

THE USE OF CRIMP AND STAPLE LENGTH IN THE VISUAL CLASSING OF STUD MERINO RAMS

MARY ROSE*

SUMMARY

In a Peppin Merino stud, all reserve and flock rams were sampled for fleece measurement at 12 months. In addition to fleece weight, yield and fibre diameter measurements which are usually made, crimp and staple length were measured and their means and distribution within the two classer's grades calculated.

Reserve rams produced 18% more greasy wool and 17% more clean wool than the flock rams. Little difference was observed in yield but the average fibre diameter of reserves was 0.4 μ m stronger than that of the flock rams.

Reserves had longer staples (70.7 mm + 7.00) than flock rams (67.5 mm + 6.46), selected stud sires having even longer staples (74.8 mm + 7.40). Crimps per inch were higher in flock rams (10.9 + 1.43) than in reserves (10.7 + 1.43). Stud sires had fewer crimps (10.1 + 1.14) than reserves.

Phenotypic correlations were estimated for all characters measured and were of similar order to those published for 15-16 month old sheep.

The classer placed considerable emphasis on fleece weight in his classing. Staple length has been shown to make a useful contribution in the visual assessment of rams with high clean fleece weight but crimp frequency was an unreliable guide to the fibre diameter of individual rams in the flock.

INTRODUCTION

A recent study of two Merino studs which measure all rams at classing has produced information on fleece weight, yield and fibre diameter in the classers' grades of rams (McGuirk *et al.* 1980). These workers showed that the two classers placed considerable emphasis on fleece weight in the selection of the reserve rams and that differences between grades in yield and average fibre diameter were generally not statistically significant.

Classers use many characters in their visual assessment of rams. Two which can be readily measured are staple length and crimp.

Classers endeavour to cull rams with short wool and consider length in choosing reserve rams and in sire selection. Length is an important component of wool weight; but since selection for high clean fleece weight would result in increased length, staple length is seldom measured.

Many authors have shown that, over a wide range of wools, fibre diameter increases as number of crimps falls but the diameter corresponding to any one crimp may vary greatly both between flocks of the one strain and also between sheep within a flock (e.g. Lang 1947; Roberts and Dunlop 1957). However crimp and handle are the factors used in the visual appraisal of wool quality.

It is apparent that as well as the relative emphasis a classer gives to each character and his efficiency of selection, the phenotypic correlations between fleece characters will greatly influence the success of his selection.

* Wool Biology Laboratory, Department of Primary Industries, Yeerongpilly, Qld 4105.

This paper examines the fleece weight, yield and fibre diameter for rams in one year in the Queensland stud reported by McGuirk *et al.* (1980), and the corresponding data on staple length and crimp. Estimates of phenotypic correlations between the fleece characters are also presented.

MATERIALS AND METHODS

The stud

The stud was a Peppin Merino stud located in south west Queensland and joining approximately 5,000 ewes each year. In the year studied all rams were shorn as lambs and classed prior to the 12 month shearing when they carried about eight months' wool. In September 1976, 1,487 rams were classed and graded as reserves (279), flock rams (957) and culls (251). After measurement 28 stud sires were selected from within the classer's reserves using clean fleece weight and fibre diameter measurements as an aid but not staple length and crimp measurements.

Measurements

Greasy fleece weights were recorded for all rams but sampling and laboratory testing were confined to reserve and flock rams. Yield was estimated as the ratio of oven-dry clean wool (plus mineral ash) relative to the weight of the greasy sample, and clean fleece weight calculated. Average fibre diameter was measured using the Sonic A Fineness Tester. Measurements of staple length and crimps per inch were also made.

Estimates of phenotypic correlations between the fleece characteristics measured were calculated.

RESULTS

The performance of the reserve, flock, cull rams and stud sires is shown in Table 1. The reserve rams were 18% above the flock rams in greasy wool production and 17% above in clean wool production. The greasy fleece weight of flock rams was 11% above that of the visual culls.

There was little difference in yield between the grades measured but the average fibre diameter of reserve rams was 0.4 μm stronger than that of the flock rams.

Although the study of the distribution of clean fleece weight by McGuirk *et al.* (1980) showed that the majority of high producers were in the reserves, there was still considerable variation in fleece weight among the reserves.

TABLE 1 Relative productivity of the classer's grades and stud sires at 12 months (8 months' wool growth)

| Mean (S.D.) | Greasy fleece weight (kg) | Yield (%) | Clean fleece weight (kg) | Av. fibre diameter (μm) |
|-------------|---------------------------|------------|--------------------------|--------------------------------------|
| Reserves | 3.78 (0.38) | 58.4 (3.1) | 2.20 (0.22) | 20.8 (1.5) |
| Flock rams | 3.20 (0.41) | 58.9 (3.7) | 1.88 (0.24) | 20.4 (1.5) |
| Culls | 2.88 (0.49) | | | |
| Stud sires | 4.09 (0.24) | 61.0 (2.1) | 2.49 (0.14) | 20.3 (1.2) |

Table 2 shows the distribution and mean staple length and crimps per inch

for the reserve and flock rams and the means for the stud sires. Estimates of variation are also given. Mean staple length of sires was greater than that of all reserves and reserves had longer staples than had the flock rams.

TABLE 2 Distribution of staple length and crimps in reserve and flock rams

| | | % of rams in class | | | | | | | | | | Mean (S.D.) |
|------------------|-----|--------------------|-----|------|------|------|------|------|-----|-----|-----|-------------|
| Staple length mm | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | |
| Reserves | | 0.7 | 0.7 | 9.3 | 24.0 | 25.1 | 24.7 | 10.0 | 4.7 | 0.7 | | 70.7 (7.00) |
| Flock rams | 0.1 | 0.4 | 4.0 | 18.1 | 28.2 | 28.5 | 14.2 | 5.5 | 0.6 | 0.1 | 0.1 | 67.5 (6.46) |

| | | % of rams in class | | | | | | | | | | Mean (S.D.) |
|-----------------|-----|--------------------|------|------|------|------|------|-----|-----|-----|--|-------------|
| Crimps per inch | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
| Reserves | 0.4 | 5.4 | 14.3 | 25.1 | 27.6 | 16.5 | 8.2 | 1.4 | 0.4 | 0.4 | | 10.7 (1.43) |
| Flock rams | 0.3 | 3.7 | 10.3 | 23.6 | 28.6 | 19.2 | 10.8 | 2.9 | 0.7 | | | 10.9 (1.43) |

Stud sire means (S.D.):— staple length 74.8 mm (7.40); crimps 10.1 (1.14)

Mean number of crimps in the flock rams was slightly fewer than for the reserves. Sires showed a further reduction in mean crimps.

Estimates of the phenotypic correlations of the various fleece characters measured appear in Table 3.

TABLE 3 Estimates of phenotypic correlations between fleece characters in reserve and flock rams at 12 months

| | Yield | Clean fleece weight | Fibre diameter | Staple length | Crimps per inch |
|----------------------|-------|---------------------|----------------|---------------|-----------------|
| Greasy fleece weight | -0.25 | 0.87 | 0.20 | 0.17 | -0.16 |
| Yield | | 0.25 | -0.14 | 0.26 | -0.24 |
| Clean fleece weight | | | 0.14 | 0.31 | -0.27 |
| Fibre diameter | | | | 0.03 | -0.16 |
| Staple length | | | | | -0.21 |

DISCUSSION

The possible relevance of such results to the Merino stud industry as a whole has been discussed at some length (McGuirk *et al.* 1980).

The emphasis given to fleece weight was considerably greater than in classer efficiency studies reported previously (Morley 1955; Riches and Turner 1955). In an early study Miller and Moule (1956) reported data for one stud where the reserve rams produced less wool than the flock average. One possible reason for the higher efficiency of the classer in this study may be that he has wide experience and is a successful commercial classer familiar with the use of objective measurement.

Although it is not possible to assess the grade averages for staple length and crimp in relation to the whole flock it may be assumed from their distributions that the rams were a very even line visually, a majority of

animals falling into very few classes for each character. Despite this and the shorter wool than is traditional for stud ram classing, the classer has achieved a difference between grades in both characters. This suggests that he places some emphasis in his selection on each of these characters.

Many of the estimates of phenotypic correlations were outside the ranges previously published for 15-16 month old animals (Turner and Young 1969) but they were of similar order. From these estimates it can be seen that the use of staple length would have contributed to the selection of higher clean wool producers in the reserves.

Average fibre diameter of reserves was slightly higher than that of the flock rams. However in this stud all rams with diameters greater than two standard deviations above the mean are culled after measurement. Because of this, selection of sires with high clean fleece weight or slightly broader crimp did not result in sires with broader wool. Sires had a higher average clean fleece weight and broader crimp than the reserves but their average fibre diameter was 0.5 μ m finer.

These results confirm previous findings that staple length may be a useful criterion in the visual selection of rams with high clean wool weights while crimp may be unreliable in assessing fibre diameter visually in individual rams in a flock. The measurement of fibre diameter must be an essential part of fleece measurement if wool quality is to be maintained.

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