

Guide to Footrot in Sheep

By Dr. Ileana Wenger

Sheep footrot is a painful, debilitating bacterial infection of the foot that can lead to severe production losses and increased culling of ewes. Sheep footrot is not the same as the infection that is seen in cattle, but it can be shared with goats; therefore goats must undergo the same prevention and control measures as sheep.

The best way to deal with sheep footrot is to avoid introducing it to your farm!

Be very cautious when you purchase sheep, and manage the biosecurity of your flock carefully.

If, in spite of your best efforts, your flock does become infected, and you find yourself with several lame sheep, there are some basic facts you need to know in order to start an eradication program.



Not every lame sheep has footrot so a correct diagnosis is critical. Footrot most often affects the front feet, forcing the animal to its knees. Sheep with infected back feet have a distinctive stance, as they try to keep their weight off their painful toes. Infected hooves are often encased in manure, which seals in warmth and moisture the bacteria needs to thrive.

Sheep Canada

This article first appeared in the Summer 2007 issue of Sheep Canada magazine.

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Causes of Lameness in Sheep

1. Active sheep footrot requires the presence of at least two separate bacteria in the foot:
 - a. *Fusobacterium necrophorum* is a common bacterium found in soil and present in animal feces.
 - b. *Actinomyces* (*Corynebacterium*) *pyogenes* is a common bacteria in soil and is also commonly found in foot abscesses.
 - c. *Dichelobacter* (*Bacteroides*) *nodosus* is responsible for sheep footrot infection. It lives in the feet of sheep, and can only survive for seven to 14 days anywhere else. *Dichelobacter* can persist for up to three years in chronically infected hooves.
2. There are three clinical causes of lameness in sheep associated with these bacteria; they are all related but it is important to be able to tell the difference between them.
 - a. Interdigital dermatitis (between the toes), also known as foot scald, is an early infection with *Fusobacterium*. Sheep with interdigital dermatitis have a moist, reddened, angry-looking lesion



Footrot treatment is time-consuming, expensive and back-breaking work.

Footrot is extremely painful! It starts between the toes then under-runs the sole, causing the sole and the hoof wall to separate. The bacteria eats away at the hoof tissue, causing the foul smell associated with the disease.



between the toes, often with a whitish layer of dead tissue on the surface. Lameness is usually mild but may progress to severe in some cases. It is generally seen during or shortly after a period of warm, wet weather, especially in conditions causing trauma to the feet (rocks or stubble grazing).

- b. Foot abscesses may occur when *Actinomyces* invades tissue already weakened by an interdigital infection. The sheep will be severely lame and an abscess can be drained from the sole of the foot. In prolonged cases the abscess may rupture and drain from the coronary band (the area at the top of the hoof where it meets the hair on the sheep's leg).

- c. Footrot occurs when a carrier sheep infected with *Dichelobacter* is introduced to the flock and these very invasive bacteria infect the tissue that has been weakened by an interdigital dermatitis. Depending on the strain of *Dichelobacter* present, it can be a mild (benign) or very severe (virulent) infection. Sheep are often so lame they cannot walk and are seen on their knees trying to graze. The infection under-runs the hoof wall and sole, causing an extremely painful separation of the hoof from the underlying tissues.

3. Once the predisposing factors of warmth and moisture are present, the organism will easily spread from chronically infected carrier



Footrot damage is visible from the exterior of the hoof. The foot on the left has recovered but has a permanent crease where the hoof wall has collapsed. The middle hoof shows the dark shadow where the tissue underneath has died. The foot on the right has also recovered but is growing erratically.

sheep to other members of the flock. All ages and types of sheep are susceptible, although selection for genetically resistant sheep in countries where the disease is widespread has helped to reduce the severity of the disease.

4. Infection does not provide natural immunity to the disease. Young lambs may show signs of foot scald when housed with chronically infected ewes. Carrier sheep often have misshapen feet and may require more frequent foot trimming. Acute sheep footrot is usually accompanied by a distinctive foul odour and discharge.
5. Diagnosis in severe cases is based on clinical signs of lameness, separation of the hoof, discharge and foul odour. In early cases of interdigital dermatitis and less virulent strains, samples should be submitted to a lab by your veterinarian for confirmation.
6. Treatment of sheep footrot is time-consuming, expensive and backbreaking work. The best defense is to avoid bringing carrier animals into your flock. However, if your flock does become infected, it is not necessary to cull the entire flock. Sheep footrot is a treatable disease and can be eradicated from your flock if strict protocols are diligently followed.
7. Footrot vaccines are available in some countries, but are extremely variable in efficacy. This is due in part to the many different strains of *Dichelobacter* involved. Vaccines may help, when used in conjunction with foot trimming and soaking, but will not take the place of a comprehensive program of trimming and soaking.

Protocol for Eradication of Sheep Footrot

1. Thoroughly examine the feet of ALL sheep in the flock. Don't forget the rams.
2. Sheep with severely infected, misshapen or chronically infected feet should be culled.
3. Sort the flock into two groups: those with apparently sound, healthy feet (the exposed group) and those that are lame or known to be infected (the lame group).
4. Animals in the exposed group should have their feet carefully trimmed, and be footbathed in a 20% zinc sulfate solution according to the schedule in Figure 1. Disinfect hoof trimmers between animals.
5. After trimming and footbathing, move the exposed group to clean ground (no contact with

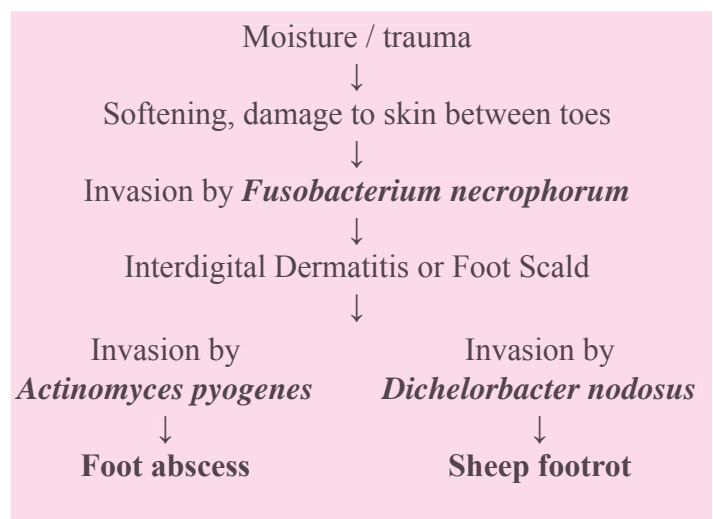


Figure 1. Footsoaking schedule for the eradication of footrot

Week	1	2	3	4	5	6	7	8	9
Infected Group	1 hour soak x 2	1 hour soak	1 hour soak	1 hour soak	1 hour soak	1 hour soak	1 hour soak	1 hour soak	1 hour soak
Exposed Group	1 hour soak x 2	1 hour soak x 2	1 hour soak x 2						

sheep for at least 14 days). Make sure they do not go anywhere near the infected group or walk on ground the infected group have walked on.

6. Trim the feet of all sheep in the infected group. ALL feet must be trimmed and all cracks, pockets or tracts must be dug out down to healthy normal tissue. Disinfect hoof trimmers between animals. We have found that a rotary tool such as a Dremmel is indispensable for this job. The bacteria must be exposed to air and the footbath solution to be killed. The rotary tool allows this to be done easily and safely.
7. Infected sheep should be treated with a suitable long-acting antibiotic at time of foot trimming.
8. Infected sheep must be foot soaked in a 20% zinc sulfate solution according to the schedule in Figure 1. Ensure that sheep stand in the bath for the full hour. The zinc sulfate is poisonous; do not allow the sheep to drink it.
9. After each treatment, the sheep should be turned out on to clean pasture (no contact with sheep for at least 14 days).
10. The feet of sheep in the infected group should be re-examined and re-trimmed every three to four weeks during the treatment period. Any sheep that start or continue to limp throughout the treatment period should be culled.
11. The flock cannot be considered cured until they have been through at least one warm/wet season after the treatments are complete.



Preparation of the Footbath

The design of the footbath will depend to a large extent on the number of sheep to be treated. It should be able to hold at least 10% of the flock at one time.

Zinc sulfate monohydrate power is available from feed and livestock supply stores and veterinary clinics. The required foot soaking solution is 20% zinc sulfate with a wetting agent (liquid laundry detergent) added. A 20% solution is equal to 2 pounds of zinc sulfate powder in one imperial gallon of water or 2 kg of powder in 10 litres of water.

To calculate the capacity of the footbath, multiply the length by the width by the water depth. One imperial gallon equals 280 cubic inches. Be sure to use the inside measurements of the footbath when calculating its capacity.

For example, a footbath that is 16 feet long by 4 feet wide might have inside measurements of 189 inches by 45 inches. If it holds water to a depth of three inches, the footbath would have a capacity of $(189 \times 45 \times 3) / 280 = 91$ gallons. This footbath would require 182 pounds of zinc sulfate.

Add one cup of liquid laundry detergent to the foot bath for every 30 gallons of solution, just over three cups in this example. This acts as a wetting agent, enabling the solution to adhere and penetrate into the hooves.

The concentration of the solution must be checked frequently, as it will be considerably less effective if it drops below 15% zinc sulfate. Use a battery tester (NOT an antifreeze tester) to monitor the solution. Used zinc solution can be an environmental hazard and should be disposed of on a manure pile where it will be composted and diluted with organic material before being spread on cropland.

This fact sheet was made possible by support from

