

SGS Wool Testing Services

Info-bulletin

Wool bulk

What is bulk?

Bulk is the ability of wool to fill space. It is expressed in terms of the volume occupied by a fixed mass of wool. It is an important factor in the appearance and handle of wool products at the point of sale, as well as in performance during processing.

Bulkier wools tend to have better "cover" and greater "apparent value". They also appear to be less lustrous, since lustre is related to fibre crimp. Lustre and bulk are well correlated.

The bulk of wool depends on its compression history - how often it has already been compressed and to what extent and for how long. Each of these factors therefore has to be controlled during measurement.

Bulk is largely determined by fibre crimp and by fibre diameter. Staple crimp is indicative of fibre crimp, but the two are not the same, as you see when you pull a single fibre out from a staple.

How important is it?

It is important to know in advance what appearance may be expected in a finished product. This can be influenced by the choice of wools and by the subsequent processing.

Bulk is regarded as an important characteristic for wools which are processed into carpet and hand knitting yarns. It also plays an important part in wools used for filling, in such products as quilts, mattress overlays and Japanese futons.

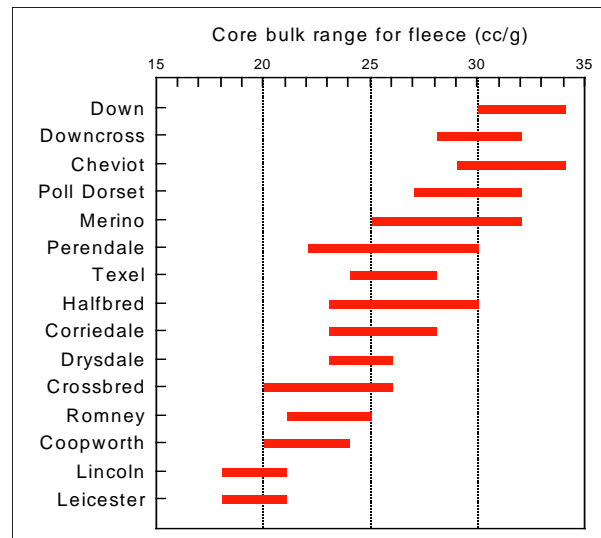
The principal factor which affects bulk - fibre crimp - is also increasingly being recognised as important in its own right in finer wools processed on the worsted system. Not only does it have a measurable effect on the processing performance of the wool, but there are measurable differences in the appraisal of garments made from fibres which only differ in their crimp.

It should also be noted that crimp can be artificially introduced to wool fibres during processing to enhance bulk. This process, and another based on batch treatment of yarn hanks, have been commercialised in association with WRONZ.

What influences bulk?

As indicated above, crimp definition and diameter are the primary fibre characteristics affecting bulk. These in turn are determined by breed and to a lesser extent by farm management practices. Both of these parameters are important in relatively subjective characteristics such as "style" and "handle".

As also indicated, bulk is affected by the history of the wool. Wool fibre has a memory of recent events, and in no other property is this so clearly demonstrated. The effects of moisture, temperature and pressure all play a part, and therefore the measurement process employed has to be very carefully standardised.



How is bulk measured?

For some period of time, bulk was measured by the loose wool bulk test, which is carried out on scoured full-length wool. The test method proved very susceptible to operator effects.

A new test method was developed by WRONZ based on the same physical principles, but using wool cores. In this method all factors which affect the bulk properties are closely controlled in automatic equipment. The new test method is known as NZS 8716, and is used for certifying the bulk of raw wool.

In brief, core samples are scoured, dried and conditioned in the laboratory, and then completely opened in a small purpose-built sample card. After a defined period of rest, carefully weighed specimens are subjected to a defined cycle of compression and relaxation, followed by measurement in an autobulkometer. Very careful quality control procedures are utilised throughout the test.

This standardised test method is relatively cumbersome, since great care is required and the tests must be scheduled in such a way that the prescribed rest periods are complied with. Alternative methods have been explored.

One technique which shows promise uses the fact that bulk is primarily determined by fibre diameter and crimp. The OFDA fibre diameter measuring instrument incorporates software which allows fibre curvature to be measured. This is related to crimp.

Good mathematical correlations have been demonstrated between bulk predicted by this type of measurement and the standard test method. However, since processing history plays such a big part in the measurement of bulk, further standardisation is needed before the technique can be applied on a wider basis. It is, however, suitable for rapid assessment of bulk for flock ranking purposes.