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A STUDY ON THE TEXTURE OF RABBIT WOOL

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Abstract

Samples were taken from 108 adult German Angora rabbits raised in the western part of Sichuan Province. Wool texture was researched in May, 1991. Various types of scale structures are present on rabbit wool. Most appear twill-weaved, closely-arranged with small open angles, making the wool surface smooth. Rabbit wool does not disseminate heat easily. Its ability to keep warmth and absorb wetness is very strong because it possesses well developed medulla cells. However, the strength, stretch, elasticity and curvature of rabbit wool are relatively low and this presents some difficulties during industrial processing. Cortical cells are not highly distributed in rabbit wool, and there is no bilateral structure, which is one of the reasons that rabbit wool has little curvature.

Introduction

Samples were taken from 108 adult German Angora rabbits raised in the western part of Sichuan province. Wool texture including scale structure, medulla cavity structure, and primary and secondary cortical cells were researched. The goal was to provide a scientific basis for breeding and selection of Angora rabbits, and for industrial processing.

Materials and Methods

Purebred German Angora rabbit wool was collected form the Rabbit Farm of Sichuan Animal Husbandry and Veterinary Science Institute, the Rabbit Research Farm of Sichuan Agricultural University, the Ya'an District Angora Rabbit Research Farm, and the YiengJing County Rabbit Farm. Samples from the above four regions were studied as follows:

Scale structure. The wool was observed under the KyKy-1000B Electron Microscope and photomicrographs taken.

Medulla cavity structure. The wool was observed by light microscope and photomicrographs of the fine organization were taken.

Primary and secondary cortical cells. Methylene blue was used to stain the rabbit fibers which were then studied by light microscope and BMS-25A fiber projection meter for distribution of primary and secondary cortical cells. Photomicrographs were taken.

Results and Analysis

Scale structure. There are various shapes and structures of scales on the surface of rabbit wool, similar to the scales of sheep wool. Scales are divided mainly into 3 types, the fish scale type (Figure 1), water wave type (Figure 2) and twill weave type (Figure 3). The arrangement of rabbit wool scales is very dense. With very weak visibility the ring arrangement is not very clear, the top angle of scales is small, scales are arranged closely, and open angles are small. Surfaces are smooth, and the brightness line is not very visible. These characteristics result in a decreased rubbing coefficient, and difficulties in the processing of rabbit wool; they are the main reasons that rabbit fibers fall easily from the textile. Different scale shapes and structures are very distinguishable in different wools and even in different regions of the same wool fiber.

Structure of medulla cavity. Under a light microscope the structure of the medulla cavity is clearly seen. Almost all rabbit wool and hair are medullated fibers. Many fine wools have a single medulla cavity (Figure 4) or discontinuous single medulla cavity (Figure 5). Coarse hairs almost always have multiple medulla cavities (Figure 6).

Cortical cells. The proportion of cortical cells of rabbit wool is less than that of sheep wool. The finer the rabbit wool, the fewer the cortical cells. The proportion of medullas increases as the wool fiber becomes thicker. Rabbit wool does not disseminate heat easily and its ability to keep warmth and absorb wetness is very strong because it possesses well developed medulla cells. This feature can present difficulties during processing, however, because the strength, stretch, elasticity and curvature of rabbit wool are relatively low. When the wool is treated by methylene blue, it shows a uniform distribution of cortical cells, with no bilateral structure. This is one reason that rabbit wool has less curvature.

Conclusions

1. There are various types of scale structures on rabbit wool. Most appear twill-weaved and closely-arranged with small angles, so that the wool surface is smooth.

2. Almost all rabbit wool has one or more medulla cavity structures, which increase in number as the wool thickens.

3. The development of rabbit wool cortical cells is less than that of the medulla cells.

4. The distribution of primary and secondary cortical cells is such that there is no bilateral structure.

References

Finzi, A. 1989. Characteristics of Angora rabbit wool in relation to shearing period. ABA (57) 4545.

Le Roux, F.L. 1959. Routine methods for determining milling quality in Merino. Nature (184) 917.

Marinucci, M.T. 1989. The Angora rabbit fibre: data on physical characters. ABA. (57) 3663.

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Fig. 1. Fish scale type scale (electron microscope x 3000).

Fig. 2. Water wave type scale (electron microscope x 1500).

Fig. 3. Twill weave type scale electron microscope x 3000).

Fig. 4. Fine wool with single medulla cavity (light microscope 10 x 20).

Fig 5. Fine wool with discontinuous medulla cavity (light microscope 10 x 20).

Fig. 6. Coarse hair with multiple medulla cavities (light microscope 10 x 20).