected by the raw wool market which has demonstrated a price advantage for finer wools over the last 10-15 years. Price volatility, though, has become a feature of the market since the Reserve Price Scheme was abandoned in 1991. Producers contemplating a change of ram source to a finer bloodline as a long-term strategy to change the diameter profile of their clip are cautious that variability in returns will lead to little if any financial advantage. In this paper, we use bloodline information derived from wether trials to examine the impact of variation in gross margins over the period 1993-96, a period notable for price volatility. The degree of risk associated with a change in bloodline source is then assessed.

MATERIALS AND METHODS

Data. The information used was the production performance measures of bloodlines reported from the combined wether trial analysis of Coelli *et al* (1996). Only 73 bloodlines which reached a specified level of accuracy were included. Gross margins for these bloodlines were reported for each sale quarter between the fourth quarter of 1992/93 and the first quarter of 1996/97, or quarters 8 to 21 in Figure 1. This period represented one of significant volatility in wool prices with a two-fold range in prices for most micron categories.

Bloodline production levels for clean fleece weight, fibre diameter and body weight were calculated from the overall means for the traits (4.6kg, 22.1μm and 51.4kg respectively) and the deviations reported by Coelli *et al* (1996). Prices used were the quarterly averages as provided by K. Stott, IWS Market

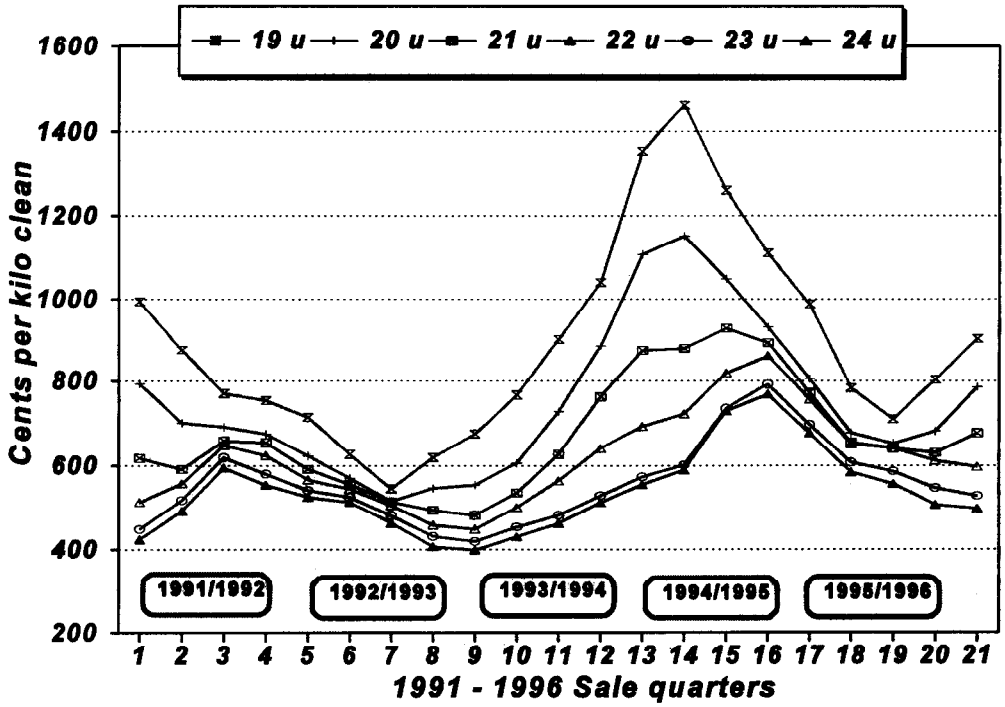

Figure 1 Quarterly wool prices for micron categories. Analysis periods were 8-21

Intelligence and "Wool Premiums and Discounts" reports. The price appropriate to a bloodline was estimated according to the bloodline performance levels for fibre diameter, style, length, colour and tenderness. The bloodline price was adjusted to a whole fleece value by allowing 25% of the fleece to be classed into non-fleece lines (10% bellies and locks, 15% skirtings), with values for these lines based on prices contained in "Wool Premiums and Discounts".

Income per wether for each bloodline was calculated as the product of clean fleece weight and adjusted price, less levies and wool selling charges. Variable costs per wether to account for shearing, crutching, jetting, dipping, drenching and the cost of wether replacement was applied across all bloodlines as detailed by Coelli *et al.* (1996). Gross margins per head were then estimated as the difference between net income and variable costs. To convert these to a common basis, a Dry Sheep Equivalent (DSE) rating for each bloodline was estimated, using a 45kg wether base, as:

$$DSE = (\text{body weight} / 45)^{0.73}$$

Analysis. The relative contribution of the production components to variation in gross margin among bloodlines within each period was assessed by analysis of variance. Variation in gross margin across periods was taken as a measure of market risk of using alternative bloodlines. The contribution of production traits to variability in returns was also examined by variance analysis.

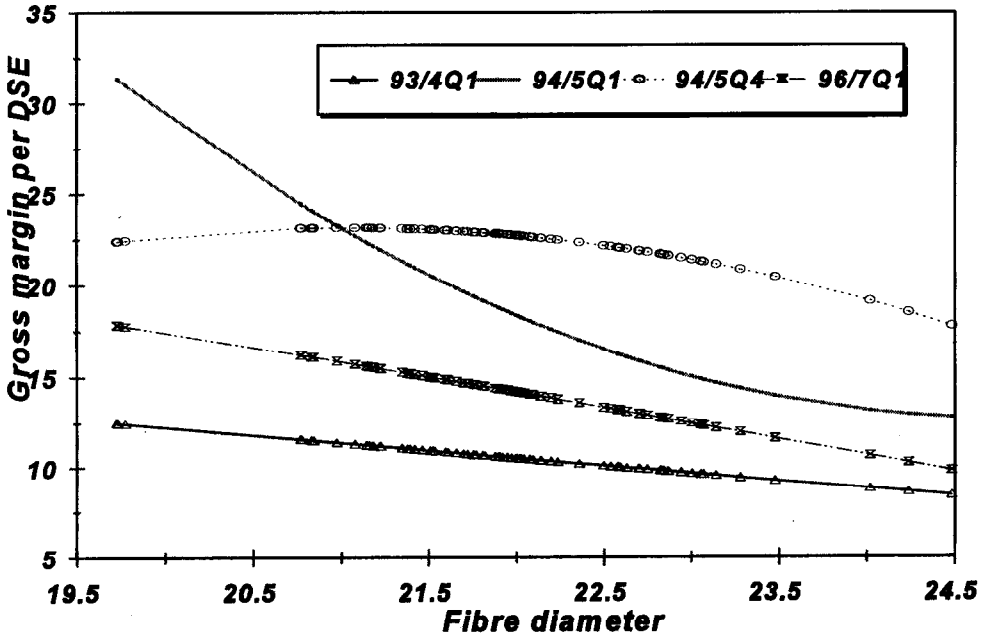

Figure 2 Fitted relationships between gross margin and fibre diameter for specific periods

RESULTS

Variation among periods. Over the 14 sale quarters analysed, average gross margin per DSE ranged from about \$10 to \$23. The contributions of fleece weight and fibre diameter to variation in gross margin were both 46% across periods, but within periods varied enormously from 16% to 81% for fibre diameter and from 15% to 74% for fleece weight. The shape of the curvilinear relationships between gross margin and fibre diameter are illustrated in Figure 2 for specific quarters. During the rising market of 1993/94 and 1994/95 the curve tended to be exponential, while in the contracting market of 1995/96 the curve was parabolic, with the gross margin declining either side of a maximum usually between 21 and 22μm. At both the peaks and troughs of the market the relationship was approximately linear, as it was for the overall average (Figure 3).

Collectively, fibre diameter and fleece weight accounted for at least 87% and up to 96% of the variation among bloodlines across periods. Body weight contributed a further 6% (range 2-10%) of the variation in gross margin, while, together, the additional quality traits of style, staple length, colour and tenderness never contributed more than 1%. The small contribution from the additional quality traits arose after fitting fibre diameter. Since style, staple length and colour all show moderate to high across-flock correlations with fibre diameter, some of the influence of these traits would have been accounted for as diameter effects.

Variation among bloodlines. Among the 73 bloodlines, average gross margin varied between \$12 and

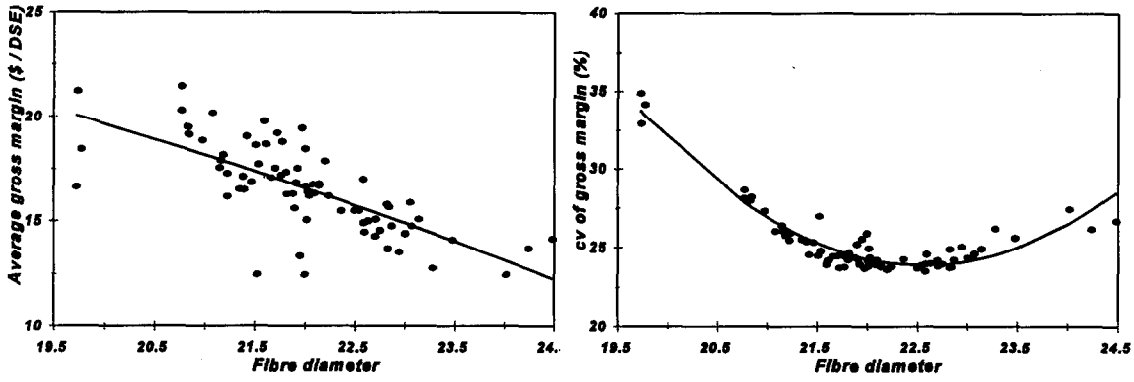

Figure 3. Average and coefficient of variation (cv) of gross margin across sale quarters for individual bloodlines and the fitted regressions on fibre diameter

$22 per DSE (Figure 3). The effect of fibre diameter differences among bloodlines was to increase average gross margin by $2.63 for a 1$\mu$m reduction, while a fleece weight advantage of 10% among bloodlines increased gross margin by $2.26. The variability in gross margin across periods can be gauged from the fitted regressions. Relative to 22μm, the fitted values for a 20μm bloodline showed a range in gross margin from +60% to -9%, while the fitted values for a 24μm bloodline showed a range of only -14% to -30%. Variability in gross margin for each bloodline is expressed in Fig 3 as the coefficient of variation (cv) of gross margin over sale periods. Variation in this measure of market risk was dominated by the effect of fibre diameter on price, although, at a given diameter, higher fleece weight bloodlines had a lower cv of gross margin. Minimum cv was found at 22.5μm, but variation in cv across bloodlines in the range 20.5 - 24.5μm was relatively small.

DISCUSSION

Comparative production information on Merino bloodlines from wether trials has provided the wool industry with a sound database for evaluating relative commercial value of alternative ram sources. The choice of an appropriate price scenario is an individual prediction of future trends. In this paper we have been concerned with whether uncertainty or volatility in this trend could influence the choice of an appropriate bloodline. Our conclusion is that for the majority of the Australian clip (20.5μm or broader), extreme price volatility over the past 3 years has not led to large differences in risk across bloodlines in this part of the diameter domain. A move to bloodlines finer than 20μm will increase the variability of returns but any decision should be a balance between average return and variability.

REFERENCES

Coelli, Katherine A., Atkins, K.D., Casey, A.E. and Semple, S.J. (1996) *Wool Tech. Sheep Breed.* **44**: 178.