THE RELATIONSHIP BETWEEN FIBRE CURVATURE, CRIMP FREQUENCY AND OTHER WOOL TRAITS

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Studies have shown that staple crimp frequency is moderately heritable and has a negative genetic correlation with fleece weight and fibre diameter (Mortimer 1987). This indicates that selecting and breeding sheep for increased fleece weight whilst maintaining or lowering mean fibre diameter will tend to produce progeny whose wool has lower crimp frequency. Fibre crimp in raw wool influences the processing and product performance of wool (Rottenbury *et al.*1994). It has been suggested that fibre curvature provides an alternative measurement of crimp frequency. Curvature can easily be measured using Optical Fibre Diameter Analyser (OFDA) technology and can be measured on wool fibres throughout all stages of wool processing (unlike crimp frequency). This study has evaluated the potential genetic variation in fibre curvature and assessed the relationship between fibre curvature, staple crimp frequency and other wool traits.

The data were derived from the Roxby Park (12 sires; 442 progeny, shorn at 15 months of age) and Hamilton (10 sires; 198 progeny, shorn at 26 months of age) central progeny test sites in Victoria. At each site ewes inseminated with semen from individual sires were managed as one mob until lambing. Following weaning, the progeny were treated as one mob. Progeny were shorn carrying 12 months fleece and prior to shearing, mid-side samples were collected and measured for staple strength (SS), staple length (SL), mean fibre diameter (MFD), c.v.(%) of fibre diameter (CVFD), standard deviation of fibre diameter (SDFD), fibre curvature (CURV), standard deviation of curvature (SDCURV), c.v.(%) of curvature (CVCURV) and crimp frequency (CRFREQ). Greasy fleece weight (GFW) was measured at shearing. The data were analysed using analysis of variance procedures, fitting both a combined code for sire and test site and a fixed effect for sex.

Table 1. The correlations between the least square constants of sires for mean fibre curvature, staple crimp frequency and other wool traits

	CURV	CRFREQ	SDCURV	CVCURV	MFD	SDFD	CVFD	SL	SS	GFW
CURV	1.00	0.85	0.95	-0.86	0.03	-0.19	-0.17	-0.44	0.37	-0.73
CRFREQ		1.00	0.76	-0.79	-0.18	-0.17	-0.03	-0.64	0.51	-0.71

The differences between sires for CURV was significant, suggesting the potential to select for this trait. Given there was no replication of sires within bloodlines, the level of variation between sires within a single flock for CURV could not be determined. There was a strong positive correlation between and CURV and CRFREQ. This suggests that CRFREQ and CURV may be genetically similar traits and that the measurement of CRFREQ for a sire progeny group is a good predictor of CURV. The exact relationship between CRFREQ and MFD for both fine and medium wool sheep is still unclear. The data set includes both fine and medium wool sheep for which a weak relationship was observed between CURV and MFD. A strong negative correlation was also observed between GFW and CURV. Further research is required to determine the level of sire variation in CURV between sires within flocks and to clarify the effect of selection for CURV on MFD, GFW and other wool traits in fine and medium wool flocks.

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MORTIMER, S. I. (1987). *In* ' Merino Improvement Programs in Australia'. (Ed B. J. McGuirk) pp. 159-174 (Australian Wool Corporation 1987).

ROTTENBURY,R.A., HANSFORD, K.A. and SCANLAN, J.P. (1994). 'Woolspec' 94. (CSIRO Division of Wool Technology 1994).