



Animal Health
Fact Sheet



CONTAGIOUS FOOT ROT

—AN UPDATE

Clell V. Bagley, DVM, Extension Veterinarian
Utah State University, Logan UT 84322-5600

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Foot rot is a serious contagious disease of sheep that has become a common problem in the western states in recent years. Once established in a flock, it usually remains until a consistent treatment program eliminates it. This disease must be differentiated from other foot problems if it is to be successfully treated.

CLINICAL SIGNS

Foot rot is characterized by lameness and a separation of the horny portions of the hoof from the sensitive underlying tissues. In the early stages of the disease there is a devitalization of the tissues between the claws in the interdigital space and later a reddening of this same area. Still later, the horny tissue at the heel or the inside center of the toe is undermined, and a characteristic fetid odor is apparent. Finally, the entire sole and even much of the hoof wall is undermined into the sensitive tissues that normally attach the hoof. Both claws of the foot are often affected, and more than one foot may be involved. In an outbreak, several stages are evident at the same time.

CAUSE

The primary, specific causative organism is the bacterial agent, *Dichelobacter* (*Bacteroides*) *nodosus*. This organism must be present in the flock before contagious foot rot will occur, and if the organism is eliminated, the disease is eliminated. Many strains of *D. nodosus* have been identified.

Another bacterial agent, *Fusobacterium necrophorum*, is also involved in the development of foot rot. This bacteria is commonly present in soil and feces. It invades the hoof tissues secondarily and aids in the continued invasion of *D. nodosus*.

TRANSMISSION

The *D. nodosus* organism will survive in the soil, but only for 2–3 weeks maximum even in moist, warm areas. It can survive for several weeks to months, walled off in the hooves of some sheep, and at times there is no external evidence of its presence. The route of spread is from infected sheep, to moist soil, and then to non-infected sheep. The organism is often introduced into a clean flock by the purchase of infected sheep, by mixing with an infected flock, or by using a facility within a few days after an infected flock.

Moisture is essential for transmission of *D. nodosus* from one sheep to another. Usually the wetter the environment, the greater is the spread of foot rot. The temperature of the soil is also a factor in transmission. A soil temperature of 50–70 F. is ideal, while at below 40 F. very

little transmission occurs. However, the disease process in feet already infected will continue regardless of the environmental temperature. Injuries to the feet contribute greatly to the spread of foot rot. Even very small (microscopic) punctures of the skin will allow the bacteria to infect the skin more easily.

Cattle may also be infected with *D. nodosus*, resulting in a more mild but contagious infection of the skin between the toes and at the heels. Thus, cattle may serve as a reservoir for the bacteria, which later could spread to sheep and cause contagious foot rot. Goats, deer, and horses have also been shown to carry *D. nodosus* for short periods although it causes them little disease problem.

The main source of infection for sheep is other infected sheep or sheep that appear to be healed but still carry small pockets of infection in their hooves for 2–4 months.

PREVENTION

If your flock is free of foot rot, it will be well worth the effort needed to keep it clean. Do this by obtaining an honest history of any flock from which you buy sheep. Also, isolate and examine all sheep added to the flock and avoid or clean up any facilities where sheep with foot rot have been kept before using those facilities for your sheep.

A vaccine is available for foot rot (FOOTVAX) that will aid in reducing the level of infection. However, it will not prevent foot rot from entering a flock nor from causing a flock infection. Other vaccines are being developed that may someday offer greater protection.

CONTROL

Treatment efforts may be directed toward temporary control of the disease or toward eradicating it from the flock. During a wet season or at certain times of the production cycle, temporary control may be the only realistic goal. Foot rot can sometimes be temporarily controlled by periodic footbathing of the entire flock. Or, individual affected sheep can be treated by footparing and topical medications and/or injectable antibiotics.

If the annual precipitation is less than 20 inches, eradication of foot rot from the flock should be possible. However, as the amount of moisture increases, the possibility for eradication decreases. Producers in some areas may have to live with foot rot continually. Producers in these areas should:

1. Vaccinate all replacement animals (2 doses).
2. Give booster vaccinations (preferably just prior to any “rainy seasons” for the area).
3. Prepare portable facilities for footbathing that can be taken to the sheep. Monitor the level of foot rot in the flock, especially during wet weather, and begin periodic footbathing early, when the disease first begins to increase in the flock.
4. Cull heavily, especially those breeding animals that have chronic or recurrent problems with foot rot. Genetic selection for increased resistance to foot rot has been demonstrated.
5. Be cautious in adding new sheep to the flock. Adding a new strain of *D. nodosus* may be just like introducing a new disease to the flock.

ERADICATION

A program to successfully eradicate foot rot from a flock will require planning, commitment, follow-through, and an investment of time and money. It is usually well worth the effort, however, if compared with trying to manage a permanently infected flock. Plan for each step listed below and avoid taking too many short-cuts in the program outlined.

1. Develop a systematic plan, commit to it and plan to follow through for two years time.
2. Implement the plan during the dry season of the year when the potential for spread is greatly reduced.

3. Stop all treatment and vaccination for 8 to 12 weeks prior to examination.
4. Set up every sheep and examine every foot to find any with foot rot lesions.
5. Identify and remove for permanent culling any sheep found with foot rot.
6. Repeat this examination and culling process every 3– 4 weeks until none are found for two consecutive examinations.
7. Continue to watch the clean flock for any lameness. Examine for foot rot any sheep which become lame. If any have foot rot, re-examine the entire flock again until two negative tests are achieved.
8. Establish procedures to keep foot rot out of the flock and prevent its re-introduction.
9. If the season turns wet and a high percentage of the flock breaks with food rot, stop the eradication program and go back to a control effort.
10. It will take two years and some wet seasons before you can be confident that you have really eradicated foot rot.

MEDICATION FOR CONTROL OR ERADICATION

For footbaths, zinc sulfate (10-20% solution) has become the preferred medication. Although it can be toxic (if the sheep drink it), it can be used daily or as an hour-long footsoak. Copper sulfate is highly corrosive to metal, stains the wool, has a high potential for toxicity to sheep, and is not quite as effective as zinc sulfate. Formalin dries and hardens the hooves, making them impossible to pare if it is used more than one time. It is very hazardous to the eyes and lungs of those working the sheep. Neither copper sulfate nor formalin should be used more often than every 3-4 days and must not be used for footsoaking (hour-long).

The solution for hour-long footsoaks should be either FOOTRITE (a commercially available product) or a 20% solution of zinc sulfate with a detergent added. The soaking process should be repeated in 5 days.

Apply some medication to infected feet immediately after paring. This aids recovery by getting the medication directly onto the freshly pared foot before it gets covered with dirt and debris. After this one treatment it is usually easier to footbathe the sheep for future medication of the feet. However, for small flocks it may be just as easy to catch and handle the sheep as it is to footbathe. The foot rot organism is susceptible to a wide variety of medication, if you can just get the medication in contact with the organism. Spraying the topical medications onto the foot with a household squeeze-spray, aerosol bottle is preferred for some products because there is no risk of transferring organisms from infected to other feet. But, immersion of the foot into medication in a can or brushing it on with a small brush have been used successfully.

All of these medications have been used with relatively good success.

1. Zinc sulfate 10% in water—1/4 lb. in 1 quart of water.
2. Copper sulfate, 10% in vinegar—1/4 lb. in 1 quart of vinegar.
3. Copper sulfate in pine tar—2 parts of copper sulfate in 1 part pine tar.
4. Oxytetracycline solution in alcohol—add 25.69 grams (one packet) of Terramycin soluble powder to 1/2 cup of water; add alcohol to bring solution to 2 quarts.
5. Penicillin solution in alcohol—(10,000 units/ml) mix 5 million units of potassium penicillin G with 10 cc. water and add the solution to a pint of alcohol.

OTHER TREATMENTS

Many other treatments have been used with some success. Injection of long-acting antibiotics benefits sheep with severe undermining. But it is also expensive for treatment of large numbers and will not cure all that are treated.

Application of medication with booties also works, but it is no better than periodic footbathing, and it requires individual attention. A form of laser therapy has been tried but is not

ready for practical use. The feeding of zinc has shown benefit in some areas of the world but not in any of several trials in the United States.

A treatment that offers great promise, if set up properly, is the use of a daily, self-treatment footbath of zinc sulfate. It should be set up so the flock has to pass through the footbath to get to feed or water, which forces them to use it. They quickly adapt to it once they learn the system. The solution must be replenished and changed periodically. If relatively large numbers are using it, a boardwalk or some other system must be devised to keep the area from becoming a mudhole. Good quality water and salt must be made available so they are not forced into drinking it. But, with attention to these problems, it provides an excellent form of treatment and can be used in a corral or pasture.

AUSTRALIAN ERADICATION PROGRAM

An eradication program in New South Wales, Australia has had great success in recent years and has provided valuable information. They stress the importance of a well-planned and implemented program, with high priority and effort for two years. Producers must be willing to purchase ANY new additions, ONLY from flocks that are free of footrot. They must be able to keep strays away from their flock. Treatment or vaccination may be used during periods of rapid spread but as those wetter (spread) seasons come to a close, all treatment is stopped in order to allow infected sheep to become apparent. From that point on the program is based on inspection of feet and culling of ALL infected sheep found.

During the phase when they are just trying to control footrot, they have had good success with the use of injectable, long acting antibiotics. BUT, the sheep must be kept COMPLETELY dry for at least 24 hours after treatment with the antibiotic. This antibiotic treatment, vaccination or footbathing are not used during the actual eradication program because the goal is to identify any infected sheep.

Three phases are used in their program:

1. **Control** the disease during the period of spread, to reduce the level of infection so eradication is feasible. Use vaccination, injection of long-acting antibiotics and/or footbathing as the basic treatments. Wait several weeks after vaccination (10–12 weeks) or other treatments before beginning the eradication phase.

2. **Eradication.** Plan the program and timing of efforts. Inspect every foot of every sheep and cull immediately ALL infected sheep. Repeat inspection and culling every 4 weeks until there have been two consecutive tests that were completely negative. (DO NOT try to treat infected sheep or ones that were treated previously and haven't healed.)

3. **Surveillance.** Examine all lame sheep. If any show footrot, repeat the inspection and culling on the entire flock until two more negative flock exams. The key test will come during wet, warm weather as any small pockets of infection walled off in hooves are most likely to break down at this period. If it does break out again, the flock would be considered back to phase one again. Prevent any re-infection from purchased or stray sheep.

The problems which have led to failure of eradication of footrot from flocks have been:

- Masking of infection by treatments of vaccination, footbathing or antibiotic treatment.
- When much attention was given to a separated “infected flock” in trying to cure them.
- With too few inspections of “clean” sheep.
- Re-introduction from stray or purchased sheep.