

ALBERTA SheepSmart

RESOURCES FOR PRODUCERS

Photo: THagedorn, AARD

A Guide to Footrot in Sheep

By Dr. Ileana Wenger

Sheep footrot is a painful, debilitating bacteria infection of the hoof and underlying tissues that can lead to severe production losses and increased culling of ewes and rams. 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!

Flock biosecurity is essential to prevent footrot from entering your farm. Be very careful where you purchase sheep from, and be sure to look at the feet of the flock.

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. The sooner you deal with the problem the better. Controlling chronic footrot is extremely difficult and extensive culling will be required.

Footrot can be classified as benign or virulent, depending on the bacterial strain present and the severity of the lesions. Benign footrot usually self-cures once the feet dry out and environmental conditions improve. Virulent footrot causes severe and prolonged infection, and must be aggressively treated to control and eradicate. Strains of benign footrot in sheep may cause more severe signs in goats. Cattle can potentially be carriers of benign strains.

If you suspect you have footrot in your flock, contact your veterinarian so that samples can be collected and submitted to a laboratory for definitive diagnosis.



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.

INFECTIOUS 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. *Dichelobacter (Bacteroides) nodosus* is responsible for sheep footrot infection. It lives in the feet of sheep, and can only survive for seven to 10 days in the environment. *Dichelobacter* can persist for up to three years in chronically infected hooves.
 - c. *Actinomyces (Corynebacterium) pyogenes* is a common bacterium in soil and is also commonly found in foot abscesses.
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 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. **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. It is the combination of *Fusobacterium* and *Dichelobacter* that causes true footrot. Depending on the strain of *Dichelobacter* present, it can be a mild (benign) or very severe (virulent) infection. Benign footrot can appear like interdigital dermatitis. Sheep are often so lame they cannot walk and are seen on their knees trying to graze. More than one foot is usually affected. Infection with virulent strains leads to under-running of the hoof wall and sole, causing an extremely painful separation of the hoof from the underlying tissues.
 - c. **Foot abscesses** may occur when *Actinomyces* invades tissue already weakened by an interdigital *Fusobacterium* infection. The sheep will be severely lame, usually only on one foot, 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



Infected hooves are often encased in manure, which seals in the warmth and moisture the bacteria needs to thrive.

3. Once the predisposing environmental factors of warmth and moisture are present, the organism will easily spread from chronically infected carrier sheep to other members of the flock. All ages and types of sheep are susceptible. In countries where the disease is wide spread, selection for genetically resistant sheep 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. Chronically infected sheep often have misshapen feet and can be carrier sheep that will spread the infection to others in the flock. Acute sheep footrot is usually accompanied by a distinctive foul odour and dark discharge.
5. Diagnosis in severe cases is based on clinical signs of lameness (often in multiple animals), separation of the hoof, discharge and foul odour. In early cases of interdigital dermatitis and those caused by 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 back breaking work. The best defense is to avoid introducing 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. The sooner you begin the process the more likely you will succeed in eradication.

7. Footrot vaccines are not currently available in Canada. They are extremely variable in efficacy, in part due to the many different strains of *Dichelobacter* involved. Vaccines may help, when used in conjunction with foot care and soaking, but will not replace a comprehensive treatment program.

PROTOCOL FOR ERADICATION OF SHEEP FOOTROT

1. Thoroughly examine the feet of all sheep (and goats) in the flock. Don't forget the rams. Keep accurate records.
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 gently trimmed. Feet should be trimmed only to remove the overgrown hoof tissue if present. All animals should be foot bathed in a 20% zinc sulphate* solution according to the schedule in Figure 1. Disinfect hoof trimmers between animals.
5. After trimming and foot bathing, move the exposed group to clean ground (no contact with other sheep for a minimum of 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. It is no longer recommended to severely trim the feet down to "healthy" tissue. This is difficult, and extremely painful for the animal. If the hooves are overgrown they should be gently trimmed, to a normal shape if possible. Over trimming has now been shown to decrease the success of treatment programs, and is not necessary. Disinfect hoof trimmers between animals.
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 sulphate solution according to the schedule in Figure 1. Ensure that sheep stand in the bath for the full hour. The zinc sulphate is poisonous; do not allow the sheep to drink it.
9. After each treatment, the sheep should be turned out onto clean pasture no contact with other sheep for a minimum of 14 days).
10. The feet of sheep in the infected group should be re-examined every three to four weeks during the treatment period. Any sheep that become lame, or continue to limp throughout the treatment period, should be culled. Keep accurate records of which sheep are in the infected group and were lame.
11. The flock cannot be considered cured until they have been through at least one warm/wet season after the treatments are complete.



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



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.

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 sulphate monohydrate powder is available from feed and livestock supply stores and veterinary clinics. The required foot soaking solution is 20% zinc sulphate* with a wetting agent (liquid laundry detergent) added. A 20% solution is equal to two (2) pounds of zinc sulphate powder in one (1) Imperial gallon of water or two (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 (1) Imperial gallon equals 280 cubic inches. Be sure to use the inside measurements of the footbath when calculating its capacity.

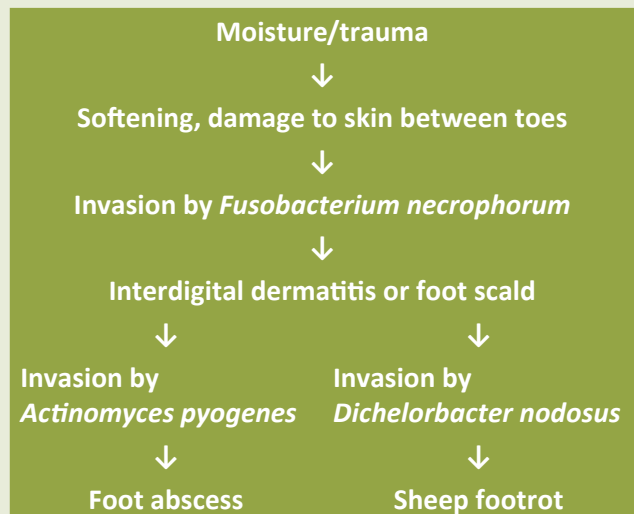
For example, a footbath that is 16 feet long by four (4) feet wide might have inside measurements of 189 inches by 45 inches. If it holds water to a depth of three (3) inches, the footbath would have a capacity of $(189 \times 45 \times 3)/280 = 91$ gallons. This footbath would require 182 pounds of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

Add one (1) cup of liquid laundry detergent to the footbath for every 30 gallons of solution, just over three (3) cups in this example. This acts as a wetting agent, enabling the zinc solution to adhere to 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 sulphate*. 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.

There are alternative disinfectants currently on the market for prevention of footrot in cattle; however they have not been tested on sheep. Stay in contact with your veterinarian for updates on available products.

*Consult your veterinarian if the concentration listed on the product label differs from this recommendation.



Above: Footrot treatment is time-consuming, expensive and back-breaking work. Right: Check the zinc sulphate concentration using a battery tester.



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 [†]						

Figure 1. Foot soaking schedule for the eradication of footrot. [†] denotes one (1) hour twice a week.

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