Fine Wool: Processors' requirements for large scale and niche market production

Dr Angus Russel, UK (Rapporteur)

Members of workshop session: Dr Luis Pinto de Andrade (Portugal), Mr Kari Anttonen (Finland), Mr Maurizio Bertoglio (Italy), Mrs Irma Boncamper (Finland), Dr Marja-Leena Puntila (Finland), Ms Hilary Redden (UK) Ms Claire Souchet (UK) and Prof. Dr Anne Valle Zarate (Germany).

Introduction

Most of the fine wool processed in Europe is imported from the southern hemisphere and comes from various strains of Merinos. There are, however, small quantities of fine wool produced in Europe from long-established breeds, such as the Saxon Merino in the UK and the White Merino in southern Portugal, from recently developed fine-woolled breeds, such as the Bowmont in the UK, and from lambs' wool from, e.g. the Shetland breed and some of the finer-woolled Finnsheep.

Most of the speciality wools, such as that from the high-lustre Lincoln Longwool and from coloured breeds such as the Jacob and Black Welsh Mountain are too coarse to be classified as fine. Some fine coloured wools, however, come from the Finnsheep and the Shetland, and the numbers of grey, brown and black sheep of these breeds are increasing in response to consumer demand. The markets for these wools are, however, very small relative to that for white fine wool; most of the production is used by the handicraft industry, with only a very small quantity being processed by commercial spinning companies.

Processors' requirements

1. **Fibre diameter.** This is widely accepted by the processing industry as the single most important criterion of quality. The requirement is for wool with a mean fibre diameter of not more than 20 - 21 μm. Most processors' equipment will cope with wool of a fibre diameter in the 17 - 21 μm range, while some specialist companies can spin wool as fine as 13 - 14 μm. The inclusion of some 22 - 23 μm wool in 'fine wool' blends can help to improve the resilience of the end product.

2. **Contaminants.** Fine wool must be free of vegetable matter and other contaminants. While small amounts of vegetable matter can be removed in the combing process, this is not always wholly successful and freedom from vegetable contamination is regarded as very important. The carbonisation treatment used to remove vegetable matter can have a damaging effect on the surface of wool fibres and adversely affects the quality of the finished product. Other contaminants which must be avoided are polypropylene, which does not accept the dyestuffs used in processing, and indelible marking fluids which cannot be washed out in the scouring process.

3. **Fibre length.** Variation in fibre length causes problems in spinning. A mean fibre length of between 30 and 40 mm is required for spinning in the worsted process, while fibres of about 70 mm are needed for the woollen process.

4. **Tensile strength.** A high tensile strength is desirable to prevent an excessive number of breakages in spinning, but this was not regarded by the processors as a significant problem; presumably the wools which they regularly purchase are satisfactory in this respect.

5. **Colour.** With the exception of the speciality coloured wools referred to above, fine wool must be free from any coloured fibres. The 'bright' whiteness preferred by most spinners must not be confused with lustre, which is an attribute of some speciality wools, such as that from the Finnsheep in which it is regarded as a desirable characteristic.

6. **Medullation.** Medullated fibres are considered a serious fault in fine wool and quality fine wool must not contain any medullation.

7. **Yield.** Spinners prefer fine wools with a yield (i.e. the weight of clean scoured wool as a percentage of greasy weight) of at least 70%, although this is not a major factor as most wool is purchased on a clean weight basis.

Processors' problems and difficulties

The larger spinning companies have little difficulty in sourcing supplies of fine wool; imported fine wool can be purchased in large uniform lots which meet their specifications. However, the smaller spinning companies processing small lots of European-produced wool experience considerable difficulty in producing yarns with repeatable specifications and characteristics. This arises principally from the non-uniformity of the small lots available for purchase.

The specifications to which yarns are spun depend on their end use. For example, Finnsheep wool is used to produce a variety of yarns for knitwear, felt, socks, carpets and tapestries; each yarn type has a different specification. At this stage, there is insufficient information on the relationships between fleece and yarn characteristics to determine which fleece types are best suited to these different yarns, although some research on this topic has recently been initiated.

Pilling of fibres on the surface of the end product has also been identified as a problem in some speciality woollen goods. The cause is not wholly understood, but is considered to be multi-factorial, perhaps involving an unduly high proportion of short wool fibres and also the softness of the wool.

Solutions

The two main requirements for progress in the development of fine wool production in Europe are:

- improvements in wool quality;
- the development of a wool grading and marketing infrastructure.

Improvements in wool quality

This can be best achieved through specifically designed breeding programmes. The second EFFN Workshop Report outlined the selection objectives of such programmes and considered the genetic implications for wool quality and quantity traits. It also made recommendations regarding the parameters to be used in selection indices and the information to be included in databases. Having now considered the requirements of the processors, these conclusions and recommendations remain unchanged.

The establishment of a fine wool database is now in progress.

It is interesting to record recent developments in a scheme designed to improve wool quality in Finnsheep. This involves collaboration between Finnsheep producers in Finland, Sweden and Denmark. The fleece assessments made include crimp, staple length, lustre (a desirable characteristic in this breed), staple formation (uniformity within staples), density, uniformity over the body, fibre fineness, tensile strength, fleece weight and colour. Most traits are assessed subjectively on 1-5 or 1-6 scales and not all traits are recorded in all countries. None the less, this is a good example of collaboration between countries and the scheme is already providing useful information on, e.g. the relationship between fibre diameter and crimp ($r = 0.8$) and the heritability of fleece weight ($h^2 = 0.4$). The estimates of these and other parameters are essential for the development of the selection indices needed to further improve wool quality.

The Finnsheep breeders in these three countries are to be commended for their initiative. Recently they have begun making objective measurements of some fleece traits using the OFDA technology and, if this approach is adopted more widely in the scheme, the greater precision which this affords over subjective assessments will undoubtedly ensure a faster rate of progress towards the improvement of wool quality. Other countries would do well to follow this example.

Wool grading and marketing infrastructure

The spinners' requirement for reasonable sized lots of wool conforming to close specifications as regards fibre diameter, staple length, absence of contamination, tensile strength, etc. can be met only by the adoption of a system or systems of wool grading. The sole large-scale wool grading system operating in Europe at the present time is that practised in the UK. This system is based wholly on subjective assessments which are not checked against any objective measurements; neither does it cater for truly fine wool with fibre diameters of less than 21 μm. The current British grading system requires to be extended to finer wools and to provide objectively determined descriptions of each grade. It could then be adopted in other EU member states with advantage to both the wool producers and processors.

A recent initiative to develop a wool grading system in Portugal has examined relationships between subjective and objective assessments of fibre diameter and yield of White Merino wool. These relationships have generally been close and it is intended to develop a system which will be continually checked against objective measurements using OFDA technology.

Towards a European Wool Marketing infrastructure

The report of the second EFFN Workshop made the case for a European Wool Marketing infrastructure. Having now considered the requirements of the wool processing industry, the need for such an infrastructure is even more apparent.

A European Wool Group has recently been established to promote the wool production and processing industries in EU member states. It is recommended that liaison between the EFFN and the European Wool Group be established to consider jointly how the development of a pan-European wool grading system would be best pursued.