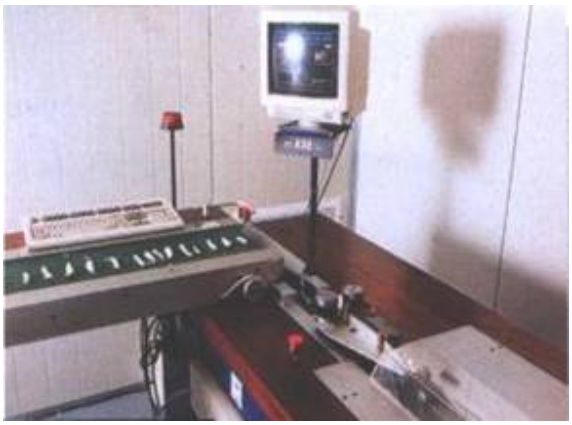
Staple Length & Strength measurement using ATLAS

(Automatic Tester for Length and Strength)

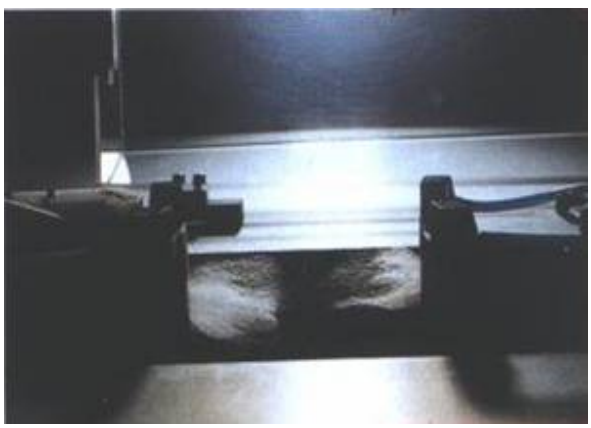


Staple length and strength is the major raw wool characteristic influencing the mean fibre length in the top and the efficiency of processing in combing wools.

Along with Fibre diameter, staple strength is a most important characteristic in determining clean price in combing wools.

Much of the New Zealand Merino, Corriedale and Half-bred wool is combed into tops and used in the worsted and semi-worsted processing systems.

Technical Background



During this process greasy wool is scoured to remove dirt and grease and dried, then carded to break open the staples and remove vegetable matter. The carding process breaks many fibres so fibre length and strength are important to determining fibre length in the top.

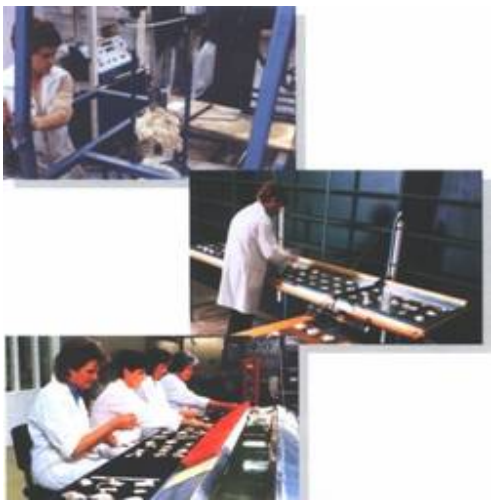
After carding the wool passes through a gill box to align wool into a silver of parallel fibres. This silver is then combed to remove short fibre noil and any remaining vegetable matter. Finally, further gillings occur to ensure that a uniform top is produced ready for spinning.

Extensive trails in the mills throughout the world have shown that staple length and strength measurement can be used to accurately predict the fibre length in the top (Hauteur).

The mean fibre length of the top affects the strength, appearance and surface characteristics of the yarn spun from it, and therefore the quality of the fabric and the garments made from the yarn.

The use of these measurements provided by ATLAS, along with the traditional results obtained from core testing, allows the processors of raw wool to use proven measurement technology to obtain a reliable prediction of processing performance, and to optimize the use of their machinery and maximise returns.

Procedures for Staple Length and Strength Sampling and Testing



- Wool bales are grab sampled
- Tufts are removed from the grab sample and placed on reels for transport to the laboratory (63 tufts/lot)
- A single staple is taken from each tuft and placed in a conditioning tray. These staples are conditioned in a controlled environment for a minimum of 8 hours.
- The length of each sample is determined by passing the staple between an array of light beams and detectors.
- Each staple is broken by gripping the ends of the staple and pulling until it breaks. The force (Newtons) required to break the staple is measured. The broken staple parts are weighed.
- The computer uses the core test results, the weight of the staple parts, the staple length and the force required to break the staple to determine the staple length and strength.

What do the results mean?

Mean Staple Length

At least 55 staples are measured for each lot. The average length is expressed in millimeters.

Coefficient of Variation: An indication of the variability of length within the lot.

As a guide:

12% or less	Excellent Uniformity
13-20%	Good to Average
21% or more	Increasingly Mixed Length

Mean Staple Strength

The average staple strength is expressed in Newton per kilotex (Newtons being a unit of force and kilotex being the linear density of the fibres expressed in grams/metre)

As a guide:

Less than 25 N/ktex	Usually Tender
25-30 N/ktex	Tender/Sound
> 30 N/ktex	Increasingly Sound
> 40 N/ktex	Very Sound

Position of Break

Each staple is broken when measured. The proportion of staples which break in the tip, middle and base region are expressed as a percentage.

How will this information be used?

By combining staple length and strength results with core test data it is possible to predict fibre length in the top (Hauteur) using the following formula.

$$H = (0.52 \times L) + (0.47 \times S) + (0.95 \times D) - (0.19 \times M^*) - (0.45 \times V) \textbf{ – PA}$$

Where:

- H = Predicted Hauteur
- L = Staple Length
- S = Staple Strength
- D = Fibre Diameter (Microns)
- M* = Adjusted Percentage of Middle Breaks

V = Vegetable Matter Base

With **"PA**" being the so-called processing allowance. This figure can be adjusted by processors to more accurately predict performance for their own unique operational system. This adjustment is also commonly called the Mill Correction factor.

The Benefits of Length and Strength Testing

Growers

- Providing equity in pricing
- Give confidence in valuations
- Offer useful farm management information
- Give reliability in predicting processing performance
- Ensuring the long term competitive viability of wool as a textile fibre
- More reliable than subjective evaluation
- Provides additional information for processors for which premiums are paid

Buyers and Merchants

- Enhancing the art of preparing consignments
- Provides additional information to processors for which premiums are paid
- Reducing appraisal errors
- Enables a comparison of processing performance of individual mills
- Reduces the incidence of claims

The Processors

- Staple length, staple strength, and position of break are vital components in determining the processing performance of wool
- These results, combined with core test results for vegetable matter and Fibre Diameter , enable the prediction of the fibre length in the top (Hauteur)
- Machinery settings can be maximized to achieve high production and the required Top length as specified in most contracts.

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