Foot Rot of Sheep

BY M. S. SHAHAN

FOOT ROT, due to infection in the hoofs of sheep and goats, is a rather widespread and sometimes serious disease that cripples the animals and causes great suffering. It yields well to combined surgical and medical treatment, and much can be done to prevent it.

Foot rot is a specific infectious disease that periodically becomes a major hazard to sheep raising and sheep feeding over wide areas in the United States. It has also been reported from many other countries where sheep husbandry is important. In this country the disease is especially troublesome in flocks confined in crowded corrals or pastures, but it occasionally affects range sheep as well, especially during exceptionally wet seasons. Goats are sometimes affected by a similar, if not identical, disease.

SYMPTOMS

Usually the first indication of the disease to be observed is lameness in some of the sheep in the flock or band, but before this becomes marked there is usually reddening and swelling of the skin just above the hoof, between the toes, or at the bulb of the heel. More or less oozing of watery fluid from the inflamed tissues follows, and if the disease is not stopped the sole and walls of the affected foot are undermined by the infectious process. Death of the tissues results in the accumulation of a grayish-yellow, cheesy exudate, or discharge, followed by separation of the hoof from the underlying sensitive tissues. A characteristic foul odor is invariably present.

If the disease is allowed to progress, lameness becomes more and more pronounced. One foot or all may be involved. When both forefeet are affected, the pain may be so intense that the animal kneels to feed. If all four feet are severely affected, the animal may refuse to stand. The infection penetrates deeper and deeper into the tissues.
until not only the ligaments and tendons but even the bones and joints may be involved. In warm weather the feet may become infested with maggots.

Some severely affected sheep may die, but even the worst cases sometimes gradually improve after several weeks, seeming to recover even without treatment. But within the long, misshapen, and extremely hard hoofs or beneath the fungoid masses that may develop between the toes, the infection often remains, to break out again in the flock. The condition tends to improve when sheep are on dry, well-drained land, but unless it is eliminated by treatment, the disease is likely to persist in affected flocks for months or even years.

**CAUSE**

Foot rot can be readily transmitted to healthy sheep by inoculating them with exudate from the feet of affected animals. Because the feet of sheep are constantly exposed to the myriads of germs present in soil, manure, and water, bacteriological studies of the disease are difficult. In foot rot, pus-forming bacteria, colon bacilli, spirochetes, and other micro-organisms are frequently present.

The micro-organism known as *Actinomyces necrophorus*, which destroys the tissues it affects, is frequently found in cases of foot rot (6, 7), and it is considered by some the essential cause of the disease. An organism known as *Treponema podovis*, or *Spirochaeta penortha*, and by other names is commonly present (1, 3, 4, 5). A germ which is known tentatively as *Fusiformis nodosus* has lately been assigned the causative role in the disease (2) with a suggestion that other organisms, particularly spirochetes and the tissue-destroying bacillus mentioned, probably act as accessories or secondary factors. The apparent confusion among qualified investigators as to the exact cause of the disease is probably largely due to the indiscriminate use of the term "foot rot" for almost any abnormal condition of the feet associated with lameness.

**TREATMENT**

Although the cause of the disease may not yet be wholly agreed upon by veterinary investigators, fortunately there are definite principles of treatment which, if followed, are very successful. As with most other animal diseases, it is preferable that treatment and preventive measures be applied by a veterinarian, or at least under the direction and supervision of a veterinarian.

Of primary importance is the immediate examination at the first signs of foot rot of all sheep in the band or flock and the segregation of all animals showing any symptoms. At this time any excessive or abnormal growth of hoof should be pared away with a sharp knife or pruning shears. Hoof nippers may be required in some cases. The object should be not only to restore the normal proportions and contour of the hoof but also to discover so far as possible any evidence of the foot rot infection.

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2 Italic numbers in parentheses refer to Literature Cited, p. 833.
In a typical, well-established case the affected animal will usually be found to have deep-seated infections beneath the sole or the hoof wall. Proper treatment demands the removal of such parts of the hoof as are undermined by the typical grayish, dead tissue characteristic of the disease (fig. 1). Trimming sometimes assumes the proportions of a major surgical operation. The tendency of the average untrained or inexperienced person is to trim either too little or too much of the horny hoof. If too little is taken away, the depths of the infected tissue cannot be reached by the antiseptic which is subsequently applied. Too drastic trimming and paring, on the other hand, needlessly injure normal tissues and thus still further delay healing.

**Figure 1.**—The foot of a sheep affected with foot rot: A, Before trimming; B, after trimming. (Courtesy of the Montana Agricultural Experiment Station.)

After the feet have been trimmed, a suitable antiseptic should be applied. If a good job of trimming has been done, nearly any efficient antiseptic agent may suffice to curb the infection. If only a few animals are to be treated, their feet may be immersed in a bucket or other receptacle containing the antiseptic, or the antiseptic may be applied by hand. The choice of method, as well as the selection of an antiseptic, depends on the severity and extent of the disease and the facilities available for handling the sheep. **Severely caustic chemicals should never be used by inexperienced persons.**

When large numbers of sheep are to be treated, a trough of wood or other convenient material is usually constructed for use as a foot bath in applying the antiseptic. For most sheep an inside width of about 12 inches and a depth of 6 to 8 inches is adequate. The length of the trough depends on the number of sheep. A 10-foot trough is long enough for a small flock, but one considerably longer is preferable if several hundred sheep are to be treated. The trough may be placed along a corral fence or in a gateway. Converging wing panels or hurdles, either permanent or movable, are usually provided at the entrance to facilitate handling the sheep. Outwardly sloping panels are usually placed at the sides of the trough in a chutelike arrange-
ment. The length of time each sheep should stand in the foot bath depends on the nature and strength of the antiseptic used and the extent of the disease. These matters are best judged by the attending veterinarian. Ordinarily no sheep is kept in the trough for less than 1 minute, and longer than 5 minutes is rarely necessary or advisable. In any event, the animals should be closely watched to insure immersion of the feet and to prevent them from lying down in the trough.

The substance most widely used in treating foot rot is a solution of copper sulfate, or so-called bluestone. The chemical, preferably in powdered form, is dissolved in warm or hot water in 10- to 30-percent solutions (about 1/2 to 21/2 pounds per gallon), prepared preferably in enameled or earthenware vessels. When weak solutions are used, the sheep should ordinarily be held longer in the foot bath. The strongest solution may be effective in one application, while two or more treatments at 2- to 4-day intervals may be required if less concentrated solutions are used.

Some cases respond well to treatment with 2- to 10-percent dilutions of formaldehyde solution (U. S. P.). This, as well as copper sulfate, is very irritating to human beings, as well as to the animals, and it should be handled with care. Other drugs are applicable in individual cases, depending on the extent of the disease and the facilities available for handling the animals to be treated. The longer treatment is delayed, the greater will be the likelihood of serious loss.

In practice, some use another trough, containing water only, placed at the front end of that containing the antiseptic. This water bath washes dirt from the sheep's feet before they enter the medicinal bath. If the disease is advanced and the feet are extremely sensitive after treatment, they may well be protected by clean, soft dressings and the application of some such substance as oil of pine tar.

PREVENTION

As with other infectious diseases, prevention is much more effective than is treatment after the disease has developed. Because infected sheep are considered the greatest source of infection, any sheep to be added to a flock from outside sources should first be held in quarantine for at least a month. If no indications of foot rot appear by the end of the quarantine period, usually the new animals may safely be added to the flock. Sheep should preferably be procured from a source known to have been free of foot rot for at least 6 months previously. Sheep treated for the disease should not be returned to the flock until it is certain that they are normal. In some cases the most economical procedure may be to sell all affected sheep for slaughter under inspection, thus eliminating the expense of treatment and the hazard of their presence to the healthy sheep.

Barns, sheds, troughs, and corrals that have been used by infected sheep should be thoroughly cleaned and disinfected. (See the article on Disinfection and Disinfectants in this Yearbook, p. 179.) All accumulations of litter and manure should be removed and preferably burned. Infective foot trimmings and dressings also should be disposed of by burning. Muddy corrals and pastures should be drained,
if practicable. In severely affected flocks it may be advisable to move all the apparently normal sheep to fresh ground. It is not known exactly how long land used by sheep affected with foot rot remains infectious. If the soil is light and well-drained, the rainfall limited, and the weather hot with an abundance of sunshine, the infection will probably not survive for more than 2 weeks. Under such conditions corrals may ordinarily be considered safe from the standpoint of foot rot if sheep are excluded for a month. On the other hand, if the soil is heavy and poorly drained and there is much rainfall and a scarcity of sunshine, a considerably longer time may be necessary before sheep can be safely returned. In northern latitudes, infected pastures are generally considered safe if sheep are withheld for 4 months during the usual cold winter season.

If different attendants cannot be provided for the healthy sheep and for those being treated for foot rot, the normal sheep should be cared for first and the others last. After handling affected sheep, attendants should cleanse themselves and disinfect all instruments used.

As an added measure of prevention, the apparently healthy portion of the band is sometimes subjected to the antiseptic foot bath described. When this is done, old solutions that have been used by infected sheep should not be used for the healthy sheep.

CONDITIONS CONFUSED WITH FOOT ROT

Animals compelled to travel long distances over rough, hard, gravelly, or rocky roads or trails, or those pastured on exceptionally dry, sparse pastures, frequently develop foot soreness that may be confused with foot rot. Continuously stabled animals or those pastured on low-lying, swampy lands are apt to develop grotesquely shaped, overgrown hoofs, which should be trimmed periodically to prevent lameness. Sheep pastured on muddy ground often collect caked and dried soil between the toes, with resulting injury to the tissues, which may become more or less severely infected. Sheep on stubblefields not infrequently suffer from local injuries that are likewise avenues for the entrance of nonspecific infections. Injuries due to penetrating wounds usually occur only in one or a few animals at a time and are readily identified. The treatment of all such animals is made easier and more effective if they are confined or isolated, just as they would be if foot rot were present.

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