

MEASURING GREASY WOOL WITH OFDA2000

INTRODUCTION

Info-bulletin 3.4 introduces the OFDA2000 instrument and its use for measuring greasy staples on-farm, either pre-shearing or during shearing. Since that bulletin was released, there have been over 1 million fleeces measured in New Zealand using these instruments, and several million fleeces measured world-wide. By mid 2002 there were some 88 instruments in use across Australia, New Zealand, South Africa, Argentina, Uruguay, USA and Italy.

One of the questions frequently asked is how the instrument manages to measure greasy wool fibres, virtually irrespective of the sample yield.

Measurement principles

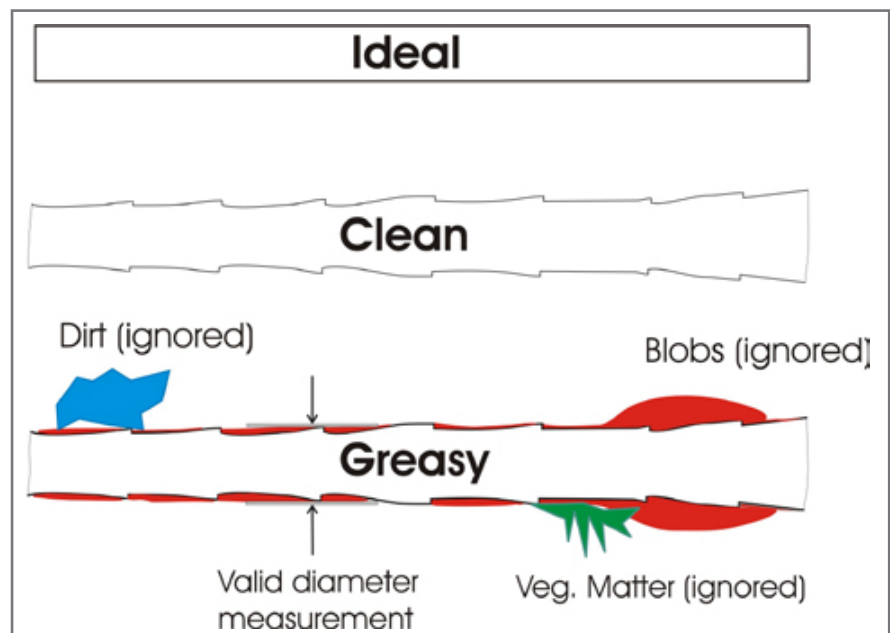
As with the OFDA 100 (see Info-bulletin 3.2a), the OFDA2000 captures images of fibres, and then analyses those images to locate and then measure individual sections of fibres. During the course of measuring a staple, the instrument may measure between 1000 and 3000 individual fibre segments.

The analysis algorithm searches the image for segments of a fibre with parallel sides. To do this, it must trace each portion of the image that could be a fibre until the parallelism criteria are satisfied. During the tracing process it automatically excludes fibre sections where there is dirt or globular grease adhering to the fibre. It will ONLY make a measurement where the grease coating is relatively uniform.

The following image shows a clean fibre in air:



The important thing to note is that the scale edges are clearly visible. The next image shows a greasy fibre in air:

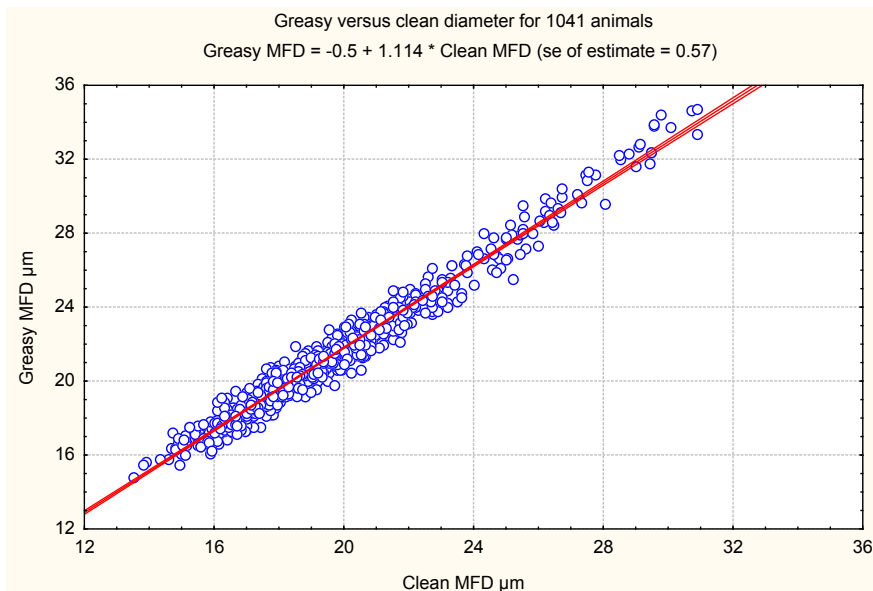


Metrology Model for OFDA2000

Apart from the blobs of grease, which are ignored by the algorithm, the fibre surface in the image is relatively smoothly coated. On the lower edge of the lower image, which is in better focus, it just and only just possible to see the tips of the scales. This suggests that the grease is filling in along the fibre between the scale edges. It is along this smooth part that the software will accept a width measurement. We also know that, on average, for merino wools, the scale height is about 0.8 µm. The average grease correction factor for the OFDA2000 is 1.7 µm on the diameter, which equates to a grease thickness of about 0.8 - 0.9 µm.

IMPLEMENTATION OF GCF MODEL

As the following plot shows, for merino wools, the relationship between OFDA2000 greasy and clean diameter is a linear relationship:



This relationship has been demonstrated by several researchers on a wide variety of flocks across Australia, NZ and Argentina. It implies that the grease coating thickness is proportional to diameter, and on average, the grease adds approximately 10 to 12% to the clean diameter.

In practice, the instrument software calculates the clean fibre diameter for every one of the 1000 to 2000 measurements it makes on a staple, thereby allowing for the variation in coating thickness on different parts of the fibre.

Proof of performance of the grease correction has been shown by several trials that conclude that accuracy and precision of the OFDA2000 greasy staple system is similar to laboratory fleece testing methods used on cleaned samples. There are a number of technical papers on this issue available for download on this website.

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