

RELATIONSHIP OF STAPLE STRENGTH TO VARIATION IN FIBRE DIAMETER IN SHEEP SELECTED FOR OR AGAINST STAPLE STRENGTH

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The strong genetic correlation between coefficient of variation in fibre diameter (CVFD) and staple strength (SS) offers a valuable tool to improve SS (Lewer and Li 1994). In this study, we examined two flocks that have been selected directly for high or low SS, to determine whether the relationship was still present after sheep had been selected for high SS.

Wools were tested from all available wethers in flocks bred by Agriculture Western Australia for low and high SS while holding fibre diameter (FD) and clean fleece weight constant. In Year 1 the sheep were fed in pens below maintenance for 12 weeks and then fed above maintenance, while in Year 2 they grazed together at pasture without supplementation. In both years, FD, CVFD and SS were determined on each fleece. In Year 1, mid-side wool patches were clipped every three to five weeks and FD measured on each patch. The minimum FD (the FD at the point of break) was recorded at the last period of feeding below maintenance and a CVFD along the fibre calculated from the 10 patch measurements. In Year 2, changes in wool growth rate were measured using six dyebands spread evenly throughout the year.

The data in Table 1 confirm that genetic selection for low SS reduced SS and increased CVFD. Simple correlation analysis showed that the overall fleece CVFD and SS were closely related in the low SS sheep, as would be expected. However, these characteristics were not significantly correlated in the high SS sheep in either year. The minimum FD was correlated with SS in the high SS sheep (Table 1).

Table 1 Mean (\pm s.e.) values for fleece characteristics and simple correlation coefficients for staple strength with characteristics of fibre diameter in high and low staple strength genotypes

	Low SS sheep (n = 19)		High SS sheep (n = 17)	
	Year 1	Year 2	Year 1	Year 2
<i>Means</i>				
SS (N/ktex)	17.5 \pm 1.0	29.4 \pm 1.7	25.2 \pm 1.1	44.6 \pm 1.9
Average FD (mm)	19.7 \pm 0.2	19.0 \pm 0.2	19.5 \pm 0.2	19.0 \pm 0.3
CVFD (%)	22.3 \pm 0.5	20.5 \pm 0.6	18.2 \pm 0.3	16.0 \pm 0.5
<i>Correlation coefficients</i>				
CVFD	- 0.55*	- 0.70**	- 0.27	- 0.36
CVFD along fibre	- 0.21	—	- 0.47*	—
Average FD	- 0.19	0.09	- 0.09	0.47*
Minimum FD	- 0.06	—	0.71**	—

If the lack of a relationship in the high SS sheep occurs at the genetic level, the results suggest that there may be a limited capacity to increase SS on the basis of selection for low CVFD. The association between minimum FD and SS in the sheep with genetically high SS may offer a means of improving SS in such sheep. The minimum FD was poorly correlated with the variation in diameter along the staple (-0.25 and -0.34 in the low and high SS flocks respectively in Year 1), and it is not clear why SS should depend more on the absolute minimum FD than on the change in diameter along the staple. We conclude that, in the high SS sheep, the minimum FD was phenotypically associated with SS by a mechanism which is yet to be determined.

This work was supported in part by Australian woolgrowers through the International Wool Secretariat.

LEWER, R. and LI, Y. (1994). *Wool Technol. Sheep Breed.* **42**, 103-111.