

A COMPARISON OF ESTIMATES OF MEAN FIBRE DIAMETER, VARIATION IN FIBRE DIAMETER AND FIBRE CURVATURE BETWEEN OFDA2000 AND CONVENTIONAL LABORATORY BASED FIBRE TESTING

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Conventional midside testing under the Australian and New Zealand Standards (AS/NZS 4492 2000) has a precision (95% confidence limit) of $\pm 1.1\mu\text{m}$. The OFDA2000 is a portable instrument capable of real-time measurements of the fibre properties of greasy wool with minimal sample preparation, for use as an aid to sheep selection or wool classing (Brims *et al.* 1999). Studies by Baxter (2001), Peterson and Gherardi (2001) and Behrendt *et al.* (2001) have indicated that the OFDA2000 is capable of similar precision to the Australian and New Zealand Standard. Additionally, these studies have shown that OFDA2000 results are correlated with clean measurements done by conventional methods. This paper further describes the correlation between these different methods of measurement.

Midside wool samples were collected from various experiments including Merino wether trials, rams, sire progeny groups, commercial ewes and wether flocks and non-Merino ewes. The samples ranging from $13\mu\text{m}$ to $36\mu\text{m}$ (mean $19.1\mu\text{m}$), were measured for mean fibre diameter (MFD), coefficient of variation of fibre diameter (CVD) and mean fibre curvature (CURV) in various commercial Rampower-accredited fleece-testing laboratories, observing the AS/NZS 4492 2000 standard. These laboratories used both conventional OFDA100 or Laserscan technologies. A single OFDA2000 instrument was utilised with factory preset calibration and greasy wool correction factor to measure MFD, CVD and CURV on a single staple selected from the midside of all samples, creating 4604 records each for the traits of MFD, CVD and CURV. Each trait was analysed separately using two models. The first model was a simple linear regression (Model 1). The second model (Model 2) was $y = Xb + Zu + e$, where b is a fixed vector containing the effect of the different experiments, u is a random vector containing the genetic effects of the animals, X and Z are the corresponding design matrices and e is a random residual vector. The analyses were performed with the Genstat program by using the AI REML algorithm. The predicted means for the effect of the different trials were used subsequently for additive correction of the data. After the correction, a new regression was performed and new correlation coefficients were calculated as reported in Table 1.

Table 1. The correlation coefficients between conventional midside fibre testing and OFDA2000 testing for mean fibre diameter (MFD), coefficient of variation of fibre diameter (CVD) and mean fibre curvature (CURV) utilising two different statistical models (r.s.d. in brackets)

Wool trait	Model 1: Simple linear regression			Model 2: $y = Xb + Zu + e$		
	MFD	CVD	CURV	MFD	CVD	CURV
MFD	0.94 (0.88)			0.87 (0.81)		
CVD		0.75 (1.77)			0.70 (1.71)	
CURV			0.77 (7.73)			0.80 (6.51)

Both statistical models indicated that the OFDA2000 produced results that were highly correlated with conventional midside testing ($P < 0.001$) (Table 1). OFDA2000 measurements of midside staples were on average lower by $0.02\mu\text{m}$, 1.25% units and 8 deg/mm for MFD, CVD and CURV, respectively. The correlation in MFD between conventional midside testing and OFDA2000 testing of a single staple is similar to that of laboratory testing versus on-farm testing using the Sirolan Laserscan (Hansford 1999). The OFDA2000 testing of single staples from the midside offers similar rankings to conventional midside testing for wool quality traits of importance in sheep selection or wool classing.

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