

New Zealand Society of Animal Production online archive

This paper is from the New Zealand Society for Animal Production online archive. NZSAP holds a regular annual conference in June or July each year for the presentation of technical and applied topics in animal production. NZSAP plays an important role as a forum fostering research in all areas of animal production including production systems, nutrition, meat science, animal welfare, wool science, animal breeding and genetics.

An invitation is extended to all those involved in the field of animal production to apply for membership of the New Zealand Society of Animal Production at our website www.nzsap.org.nz

[View All Proceedings](#)

[Next Conference](#)

[Join NZSAP](#)

The New Zealand Society of Animal Production in publishing the conference proceedings is engaged in disseminating information, not rendering professional advice or services. The views expressed herein do not necessarily represent the views of the New Zealand Society of Animal Production and the New Zealand Society of Animal Production expressly disclaims any form of liability with respect to anything done or omitted to be done in reliance upon the contents of these proceedings.

This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](http://creativecommons.org/licenses/by-nc-nd/4.0/).



You are free to:

Share— copy and redistribute the material in any medium or format

Under the following terms:

Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for [commercial purposes](#).

NoDerivatives — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

<http://creativecommons.org.nz/licences/licences-explained/>

clean scoured yield, while timing of shearing affects staple strength, fleece discolouration and vegetable matter contamination. Most long-woolled sheep are shorn between November and January, with the majority in the northern North Island second shorn in the autumn between February and May. The shorter second shear wools have a higher clean scoured yield than once-shorn full fleece wools.

Fleece discolouration develops during the late spring early summer period under conditions of rising temperature and increased humidity. Shearing as early as practicable in the season will minimise fleece discolouration and reduce vegetable matter contamination as the plants concerned have not reached the seeding stage. Early shorn wools also have a higher tensile strength as the region of reduced diameter occurring in winter is relatively close to the end of the staple, with pre-lamb shorn wools having the highest possible staple strength. Shearing in October rather than December can have the effect of reducing CIE tristimulus Y-Z value by 2 units and increasing apparent staple strength by 20 N/ktex (Sumner, unpublished data). Both changes are of processing significance.

Breeding Status

Pregnancy and subsequent lactation impose nutritional demands on ewes. The effect on wool growth is similar to reduced feeding, with a reduction in length growth rate and fibre diameter. In the extreme, fleeces have a

much lower tensile strength with increased crotting and a propensity to discolour due to slow drying after wetting by rain. Fleece weight of New Zealand sheep is depressed by between 3% and 5% for each additional lamb reared (Sumner, 1985).

Disease

Most disease conditions result in a loss of appetite producing similar effects on wool growth to underfeeding with the fleece being shed in serious cases.

SUMMARY

While objective measurement *per se* has no direct effect on individual farm returns (Simpson, 1986), because the measurements do not guarantee higher wool prices, the benefits of objective measurement lie in the understanding of the trends that would be likely to take place as a result of specific management decisions. Complete pre-sale objective measurement would provide:

- (i) Reliable relative economic values on which to base management and clip preparation decisions;
- (ii) An objective basis for payments to grower;
- (iii) Product specification to ensure the long term viability of wool production and to meet technological advances in processing and fashion trends.

Implications of objective measurement for fleece tenderness research

D.F.G. ORWIN

Wool Research Organisation of New Zealand, Christchurch

K.G. GEENTY

Ministry of Agriculture and Fisheries, Hamilton

Tender fleeces are defined as those with a region of reduced tensile strength at some point along their staples. The weak region is generally associated with a reduction in fibre diameter, i.e. cross-sectional area (Orwin *et al.*, 1980; Bigham *et al.*, 1983b).

SIGNIFICANCE OF FLEECE TENDERNES

Why is fleece tenderness an important area for research? Tender wools are a problem in the textile industry because they have a detrimental influence on the length

of fibres after carding and, as a consequence, may influence processing efficiency in subsequent operations such as spinning, tufting, and weaving. Excessive breakage of fibres during carding usually limits tender wools to woollen processing. Other associated faults are increased colour (yellowness), more crotting, and reduced fleece weights compared with sound wools (Bigham *et al.*, 1983b). In fact, desirable wool characteristics associated with tender wools are hard to find. The cost of tenderness to the wool industry is estimated to be as high as \$100 million/year (Ross, 1982/83).

AIMS OF WOOL—TENDERNESS RESEARCH

The information above is important in setting our aims in collaborative research between WRONZ and MAF at Lincoln. The aims are to develop a line of sheep whose genotype, coupled with an appropriate nutritional and management technology, results in the production of the soundest possible wool with adequate length.

More specifically, our immediate aims are to develop a line of sheep whose wool

(a) shows a minimum reduction in fibre diameter during annual growth and has sufficient staple length for the fibres to be adequate for all processing routes, and

(b) has maximum intrinsic strength (material strength), an important component of wool strength (Orwin *et al.*, 1980, 1985). Implications of this fibre property are still being studied.

Another fibre property of lesser importance in wool strength, fibre shape or degree of ellipticity (Orwin *et al.*, 1985), may also be used as a criterion in this work.

WOOL—STRENGTH MEASUREMENT

Clearly there is a need to assess sheep for the desirable strength and fibre length attributes of their wool. This is where objective measurements are vital.

The 2 types of measurements directly relevant to our research are

- (i) fibre length after carding, and
- (ii) staple strength.

Fibre length after carding would be our first choice. Unfortunately we cannot use the test routinely for the following reasons:

- (a) it is comparatively time-consuming to carry out;
- (b) it requires substantial amounts of full-length fleece wool (about a quarter of a fleece or more); and
- (c) it could give deceptive results in our research if the presence and position of a weak region along the staple is not determined. For example, if the weak region is near the staple butt the wool may be adequate with respect to length after carding but not desirable in genetic terms.

The advantage of using length after carding is a very significant one. It assesses wool directly in terms of its length/strength attributes during processing. We therefore intend using length after carding to monitor progress in our research although future development may make the test more suitable for routine use.

Staple strength measurements are used to indicate the tensile strength of wool staples. There are at least 8 different ways of making this measurement (Cizek and Turpie, 1985; Ross, 1982/83; Caffin, 1980; Kennedy, 1983) of which we use 3. The measurements are commonly expressed as either the peak load (Newtons) or the energy (Joules) needed to break a given amount

(as linear density, ktex or g) of wool (de Jong *et al.*, 1985).

Disadvantages of staple strength measurements are as follows:

- (i) they give an indirect measure of processed length/strength or fibre length after carding. The relevance of staple strength estimates to length after carding results in New Zealand wools is not well defined but is under active investigation. Australian work with Merino wools has shown that staple strength is an important component in predicting length after carding (Douglas, 1984).
- (ii) results may be biased according to the type of measurement used. For instance, the peak load required to break a staple will be underestimated if there are large variations in the length and alignment of fibres in a staple (de Jong *et al.*, 1985); and
- (iii) some unmeasured factors can cause errors in staple-strength estimates. For example, a staple-strength measurement relating the load required to break a staple to the mass of wool broken may include fibres which had stopped growing during the period when the weak region of the staple was produced. These fibres would contribute to the mass measurement but not the load measurement. Staple-strength estimates do not make provisions for these discontinuous fibres.

The advantages are:

- (i) they are a fast method of testing wool when appropriate equipment is available. For instance, we screen large numbers of sheep for staple strength using a simple Baumann staple tester (Baumann, 1981). Selected wools are then retested more precisely using an Instron tensile tester;
- (ii) small amounts of wool are required for testing; for example, 10 staples are often enough;
- (iii) the wool need not represent a year's growth providing the weak zone is within the region tested; and
- (iv) there is genetic information about the heritability of staple strength. Current estimates are about 0.5 (Bigham *et al.*, 1983b; L. Baker, Ruakura Agricultural Research Centre, MAF, 1986; personal communication).