Root-Ends and Skin-Pieces in Woolen Materials

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If root-ends or even skin-pieces are found in woolen material when submitted to microscopic examinations, this is generally regarded as proof that pulled wool is present in the cloth. This evidence is weak, however, as in reality root-ends may be found in the very best fleece wool (shorn from the living sheep).

There are three possibilities to which the presence of root-ends may be traced.

I. Shed Wool-Hairs

According to Spoettel & Taenzer[1] the thoroughbred sheep no longer has a periodical shedding of its hair, or rather, this latter proceeds very slowly and only partially.

In Merino and Southdown wools of one year's shear, one finds hairs with pointed upper ends (natural points) without papilla, hairs with blunt ends, but with papilla, and finally some with pointed upper ends and papilla. In the two latter cases, we are concerned with shed hairs; those with pointed upper ends are hairs which have grown in again. Shed wool-hairs with root-ends are, therefore, present in all fleece wool.

It may happen that a very large quantity of wool-ends may appear as in the case of the abnormal, sickly, wool-fleece I described in THE MELLIAND, No. 4, 1929. I learned the reasons for such an uneven fleece-structure from the book by Froehlich-Spoettel-Taenzer *"Wollkunde."*[2] One reason is the undernourishment of the animal. In periods of starvation, the skin nourishment may sink so low, that all the hairs can no longer be fed. A part of the hair dies and falls out. If these disturbances last over a long space of time and in larger degrees, then more and more hairs and finally even the last hairs will decay and loosen themselves. The entire fleece then falls from the sheep in shreds. One calls this the wool "grows" off.

[1] Herzog VIII, Wollkunde, Page 55.
[2] Herzog VIII, Wollkunde, Page 207.

With the entry of normal activities of the organism under normal nourishment, the hair-structure returns to normal. The hairs which survived the unfavorable physiological conditions, resume their former diameter and their close structure. In place of the decayed and shed hairs, new, young hairs form, and gradually the fleece resumes its original form and the close and compact hair condition.

The presence of such disturbances in the hair-structure is made evident in the fleece by the appearance of a break in the evenness of the staple called "Absatz" or "Knick" in German. These breaks always travel through the entire fleece in equal breadth.

It also happens that wool may grow off due to sickness, before any symptoms of undernourishment are detectable from the body of the animal. It may also occur during the time of bearing, or in the early periods of nursing the lamb, or by sudden food changes.

II. Skin-pieces in Fleece Wool

It often occurs while the sheep are being shorn, especially when machines are used for this work, that the shear cuts small pieces from the skin of the animal. This happens very easily when shearing the neck portions, where the skin is folded over heavy rolls of fat as with the Merino.

These skin parts remain in the fleece and find their way to the factory.

Illustrations 1 and 2 show such pieces together with their wool-hairs. The two staples come from an A/AA Australian wool and are reproduced in one-half their original size. While in Illustration 1 the skin-piece is visible in its entire size, in Illustration 2 it is partly covered by wool hairs. The skin is usually of a reddish, yellow color and quite hard.

These skin-pieces are the natural supporters of the hair-roots. Seen under the miscroscope, we find the hair-roots in the skin with the complete hair follicles.

In Illustration 3, three complete roots may be seen, surrounded by the different skin layers. Accidentally I found that with a diluted soda solution the lowest part of the roots, especially the papilla, swells peculiarly, and no further separation then exists between the root-sheaths.

1. The principal method, especially for cross-bred wool, is the one of treating the skin with chemicals. The flesh side of the skin is soaked with a mixture of lime and sodium sulphide. This mixture penetrates the skin and destroys the hair roots, so that the wool may be easily pulled out of the skin.

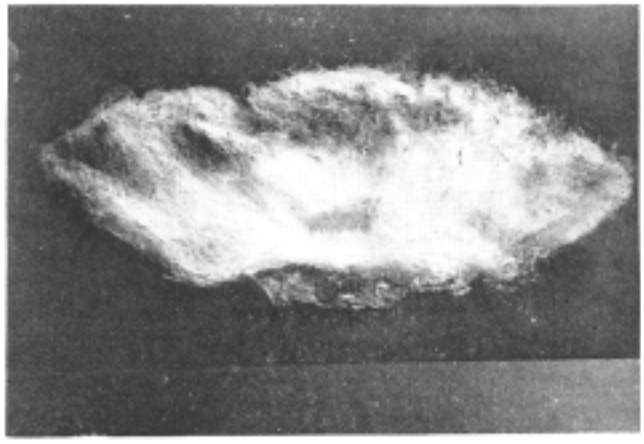

Illustration 1
Wool Staples with Piece of Skin
½ Natural Size.

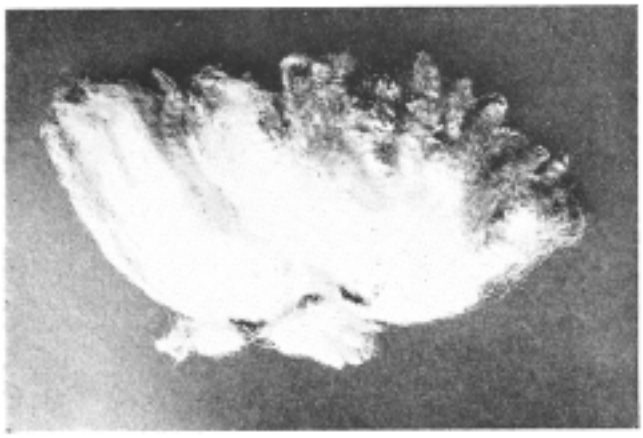

Illustration 2
Wool Staples with Piece of Skin
½ Natural Size.

In Illustration 4, the effect of an n/10 caustic soda solution on the three roots of Illustration 3, may be seen. Both illustrations are enlarged eighty times.

The root sheaths and the surrounding tissues and glands swell, but not as much as the real hair-root.

III. Pulled Wool or Skin Wool

Pulled wool is wool taken from slaughtered sheep or sheep that have died.

There are different procedures in use for taking the wool off the skin.

2. Another procedure is the perspiration method according to Mueller.[3] This method which is especially used with Merino wool, is a decomposition process developed in the fleece. The dried hide is soaked in water, and then hung in a special room several days. The decomposition caused by the developing temperature progresses steadily, without any chemical aid whatsoever, and the wool can be easily taken from the skin.

That the second procedure is better for the wool is certain, as it cannot be avoided that the

[3] Leipz. Monatschrift, Text. Ind. No. 2, 1930, P. 77.

hairs be injured by the application of chemicals.

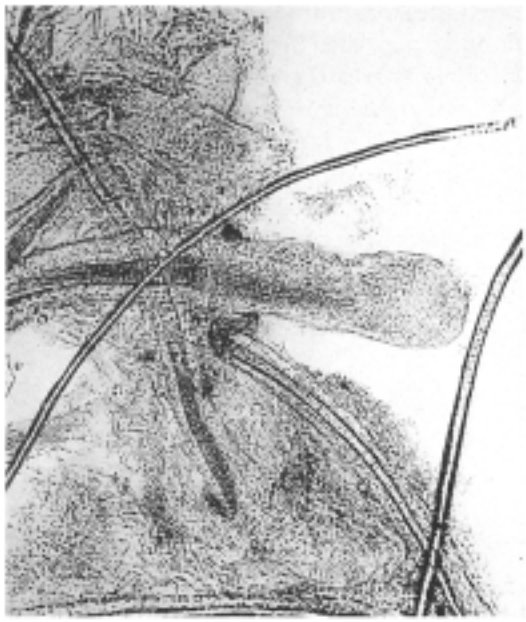

Illustration 3
Roots and Skinparts 80 x.

The wool treated with lime is easily recognized in a loose state, as the staple root-ends are usually surrounded with lime and skin-particles. Under the microscope, these roots have a very typical appearance, as Illustrations 5, 6 and 7 indicate.

The root papillæ do not show the fibrillation as they show with hairs that fall out. With an n/10 caustic soda solution, the root-ends and skin-pieces swell up somewhat, but without the setting in of structural changes.

Defects caused by skin particles of fleece wool, which the manufacturers encounter when using lime-treated skin wools are well-known: poor scouring and irregular dyeing. Less known are the defects which can be caused by the skin-pieces from the fleece wool.

Sorting and Scouring

In the factory the first work which has to be done is the sorting. The fleece is spread out with the top upwards and sorted by a wool sorter into its various grades. Because the skin-pieces are on the cut side of the fleece, they are usually missed by the sorters. If one

Illustration 4
Roots and Skinparts Swollen with Caust. Soda.

should ask sorters how often skin-pieces are found in fleece wool, the answer would usually be, "very seldom." However, if told to look for skin-ends, a few pieces are frequently found in a short time.

The sorted wools are washed in scouring

Illustration 5
Roots from Pulled Wool 120 x.

machines with soda and soap. After the washing, the skin pieces will show themselves entirely unchanged. They are, however, more easily visible in the washed wool. If, however, a wool free of skin is desired, a second sorting after the washing is to be recommended.

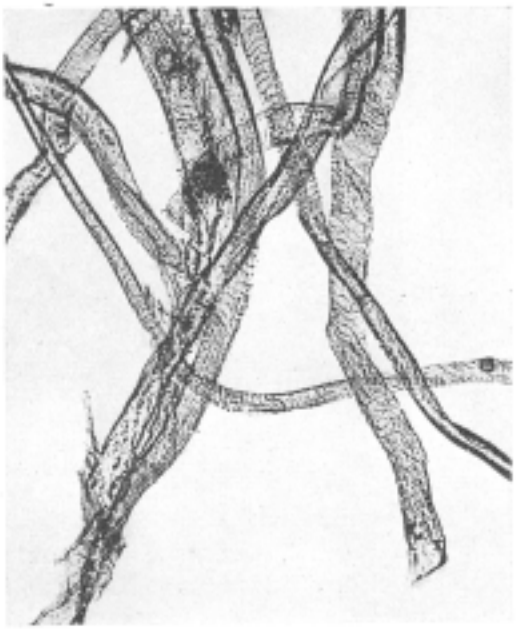

Illustration 6
Roots from Pulled Wool 80 x.

Spinning

In the *Worsted Spinning* (French system) the skin-pieces do not get very far. What is not discarded by the cards, will be removed in combing.

If large pieces of skin get into the machine a direct damaging of the card rollers can result. It has happened that a card roll was thrown out of its place and a great deal of damage resulted.

In the *Wool Spinning*, the largest pieces are removed by the stripping outfit (garnetting) of the first card or opener. Some parts, however, are torn into little pieces by the card clothing and thus find their way through all three cards into the roving.

When spinning on the self-actors, they may be the cause of points—twitty yarn, which often leads to breaking of the yarn.

This is likewise true of the *Weaving* Department, where the skin-pieces may be the causes of warp and filling breaks.

Illustration 7
Roots from Pulled Wool Treated with n/10 Caust. Soda.

These defects in the Spinning and Weaving Departments, are of little significance when compared with all the other sources of these troubles. *(To be continued)*