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A STUDY OF SOME

WOOL - DISINTEGRATING BACTERIA

By "Animal"

Katrine
(~~Catherine~~ Horsthouse)

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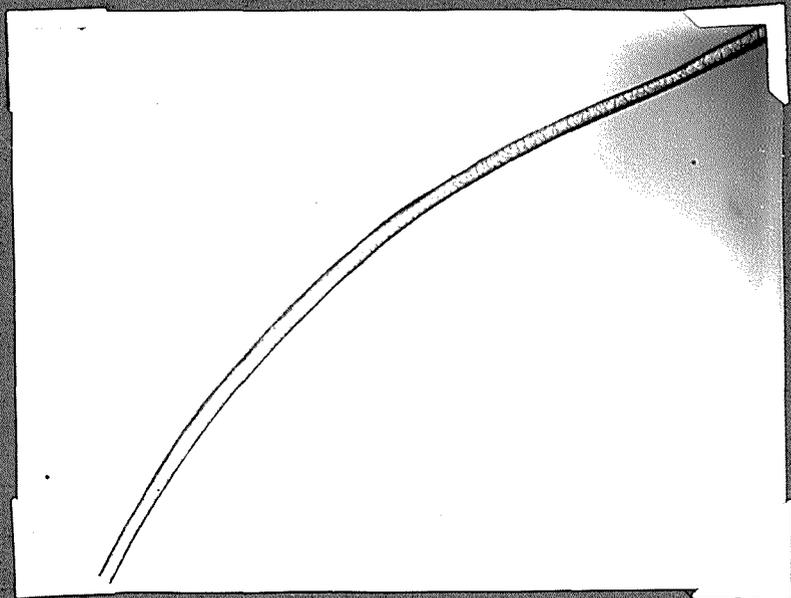
PURPOSE AND SCOPE OF THESIS

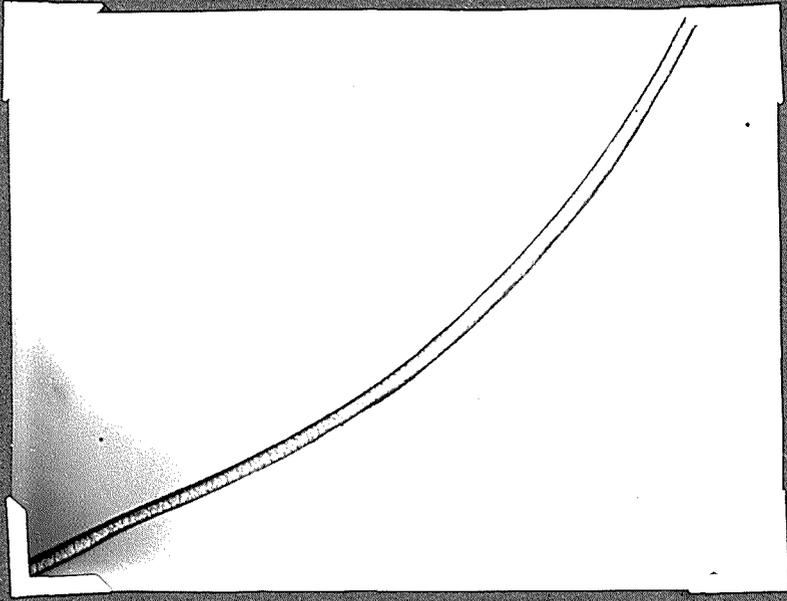
The purpose of this thesis is the isolation and study of the bacteria that rot the wool of living sheep in New Zealand, the study of the distribution of wool-retting bacteria and of some of the conditions in which they bring about decay. It is also desired to show what effect the wool retting bacteria have upon the hoof of sheep - a substance which like wool, consists largely of keratin - and what effect the hoof rotting bacteria have upon wool.

WOOL RETTING.

"Retting" is a word used to describe the process of disintegration of the wool fibre brought about by the activity of micro-organisms. Certain bacteria or their products attack the epithelial scales of the fibre and then the interstitial substance that binds the cortical cells together. Incipient retting, as it is seen under the low power of the microscope, is characterised by the appearance of longitudinal striations in the fibre. If the retted fibres are pulled in two "brush ends" are seen at the break i.e. the break appears torn and frayed due to the protrusion of the loosened spindle-shaped cortical cells. Sound fibres when pulled in two show a clean even break. The retted fibres lose their strength. In the final stages of retting the fibre loses its form also, the epithelial cells fall away and the cortical cells are loosened.

Burgess and other English workers use the term "tendering" to describe the disintegration of the fibre. In New Zealand wool literature the word "tendering" is applied to the thinning which occurs in the wool fibres of some sheep in winter. These "tendered" fibres are much weaker than normal ones. It seems advisable, therefore, to use the word "retting" for the disintegration of wool caused by micro-organisms.



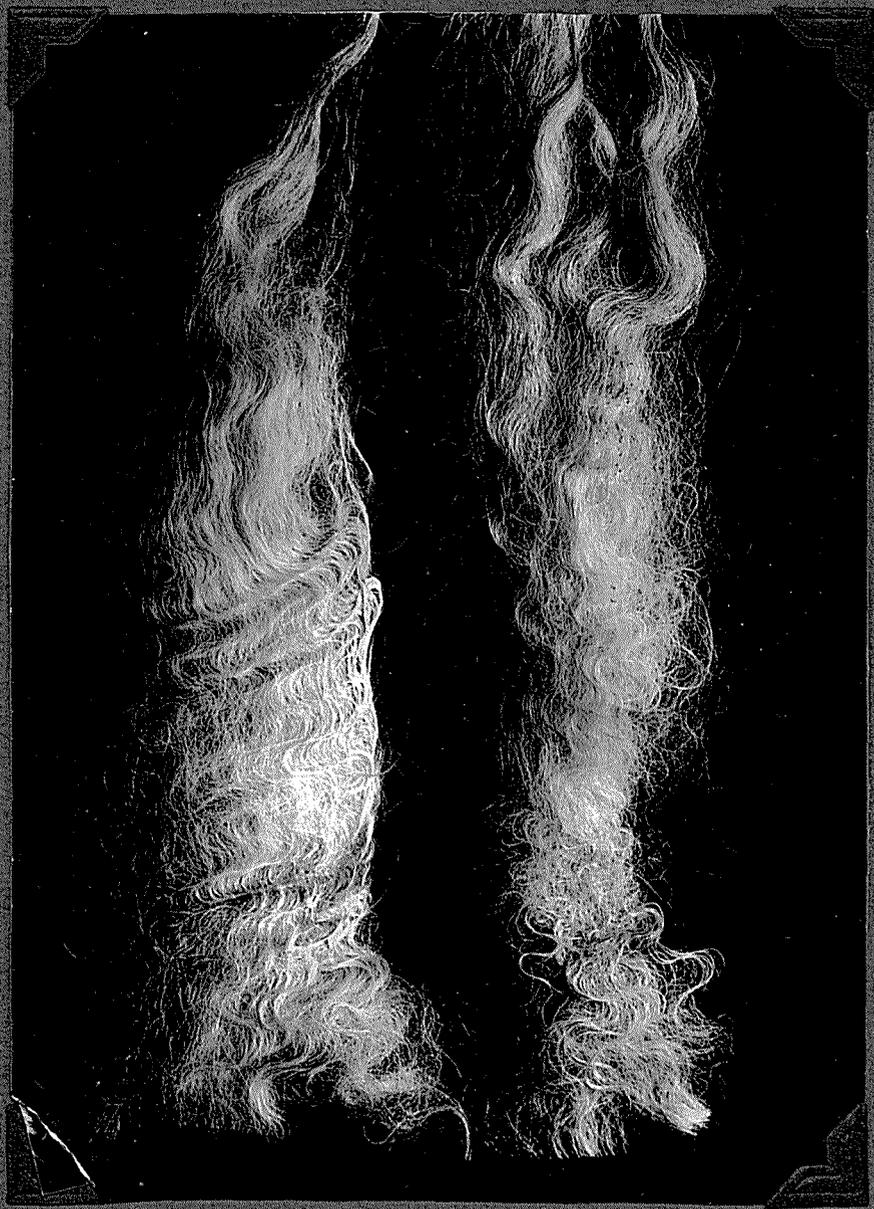


1. Sound wool fibre. The outlines of the epithelial scales can be made out.

Photomicrograph by writer. Magnification $\times 60$

2. Well retted wool fibres. The cortical cells have been liberated. The arrow indicates the epithelial scales.

Photomicrograph by writer. Magnification $\times 60$



Two Samples of Pink Rot Wool.

Photo by Harvey Drake.

Retting is conveniently detected by treating with Pauly reagent. The method described by Burgess and Raminigton 1929 is as follows:

To a large test tube add

10 c.c. of 10% sodium salt of sulphanic acid

5 c.c. of 8% sodium nitrite.

then pour 2 c.c. of concentrated hydrochloric acid slowly down the tube. Mix gently and leave one minute. Immerse the wool in 15 c.c. of 9% sodium carbonate solution and add the mixture. Leave ten minutes. Wash in water.

Staining takes place only where the epithelial scales of the fibre have sustained damage. Well retted wool samples stain dark brown.

PINK ROT

Retted wool is found in the fleeces of living sheep in the condition known as "pink rot". The rotten wool is sometimes chalky-white but more often coloured pink, yellow, or orange.

Pink rot is found sparingly among New Zealand sheep.

THE ROTTING OF HOOF.

In connection with this thesis some work has been done on a kindred process to that of wool retting - hoof rotting.

Sound sheep's hoof autoclaved at 15 lbs. for 20 minutes and incubated in sterile broth is tough. Its cellular structure cannot be made out from scrapings or unstained free hand sections which appear homogenous and refractive. Broth cultures of some bacteria are able to rot autoclaved hoof. The rotten and gelatinised hoof contains sheets of hoof material in which the cellular structure can be clearly seen in unstained water mounts. Different parts of the hoof rot at different rates - the sole and the pliable horn between the heels are much more readily attacked than the hard external layers.

FOOT ROT.

Foot rot was described by French workers (Ludovic and Blaizot) as a contagious chronic disease of sheep characterised by destruction and alteration of the ungual tissue. Experiments by Australian workers, however, cast doubts on the contagious or chronic nature of the disease as it is found in Australia.

Foot rot is extremely prevalent among New Zealand sheep.