ASSESSMENT OF VARIATION WITHIN AND BETWEEN MERINO FLEECES DUE TO WEATHERING USING METHYLENE BLUE

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Weathering of wool from environmental exposure during grazing has been recognised as having a detrimental effect on wool processing performance. Weathering weakens wool tips and weakened tips are lost to noil during processing, or retained in the fabric leading to skittery dyeing (Holt *et al*. 1994). Weathering studies have concentrated on weathering of the tip component along the back line and not the whole staple. This experiment reports on the feasibility of using mid-side samples as representative samples for measuring weathering damage in the fleece. It also provides an estimation of the source of variation within and between fleeces for weather damage using increasing methylene blue absorption to indicate increased weather damage (Steenkamp *et al*. 1970).

Twenty Merino wethers were run as a single flock at the CSIRO Yalanbee Field Research Station, Bakers Hill (31° 45'S, 116° 27'E). Fleeces were sampled at annual shearing from 9 fleece sampling sites of shoulder (S), mid (M) and rear (R), at 3 heights down the side of the sheep (1=backline, 2= mid-side, and 3= bottom) (Denny 1990). Measurement of the raw wool parameters is described by Schlink *et al*. (2002). Whole staple wool weathering was determined on duplicate samples using the methylene blue test (Steenkamp *et al*. 1970). Correlations were determined using Minitab. Analysis of variance and the proportioning of the variance within and between fleeces were undertaken using ASREML (Gilmour *et al*. 1999). The first analysis estimated the least square means for animal, with site and replicate fitted as fixed factors. The second analysis fitted animal, site and replicate as random factors to obtain the amount of variation due to these 3 factors.

Table 1. Mean fibre diameter (FD; µm), curvature (Curve; °/mm), wax index (Wax; g/100 g clean wool), suint index (Suint; g/100 g clean wool), dust index (Dust; g/100 g clean wool) and methylene blue absorption (MBA; g absorbed/100 g clean wool) for 9 fleece sampling sites (see text for details), fleece mean (Average) and least significant difference at P<0.05.

	S1	M1	R1	S2	M2	R2	S3	M3	R3	Average	l.s.d.
FD	18.1	19.2	19.8	18.1	18.4	19.5	17.5	18.2	18.8	18.6	1.0
Curve	103	107	105	105	106	103	106	109	102	105	6
Wax	20.4	26.4	28.3	20.2	22.9	23.4	20.1	20.5	17.6	22.2	3.2
Suint	9.3	12.0	13.1	11.4	14.6	14.8	17.7	19.3	16.2	14.3	3.4
Dust	24.1	20.2	22.9	14.2	17.1	9.5	12.1	12.5	15.2	16.4	2.4
MBA	68.6	63.8	61.6	60.7	66.2	61.0	75.2	68.8	73.1	66.6	10.8

The mid-side sample site (M2) was not significantly different from the average of the 9 sample sites of the fleece for fibre diameter, curvature, wax index, suint index, dust index and methylene blue absorption. Methylene blue absorption was positively ($P<0.05$) correlated with curvature ($r=0.224$), suint index ($r=0.683$) and wax index ($r=0.147$), but not ($P>0.05$) with fibre diameter ($r=-0.088$) or dust index ($r=0.138$). Although methylene blue absorption was not significantly related to dust index, it was significantly correlated with dust penetration ($r=0.194$, $P=0.009$). Variation between fleeces in methylene blue absorption accounted for 72.8% of the total variation, with sampling site accounting for 8.3% of the variation, and none of the variation from sampling replication. The results show that the mid-side sample is the appropriate sample site for experiments to determine the role of the environment and genetics in between-fleece variations in methylene blue absorption.

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