

# SGS Wool Testing Services

## Info-bulletin

### Medullation

#### Introduction

Fibres that are medullated contain internal cells which are air-filled. These medulla may be continuous, interrupted, or fragmented (see photomicrograph). In severe cases, most of the interior of the fibre is affected, and the fibre tends to become flattened, chalky-white and brittle - such fibres are generally known as "kemp". (There are several definitions of "kemp", but in wool, the term is often used for shorter fibres which have been shed into the fleece.)

Medullated fibres are of lower density than normal fibres; they tend to be coarser than non-medullated fibres; the medulla diameter tends to increase as the fibre diameter increases; and there is a tendency for there to be more medullated fibres as the coefficient of variation of diameter (CVD) increases.

Fibres that are medullated give a different appearance when dyed - this is because of the effects of the air in the cells rather than different dye performance in the medulla cell material. The contrast between medullated fibres and others becomes more obvious as the depth of colour saturation increases, so the least obvious effects are in pastel shades.

#### Importance - apparel

In general terms, medullation is almost always undesirable in apparel wools. Fortunately, significant medullation only starts to appear as mean fibre diameter approaches 30 microns, and so problems are not obvious for many combing wools. Medullation is heritable, and therefore may be regarded as breed-specific. Merinos are generally free of significant medullation.

However, medullation may appear in knitting wools and in mohair. In mohair, it is generally very undesirable, and best quality grades aim for medullation contents of 0.3% or less of what are termed "objectionable fibres". Not all medullated fibres are, however, "objectionable" and this has in the past created difficulties in measurement because of the poor definition of this term.

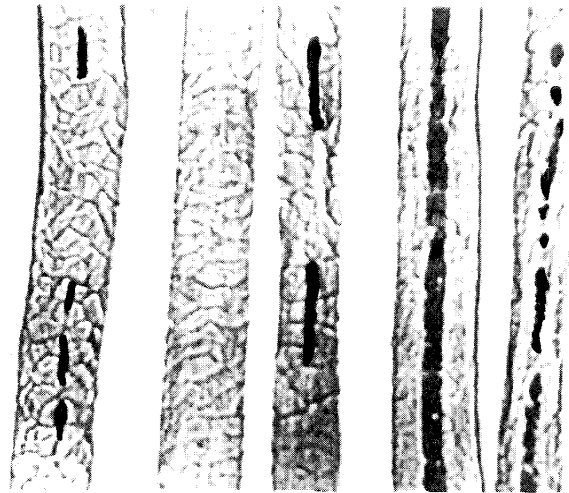
In the mohair trade, "objectionable fibres" have been called "kemp". The most medullated fibres are brittle and may be partly removed in carding and combing.

#### Importance - carpets

Some degree of medullation is seen as desirable in carpet wool: it imparts a "crisp" handle and an improved appearance in some styles of carpet; it gives a higher resistance to compression, less tracking, and improved appearance retention.

However, the benefits of higher medullation have to be offset against poorer spinning performance, lower processing yields, and dyeing problems. Excessive levels reduce abrasion resistance, and high levels of kemp are considered undesirable in most cases.

Medullation content is often specified using breed and classing specifications - for example, Drysdale wools were bred especially to produce desired levels of medullation for carpets, and within breeds higher levels are seen in crutchings and eyeclips. New



F: fragmented      N: not medullated  
I: interrupted      C: continuous

Zealand wools have traditionally not been as highly medullated as other strong breeds, and hence the genetic improvement efforts some decades ago which produced the Drysdale and others.

#### Measurement

Medullation has been measured by a range of techniques: manual separation of fibres, microscopic counting, flotation techniques, and refraction methods all having been used. All these require skill and experience, and are time-consuming.

Several attempts have been made to produce instrumental methods - the two most successful until recently were the WRONZ medullameter and Near Infra Red Analyses (NIRA). Neither has had widespread use, however, and the different interpretations of what constitutes relevant medullation or "objectionable" fibres has been an additional barrier to uptake.

In December 1996, IWTO accepted a final version of IWTO-57 "Determination of medullated fibre content of wool and mohair samples by opacity measurements using an OFDA". This test method at last opens the way to economical and precise certification of a number of medullation properties, including simultaneous results of "objectionable fibres" which satisfy the mohair and apparel wool community, and "total medullation", which is more appropriate for carpet wools. The instrument can also measure the distribution of fibre opacity and medulla diameters, enabling further investigations to be carried out.

With the appropriate accessories, the measurement of medullation on the OFDA 100 can be undertaken at the same time as mean fibre diameter, thus, for the first time, opening the way for widespread availability of medullation data on presale lots.