

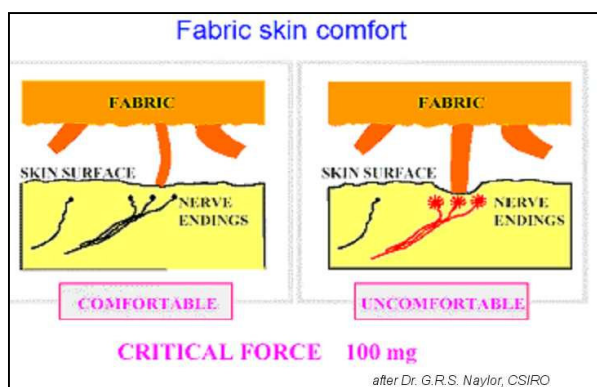
SGS Wool Testing Services Info-bulletin

Fibre ends fineness & next-to-skin comfort

Introduction

Fabric skin comfort is an important consumer choice factor. One aspect of wool fabrics that has caused concern, particularly with American consumers, is the sensation of prickliness. Extensive work at CSIRO has shown that next-to-skin comfort of wool fabrics is related to the diameter distribution of the ends of fibres sticking out from the fabric. Whilst the effect varies with the type of fabric and finishing process, a rule of thumb that has been developed is that if less than 5% of the fibre ends have diameters exceeding 30 μm then the skin comfort level is acceptable to most wearers.

The reason for the sensation of prickle has been shown to be a combination of mechanical properties of the fibre ends and the skin's physiological response. Once the diameter of a fibre end exceeds approximately 30 μm , it is capable of acting like a stiff rod rather than buckling, and at 100 mg force, this triggers the near-surface pain sensors in the skin.



Theory to practice

It has been demonstrated that most commercial tops have fibre ends that taper over the last 20 mm or so. This may arise both from the fact that fibres tend to break in processing at weak points caused by thinning of the fibres, and some fibres being naturally finer at the ends due to the growth pattern.

Whilst the handle of fabrics tends to be related to the overall mean fibre diameter (other factors being constant), next to skin comfort can be enhanced if the fibre ends characteristics can be managed. In the first place, measurements of fibre ends diameter are required in order to be able to select tops with enhanced skin comfort factor. CSIRO has developed a test method for tops that is now incorporated in IWTO DTM-60. This method compares the diameter characteristics of fibre ends (cut from a "beard" prepared by a Fibroliner) against the mean fibre diameter of the top determined by conventional

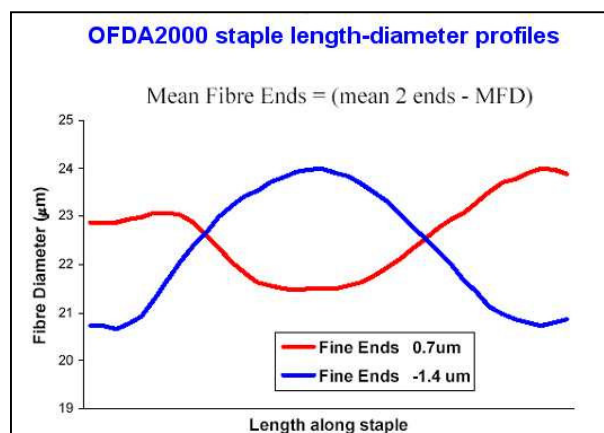
methods. The fibre ends fineness index (FEFI) compares this difference to the average for commercial tops, and is negative when the top has characteristics that indicate enhanced skin comfort. FEFI values may typically range from -1 to +1 for commercial tops.

Clearly, for next to skin products, it is desirable to use tops with negative FEFI values, since this allows the topmaker to buy wool with a higher MFD for the same skin comfort level, without necessarily sacrificing other characteristics.

Unfortunately, there is no direct method of predicting the fibre ends characteristics of tops from the certified characteristics of the constituent greasy lots, although some work is in progress to develop a regression-based prediction method.

Selecting wools for enhanced skin comfort

It has been shown that greasy wools selected to have a "hump", rather than a "valley" length-diameter profile can produce greasy wool processing batches with fibre end characteristics that carry through to tops with enhanced fine ends characteristics.



When wools are selected in this manner, there is a very good correlation between fibre ends characteristics of the greasy staples and the fibre ends characteristics of a top produced from that wool.

Using OFDA2000

As mentioned in Info-bulletin 1.5, fibre length-diameter profiles were originally determined by sectioning staples and measuring the segments separately. This relatively expensive process is no longer necessary with the advent of OFDA2000 measurements on-farm (see info-bulletin 3.4).

The OFDA2000 incorporates software that calculates the fine ends characteristics for each greasy staple measurement. It is now feasible for wools to be selected at shearing time for incorporation in consignments intended for enhanced skin-comfort products. Because such consignments will have higher MFD values than might typically be chosen on the basis of traditional comfort factor measurements (Info-bulletin 3.10), there are obvious financial benefits to be obtained. Manufacturers of woollen underwear and bedding products are just as likely to benefit as knitters of fine woollen sweaters.