THE MYCOFLORA OF FLEECE WOOL

A Thesis presented in partial fulfilment of the
requirement for the degree of
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SUMMARY

A study has been made of the variation in the total population of fungi within sheep fleece *in vivo* with time, and also of the types of moulds and yeasts present within this environment. Fungi were isolated by dilution plating and by the brush technique at the two temperatures of 25C and 37C. Considerably larger numbers of fungi were isolated at the lower temperature. There was no apparent correlation between fungal numbers within fleece wools and the environmental rainfall, either at the time of sampling or on a monthly average basis. The total population of moulds able to grow at 25C did, however, vary with the average monthly environmental temperature. No such correlation existed for moulds growing at 37C nor yeasts at either temperature.

Fungal numbers were unaffected by pretreatment of the sheep with commonly used insecticides variously applied, and seemed more related to general environmental conditions than to mode of pretreatment. Possible factors contributing to variations in the total fungal populations of fleece wools are discussed.

The types of fungi isolated from wools could be grouped into very frequently isolated species, e.g. *Alternaria alternata*, *Phoma spp.*, *Torulopsis candida*, frequent species, e.g. *Mucor racemosus*, *Aspergillus fumigatus*, occasional species, e.g. *Cladosporium herbarum*, *Epicoccum purpurascens*, *Fusarium oxysporum* and very occasional species, e.g. *Aspergillus niger*, *Geotrichum candidum*, *Peyronellaea glomerata*.

A study of the spatial distribution of the fungi within the fleece was made by an impression technique involving both microscopic and cultural examinations. Most fungi were present in the median parts of the staple and numbers decreased towards the tips and basal parts of the fleece. Again, the most frequent types included *Alternaria alternata*, *Fusarium culmorum* and *Phoma spp.*

Of the 68 isolated species, 19 were tested for their ability to degrade autoclaved and propylene oxide sterilised wool *in vitro*. While *Aspergillus niger* and *Penicillium canescens* were consistently unable to degrade either of the wools, most of the tested species degraded both autoclaved and propylene oxide sterilised wool. The degradation of wool by these fungi resulted in the release into the culture medium of cortical cells from the wool fibres. It is postulated

that degradation occurred as a result of the breaking down of cementing materials holding the cortical cells together and did not involve true keratin digestion. Wool degraded by fungi was densely stained by lactophenol cotton blue. It is suggested that this activity could be useful in estimating the ability of fungi to degrade wool, even though undegraded wool was lightly and irregularly stained.

As several fungi were shown to be capable of breaking down wool *in vitro*, further tests were made to determine which of these species are potentially able to grow within fleece *in vivo*. Of those able to grow at skin temperature and which were unaffected by the fatty materials present in wool, *Sordaria fimicola* and *Aureobasidium pullulans* were the two species most likely to grow in the natural fleece environment.

The significance of the work reported here is discussed. Many of the fungi commonly isolated from fleece wools have been reported to cause opportunistic fungal infections in man and animals and are also capable of spoiling refrigerated meats. Thus knowledge of the presence of these fungi in wools is necessary to help avoid problems in public health.

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