DUST PENETRATION IS NOT RELATED TO STAPLE PROFILE CHARACTERISTICS

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The penetration of dust into the staple has a significant negative impact on the style of wool, and hence its value, particularly for finer genotypes. Both the heritability (0.04 ± 0.03) and repeatability (0.01 ± 0.01) of assessed dust penetration are negligible (Hatcher and Atkins 2000), thus the prevailing environment is the dominant influence. However, it is possible that the characteristics of the fleece itself, particularly those that affect fibre alignment and staple structure, may impede the penetration of dust into the fleece. Charlesworth (1970) found significant phenotypic correlations between AFD, crimps per inch and dust penetration, but both traits accounted for only a small percentage of the variation in dust penetration. Estimates based on midside samples from sheep grazing in the New England Tablelands indicate that dust penetration had a low phenotypic variance (0.25) and was moderately genetically correlated with fibre diameter (FD) (0.34), but with only a low phenotypic correlation (0.04) (Swan *et al.* 1997). However, estimates from midside samples taken from a related flock of sheep grazing in central NSW and, therefore, subject to significantly higher levels of dust, were higher ($\sigma^2_p = 0.32$, $r_g = 0.56$, $r_p = 0.04$) (S. Hatcher and K.D. Atkins, unpublished data) indicating that dust penetration in this environment was greater, and increased dust penetration is positively correlated with FD. Therefore, selection for reduced fibre diameter will lead to an improvement in dust penetration regardless of environment, thus generating an improvement in style particularly for non-tablelands wool. The aim of this paper was to explore the relationship between dust penetration and staple profile characteristics.

Dust penetration as a proportion of staple length was measured on samples taken from the backline of 378 2-year-old Merino wethers grazing at Condobolin ARAS in central NSW. The backline was sampled for this work as it represents the site of the fleece most affected by dust contamination. A staple from each sample was measured for the range of staple profile traits (Table 1) generated by the OFDA2000. A series of linear regressions between dust penetration and each of the staple profile characteristics were carried out using the regression data analysis tool within Microsoft® Excel.

Table 1. Summary of linear regression analyses between staple profile traits and dust penetration.

	r^2	Intercept	Slope			r^2	Intercept	Slope	
AFD	0.000	0.563	0.000	ns	Across fibre CVFD	0.002	0.578	0.000	ns
SDFD	0.000	0.568	0.000	ns	Maximum diameter	0.000	0.562	0.003	ns
CVFD	0.000	0.572	0.000	ns	Minimum diameter	0.000	0.569	0.000	ns
Fibre curvature	0.000	0.573	0.000	ns	Position max FD	0.006	0.574	0.000	ns
Along fibre SDFD	0.001	0.558	0.009	ns	Position min FD	0.005	0.549	0.000	ns
Along fibre CVFD	0.001	0.557	0.002	ns	Rate of change of FD	0.002	0.573	0.050	ns
Across fibre SDFD	0.000	0.571	-0.001	ns	Staple length	0.007	0.532	0.000	ns

It was expected that fleeces whose staples had a uniform arrangement of highly aligned fibres would be more able to withstand dust penetration since there would be less physical space for the dust to occupy. Therefore, we hypothesised that those staple profile characteristics related to the evenness of fibre diameter and crimp frequency along the staple (ie SDFD, CVFD, fibre curvature and both the across and along SDFD and CVFD) would be related to dust penetration into the fleece. However, this was not the case. There were no relationships between any of the staple profile traits measured by the OFDA2000 and dust penetration into the fleece.

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