



AUSTRALIAN WOOL TESTING AUTHORITY LTD

A.B.N 43 006 014 106

70 Robertson St, Kensington, Vic 3031 Australia

Ph: +61 3 9371 4100

Fax: +61 3 9371 4191

Email: awtainfor@awta.com.au

Web: www.awta.com.au

Fundamental Principles of Fibre Fineness Measurement

Part 6

Direct Measurement



Peter Sommerville

Corporate Development Manager

AWTA Ltd

March 2003

Originally printed in the February 2003 issue of AWTA Ltd's Newsletter this review article is the sixth of a series of articles on the fundamental principles of wool fibre fineness measurement.

Published March 2003

© 2003, AWTA Ltd

DIRECT MEASUREMENT

Principle

In SI units the primary unit of length is the metre. A number of devices such as the micrometer and the micrometer calliper are available for measuring the thickness, in fractions of a metre, of various fine materials. In suitable materials distances of the order of 0.01 micrometres are possible. The thickness is determined by using an arrangement of high precision screws to adjust the physical distance between two parallel jaws, which grip the material transversely. The screws provide a method of amplifying the scale and to make the fine adjustments necessary to adjust the gap between the jaws to the thickness of the material.

Development

Hill (1921) used a machinist's calliper in measuring the thickness of a wool fibre.

Burns (1935) described the use of the micrometer calliper and expressed his view that it was preferred to other methods then available for the measurement of the thickness of wool fibres. He claimed that the micrometer calliper method provided information on fibre diameter variability, with the entire fibres as units, whereas cross-sectional methods altered the identity of individual fibres. There was little crushing action in the micrometer measurements. A resolution lower than that obtained using microscopic methods was claimed, results were provided demonstrating high correlation with measurements made using length to weight ratios.

Technical Issues

Since this initial work there has been little interest in this technique. There is almost no data on the precision of the method, and it was probably made redundant by the rapid development of methods based on the optical microscope in the period 1930 to 1940. Consequently few technical issues have been adequately documented.

However, the limitations that apply to the Projection Microscope would almost certainly apply to this technique. Individual fibres must be sampled at random locations along their length and in proportion to their length in order to obtain a length-biased sample. A large number of such measurements would be required for an acceptable precision. It must be expected therefore that the technique would be slow and tedious.

Commercial Issues

Within the wool industry, this mode of measurement has never been applied commercially, largely because faster and less expensive measurements systems have been developed.

Bibliography

Hill, J. A., *Micrometer callipers for teaching the discrimination of the fineness of wool*, Proc. Amer. Soc. Of Animal Production, 1921

Burns, R. H., *The micrometre calliper for measuring wool fibres*, Wyo. Agric. Expt. Sta., 204, 36pp, 1935

