Mycotic dermatitis (Lumpy wool) and fleece rot of sheep

J Shilkin
TWO CAUSES OF FLEECE DAMAGE

MYCOTIC DERMATITIS ("LUMPY WOOL") AND FLEECE ROT OF SHEEP

Matted and sometimes discoloured specimens of wool are often received at the Department of Agriculture during seasons of heavy rainfall. Two similar but quite distinct diseases are recognised as having caused this condition. They are mycotic dermatitis (lumpy wool) and fleece rot. Both conditions damage the fleece and render affected sheep susceptible to blowfly strike.

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MYCOTIC dermatitis and fleece rot depend to some extent on the presence of moisture in the wool for their development. Both diseases are most likely to occur in seasons of excessive rainfall when the fleece is often soaked with water.

The diseases have been established in Western Australia for many years and there is little doubt that their incidence has increased with the development and stocking of properties in the wetter districts.

MYCOTIC DERMATITIS (Lumpy Wool)

This disease is caused by the organism *Dermatophilus dermatomonous* and while it is mainly a disease of sheep it can also affect cattle, horses and goats.

It was at first thought that the spores of the organism were often present in the soil and could enter the wool with dust.

Later investigations by C.S.I.R.O. workers have shown that the spores are most unlikely to survive for long periods or to grow in soil, and are also highly susceptible to moist heat. It is believed that sheep become infected by a direct transfer of the spores from sheep to sheep, and that the slight scabby infections on the face and ears are the chief sources of infection.

ECONOMIC EFFECTS

The cost of the disease to the wool industry would be difficult to assess because the incidence of infection is highly variable and the effects of the disease on income from wool are largely indirect.

The incidence of the disease varies between seasons, between flocks within districts and between different districts.

The reduction in value of affected fleeces is only slight in uncomplicated lumpy wool. It is serious however, when heavy rain subsequently causes bacterial decomposition or rotting of the scabby material which binds the fibres into lumps. The condition is similar to fleece rot, with damage and discoloration of the wool. The disease may also cause serious losses, particularly of lambs between birth and marking.

LIFE CYCLE

*Dermatophilus dermatomonous*

The infective spore, released from the mycotic dermatitis lesion is about 1/30,000 in. in diameter and is highly motile under moist conditions.
Mycotic dermatitis. Note the matting of the wool fibres with crusts of hardened exudate.

When a spore settles on a susceptible skin area it germinates and produces a small bud or germ tube which passes straight down into the skin. Once under the skin it extends as a branching thread or hypha, damaging the tissues and producing the characteristic inflammatory response of mycotic dermatitis.

As the tubes of the hyphae continue to extend and invade, the older parts near the surface of the skin undergo division and produce a fresh crop of infective spores. These can then escape and infect any other susceptible skin areas on the same sheep, or on other members of the flock.

**SYMPTOMS**

The branching threads of the hyphae damage the tissues and produce an inflammatory condition or dermatitis. This is accompanied by exudation and the formation of crusts or scabs which bind the wool fibres firmly together. As the condition develops, areas of hard matted wool appear in the fleece. These are roughly circular, about 1/4 in. to 1 in. or more in diameter, and extend from 1 in. to about 3 in. along the wool fibres forming the hard horn-like processes projecting upwards like fingers in the fleece.

Outwardly the full woolled sheep usually appears normal, and the condition may not be found until shearing. The lesions are usually confined to the back and sides of the animal, but some cases have been observed when other parts of the body including the head and limbs have become affected.

In advanced cases, separate areas of the affected wool may join together. Large areas of the skin then become covered with hard masses of matted wool which firmly adheres to the under-lying skin, leaving a raw, bleeding surface if forcibly detached.

In time the crusts tend to separate from the skin and are pushed outwards by the new growth of wool and may subsequently be shed.

**SUSCEPTIBILITY**

Mycotic dermatitis is largely a disease of young sheep. Older animals are much more resistant and the disease does not usually recur, so that an animal affected during one season is generally found to be free of the condition at the next shearing. The disease has been observed chiefly amongst Merinos, but cross-breds are also susceptible, and occasionally cases have been reported in the British breeds.

**PREVENTION**

It is considered by C.S.I.R.O. workers that the spread of infection largely depends on these three factors:

- Enough sheep in the flock with active infection (probably only on the face and ears), to provide infective spores.
- Suitable conditions and possibly vectors of some kind to transfer spores to susceptible sheep. Factors
involved here may be rain, heavy dew, dipping, pasture length, population of flies or other insects and shearing combs.

- Large numbers of sheep simultaneously susceptible.

It is known for instance that Merino sheep are susceptible:

1. For the first week or two after birth.
2. Between three and 12 months of age.
3. For a week or two after shearing, and,
4. When they have been dip-scalded.

When some of the above factors coincide, the possibility of body infection must obviously be increased. It is possible also that some strains and breeds of sheep may be inherently more susceptible, but the only evidence at present tends to incriminate the broader wool types of Merino.

At present the only practical recommendation for prevention is to spray with 0.2 per cent. to 0.5 per cent. Zinc sulphate* straight off shears to avoid most of the infection which occurs in shearing cuts.

Infection at other times however cannot be dealt with in this way because of the difficulty of predicting when the outbreaks may start.

**FURTHER RESEARCH**

The main aim of the research programme is to find a way of preventing infection of the woolled skin.

A relatively inapparent form of the disease is found in most flocks in southern Australia, usually causing only small scabs in the haired regions of the face and ears. We do not know why the infection extends into the body areas to cause lumpy wool in some flocks, but not in others.

Experiments currently being undertaken by the C.S.I.R.O. were designed to answer three main questions—

1. At what stages of its life cycle is the causative organism accessible for destruction?
   A detailed investigation of the life cycle has now been in progress for some time.

2. How can invasion of the skin by the organism be prevented?
   This question is being answered by an investigation of the sheep's natural barriers to the organism's entry, and of factors which weaken or damage these barriers.

3. How can sheep be induced to throw off an infection soon after it has started?
   The lesions on many sheep, including most adult sheep, usually heal early. This aspect is also being investigated.

**TREATMENT**

The causative organism is highly susceptible to penicillin in the laboratory and tests in the field have shown that some infected sheep can be cured by a course of penicillin injections, but that a single dose is of little value. This is probably because many of the invading thread-like forms, or hyphae, are located in niches in the skin which are inaccessible to the penicillin diffusing from the blood vessels into the infected skin. There is no effective treatment suitable for use on a flock basis at present.

**FLEECE ROT**

Fleece rot occurs under conditions of excessive rainfall.

Prolonged wetting of the skin causes the outer layers to swell and soften and results in the development of a mild dermatitis (inflammation of the skin). This is accompanied by exudation and the formation of crusts at the base of the wool fibres which mat them together.

Examination of an affected sheep will show a greyish yellow band of matted wool \( \frac{1}{4} \) in. to \( \frac{1}{2} \) in. wide at a level in the fleece corresponding to the period when the inflammatory process occurred. Should the condition recur with the onset of

* Zinc sulphate spray—
  0.2 per cent.—1 lb. Zinc sulphate to 50 gallons water.
  0.5 per cent.—2\(\frac{1}{2} \) lb. Zinc sulphate to 50 gallons water.
Further rains, a second band may be seen, but closer to the skin. The wool covering the withers, back and sides is most commonly affected.

Sheep six to 12 months old are more severely affected probably because of the openness of the fleece, which allows the penetration of moisture. Sheep of all breeds are susceptible and the condition has most often been seen in Merinos.

The exudate on the skin, when associated with warmth and moisture is an excellent medium for the growth of bacteria, some of which produce pigments which discolor the wool. The colours range from yellow, green, blue and red to brown, black and violet.

The green discoloration commonly seen in this State is caused by the organism *Pseudomonas aeruginosa*. The colour is usually confined to the matted bands of wool but may be diffused through most of the staple, extending almost to the tip.

### CAUSE

Recent research has shown that the occurrence of fleece rot is influenced by certain fleece characteristics, the most important of which is the proportion of wax to wool. Wax has a waterproofing effect and helps to protect the fleece from wetting by rain.

The high wax content of low-yielding fleeces increases resistance to penetration by rain and helps the sheep to resist fleece rot. High-yielding fleeces with a lower wax content are more readily penetrated by water. Sheep with fleeces of this type may therefore be expected to be more susceptible to fleece rot.

The ability of the skin to stand continuous wetting despite any protection afforded by wax in the fleece is also a factor of considerable importance. The skin of some sheep is tolerant to continuous wetting and they do not suffer from dermatitis or fleece rot. The skin of susceptible sheep cannot stand prolonged wetting and they develop dermatitis with characteristic lesions in the fleece.

Differences in susceptibility have been observed in certain families of Merino sheep and there is reason to believe that this variation in skin reaction is inherited.

### BLOWFLY STRIKE

Sheep affected either by fleece rot or mycotic dermatitis become susceptible to blowfly strike. An odour is produced which is attractive to the fly and the moisture present is favourable for the development of the maggots.

Extensive strikes involving the withers, back and sides may result and unless promptly treated may cause the death of the animal.

Treatment involves removing a considerable amount of the most valuable part of the fleece.

Sheep may of course be protected against body strike by spraying or jetting with proprietary blowfly preparations available for this purpose.
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