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## **Fine Wool Quality in Portugal** (Preliminary Results)

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### **Introduction**

Sheep are bred in Europe essentially for the production of meat and/or milk. Today, wool produced represents a liability for the breeder, as the selling price does not cover the expenses of shearing, which is a physiological necessity for the animal (Gallico, 1994).

In the last years, wool prices have been decreasing due to world crisis within the sector and most of the substantial wool produced in the EU's countries is of moderate to poor quality which cannot properly be classed as “fine fibre”. However fine wool of high quality, have been “rediscovered” by the fashion industry in recent years in many European countries and it has a great demand on the international markets. In Europe, wool merchants and textile processors import large lots of wool which have been rigorously graded and meet rigid specifications. They are reluctant to buy small batches of locally grown wool, which are of variable quality and often heavily contaminated with vegetable matter (Russel, 1998). It is therefore relevant to re-evaluate the present situation in what concerns the wool valorization and try to improve or at least keep the wool quality of some flocks, although, it is necessary that selection bodies (herd book) redefine and reintroduce “wool quality” in genetic selection criteria so that wool improving breeding stock may be identified. This purpose fits into the national policy of conservation of genetic resources of indigenous breeds. Therefore it is urgent to carry out an objective and directed survey of the wool quality and to identify the best genetic basis in order to set up an initial fine wool flock ( $\leq 20\mu\text{m}$ ).

The objectives of this work are, from one side, to verify the quality of fine wool produced in Portugal, taking as the basis for the evaluation the fineness and, in the other side, to identify the existent correlation between the tactile classification and the laboratory evaluation.

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**Note 2:** This study is part of the results from the project in course “Evaluation of Fine Wool in Portugal” INTERREG II n<sup>o</sup> 98.09.5050.5

## Materials and Methods

This work was done on the basis of samples graded by the technicians as fine wool samples (AA Extra), based on the Portuguese official wool grading system classification and constituted by five classes (Table 1)

Table 1 -The Portuguese official wool grading class

AA	Extra - Merino Extra	19 - 22 $\mu$
	Fino - Merino Fino	21 - 23 $\mu$
A	Corrente - Merino Corrente	22 - 25 $\mu$
B	Primas - Primas	25 - 29 $\mu$
	Primas - X Médio	29 - 32 $\mu$
	Cruzados - X Médio	28 - 30 $\mu$
	Cruzados - X Comum	30 - 35 $\mu$
	Cruzados - X Lustroso	28 - 36 $\mu$
D	Merinos Defeituosos (E,F,C)	DM
	Cruzados Defeituosos (P,X)	DX
Aninhos	Lamb wool (1st shearing)	
Peças	Belly and head wool	

When wool grading was done, in three different places of concentration (Castelo Branco, Évora and Beja), samples were taken randomly on the classes AA and A which correspond to the Subclasses Extra Merino (ME) (n = 42), Fine Merino (MF) (n = 54) and Current Merino (MC), (n = 51). Within each subclass, samples have been collected from each one of the three grades of yield.

The three places, where concentration is done, are responsible for collecting a significant slice of the wool produced in the interior Center and South of Portugal, where the two breeds of Merino prevail. In the center, we have the Beira Baixa Merino (Castelo Branco) and in the South we have the White Merino (Alentejo) which represents the highest figures in sheep population (1.300.000 animals).

Yield grading is based on an individual fleece evaluation (tactile and visual assessment of the content in grease, vegetable matter, mineral matter and other material rather than wool fibre) and is divided in three different grades: Grade 1 (62%), Grade 2 (57%) and Grade 3 (53%).

Samples have been taken from the mid-side (4.5 cm<sup>2</sup>) based on the proposed measurement procedures from the EFFN (1997).

Laboratory analysis for Yield and Fibre Diameter (OFDA, according the IWTO 47-95) were done on the Macaulay Land Use Research Institute (Scotland).

## Results and Discussion

### Fineness

Significant differences were observed between the averages of the fineness evaluated by OFDA of the samples classified as ME and MF and the samples classified like MC ( 22.0 $\mu$  e 22.7 $\mu$  versus 25.3 $\mu$ ) (Table 2).

Table 2 - Fineness diameter and Yield in the three regions of wool concentration in the three classes of grading

Grading Class	n	Diameter - OFDA ( $\mu$ )	Yield (%)
ME (19-22 $\mu$ )	42	22.0 <sup>a</sup>	58.6
MF (21-23 $\mu$ )	54	22.7 <sup>a</sup>	60.3
MC (22-25 $\mu$ )	51	25.3 <sup>b</sup>	60.6
<b>Region</b>			
CB	50	23.2	57.1 <sup>a</sup>
E	49	23.4	60.4 <sup>ab</sup>
B	48	23.4	61.8 <sup>b</sup>
Total/Mean	147	23.3	59.8
SD		1.65	8.50
S Grading		*	NS
S Region		NS	*

**Nota:** S - Significance for  $P < 0.05$ ; a and b - Índexes that, when similar, indicate that averages are not significantly different; n - number of samples; OFDA - Optical Fibre Diameter Analyser; CB- Castelo Branco; E- Évora; B- Beja; ME - Extra Merino; MF - Fine Merino; MC - Current Merino; SD - Standard Deviation; SRegion- Significance for Region; SGrading- Significance for Grading; \*- Significant Differences; NS - Non significant

The correlation found between the subjective grading and the laboratory evaluation of the diameter (OFDA) is not particularly high (0.6182). That could be due to the fact that in the range of variation of the fineness of the classes, there is an overlapping among adjacent classes. This means that a wool that can be identified as 22.0 $\mu$  is, in the tactile grading, and in function of a group of another subjective components classified in the class ME or in the class MF. Nevertheless, is still necessary to have present that the subjective evaluation is done on the fleece, considering it as a whole, while the laboratory evaluation is done on samples taken in specific places (mid-side of the animal).

Relatively to the place of concentration (regions), where the samples of fine wools were obtained, no significant differences were observed ( $P > 0.05$ ) among the averages of the diameter of the fibres determined by OFDA (23.2 $\mu$ , 23.4 $\mu$  e 23.4 $\mu$  in the area of Castelo Branco, Évora and Beja respectively). A

high homogeneity of the wool produced in the three areas of the interior center and South of Portugal was noticed (Table 2).

### Yield

In what concerns to the yield, no significant differences were observed ( $P > 0.05$ ) among the averages of the yield of each class. The yield varies among 58.6% in the ME (19 - 22 $\mu$ ) at 60.6% in the MC (22 - 25 $\mu$ ). However, this parameter, varies from region to region, with significant differences between the regions of Castelo Branco and Beja (57.1% and 61.8%) (Table 2).

These results could be due to the handling system and also of the purpose of production. In the region of Beja and Évora, where the highest yield was observed, the flocks are essentially kept in a pure extensive system, based on grazing, and directed to meat production. In the region of Castelo Branco, where the yield is lower, the flocks of Beira Baixa Merino are bred for milk purpose; the animals are kept on an extensive production system, based on grazing, and, are daily subject to a high space restriction, that has for purpose to make easier the process of milking. This space restriction is made in covered lodging (during the Winter) or outdoors (final of the Winter and Spring) and it can be prolonged since the beginning of the night milking to the end of the next day morning milking. This leads to a higher degree of wool contaminating materials and to the consequent low yield.

### Grades of yield

The averages of yield of the three lots show significant differences to each other (55.5% versus 59.1% versus 63.6% for the lots 3, 2 and 1 respectively) (Table 3), which confirms the difference of the lots and the quality of the work accomplished by the classifiers. We can see that the yield obtained in the laboratory is about 2% higher than the expected yield done by the classifiers. It is necessary to point out that between each grade of yield there is a difference of about 4%, which leads to a difference of 8.1% between lot 1 and lot 3, being evident the advantages that comes upon in terms of marketing and industry.

**Table 3-** Comparison between the wool Yield grading by the technicians and the laboratory results

Yield grading	n	Yield (%)
1(62%)	53	63.6 <sup>c</sup>
2 (57%)	53	59.1 <sup>b</sup>
3 (53%)	41	55.5 <sup>a</sup>
Total/Mean	147	59.8
SD		8.03
S		*

### Prevision of fine wool produced in Portugal

The distribution of the medium diameter of the samples, determined by OFDA, by classes, allow us to verify that 36.1% (53/147) of the analysed wool is fine, with less than 22.5 $\mu$  of diameter. Only 4,1% of the samples show diameters lower than 20 $\mu$ . However 32,0% of the samples show diameters that vary between 20 and 22,5 $\mu$ .

These results, obtained in randomly sampling, and the fact that we have found wool samples with 18,1 $\mu$ , let us to foresee enough variability to point out the improvement of the characteristic fineness.

This work is so much more urgent as we know that it has been happening an increase of the fibre diameter with a decrease of animals with diameters lower than 20 $\mu$ . Work done by Morais (1938) shows that in some regions in the South of Portugal were still possible to find 20% of animals with wool with a diameter lower than 20 $\mu$ .

Table 4- Evaluation of the percentage of fine wool

	< 20 $\mu$	[ 20 - 22.5 $\mu$ [	[ 22.5 - 25 $\mu$ [	$\geq$ 25 $\mu$	Total
<b>n</b>	<b>6</b>	<b>47</b>	<b>60</b>	<b>34</b>	<b>147</b>
<b>%</b>	<b>4.1</b>	<b>32.0</b>	<b>40.8</b>	<b>23.1</b>	<b>100.0</b>

### Conclusions

The results obtained with the evaluation of the fineness by OFDA revealed a reasonable correlation with the subjective grading based on tactile and visual assessment.

The continuity of this work within the project "Evaluation of fine wool in Portugal" is essential. However, the preliminary results obtained and presented are enough to foresee that more than 35% of the wool produced in Portugal (from 1,3 million animals of the breed Merino) is fine wool, with less than 22.5 $\mu$ . We believe that genetic variability exists in the population, what let us to foresee, the real possibility of improving the characteristic wool fineness.

The homogeneity of the wool obtained in each subclass and the differential of the found yield, allows us to conclude about the real advantages to the marketing and industry of these classified wool. It is necessary to understand that in large quantities of raw material, 8.1% of yield losses, it is a great economic loss.

The obtained results turn evident the quality of the work done by the classifiers which works, as a warranty of the product offered to the market.

The maintenance in Portugal of the wool classifying activity is recommended, however, it is necessary to associate the vocational and objective training of

new technicians in order to accomplish this task. If this aim is reached, it will be possible to be less dependent on the import of high quality raw materials and from price variations in the international markets, assuring that the added value lost in the import process will be retained in the area (Russel, 1994).

At the European level, we consider that an effort must be done in protecting fine wool in EU by a labelling system (Corcoran, 1994). It will have impact at the production level (increasing income from sheep production, settling rural population in LFAs) at the industry level (availability of fine wool produced in the EU suitable for the market demands) at the consumers level (providing a certified product) and at the research level (which must provide answers to the needs of the whole chain).

It would be however necessary to establish quality grading for European wool and standardisation of classification methods in order to establish quality related price scales (Pinto de Andrade *et al.*, 1997), as well as the creation of an European wool marketing infrastructure (Russel, 1998), which will be responsible for grading and marketing and could guarantee an high standard of presentation and quality of fine wool, and so, to assure an higher added value of wool production.

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