Foot Rot in Beef Cattle

Foot rot is an acute infectious disease of cattle characterized by swelling and lameness in one or more feet. It also is known as interdigital necrobacillosis, interdigital pododermatitis, and interdigital phlegmon. Foot rot can become chronic if treatment is not provided or is delayed.

Etiology

Fusobacterium necrophorum is a causative organism, but there is disagreement about whether it can produce disease alone or invades synergistically with another organism, Bacteriodes melaninogenicus. Both organisms are nonmotile, anaerobic, gram negative bacteria that are routinely cultured from foot rot lesions. However, F. necrophorum is capable of causing foot rot by itself when experimentally injected into the skin of the interdigital space. Bacteriodes nodosus, the agent causing ovine foot rot, also may be involved. These organisms are common in the environment, and F. necrophorum is present in the rumen and feces of normal cattle.

Researchers do not agree on how long F. necrophorum can survive in the environment. One source states that the organism can survive for a maximum of one month, another that it can survive in soil for up to 10 months. Wet conditions, soil pH, and constant replenishment from cattle feces are probably the dominant reasons for the high numbers of these organisms in the environment. The factors that contribute to the pathogenicity of F. necrophorum include a potent endotoxin, a polysaccharide capsule, an exotoxin (a leukocidin), and a hemolysin. The leucotoxin kills phagocytic cells and allows the infection to persist.

Epidemiology

Foot rot of cattle is common in most countries and is one of the most common causes of lameness. Morbidity varies from one or two animals in a herd or pen to explosive outbreaks with very high morbidity. The disease is seen year round, but the prevalence is usually higher when lots and pens are wet and muddy. All ages are susceptible, but the disease is most commonly seen in cattle of weaning age and older. The same animals may be affected repeatedly. Acquired immunity to the bacteria appears to be poor.

The organisms cannot penetrate intact, healthy skin, so the factors predisposing cattle to interdigital infection are those affecting skin integrity, such as abrasive surfaces, stones, frozen or dried mud, stubble, and wet pens. Zinc and possibly other trace mineral deficiencies may complicate susceptibility to foot rot. The fact that the disease is common on some farms and does not occur at all on others suggests that factors affecting spread of the disease are not well understood. For instance, there may be factors which limit the persistence of infectivity in certain soils. Individual susceptibility may be affected by nutritional, genetic, or other unknown factors.

During 30 years of cow/calf and feedlot practice, the author has observed that foot rot outbreaks frequently occur when cattle in a feedlot are moved to a recently cleaned pen or immediately after fresh soil is added to a pen. Most outbreaks of this type have occurred during dry conditions. The author's experience has shown that many explosive outbreaks with high morbidity occur when feedlots are powdery dry.

Clinical signs

There usually is a sudden onset of mild to severe lameness with swelling of the coronet and interdigital space. The interdigital space often is necrotic and fissured, with a characteristic foul odor but little exudate. Body temperature is often elevated, appetite reduced, and body condition lost. Affected animals will not aggressively approach the feedbunk. Grazing is reduced in pastured animals. Breeding bulls are incapacitated, especially if a hind foot is involved.
Differential diagnosis includes:
- foreign bodies in the interdigital space,
- interdigital dermatitis (hairy heel warts),
- interdigital hyperplasia (corns),
- wire or twine nooses around a foot or claw,
- sole bruises and abscesses,
- toe abscesses, and
- fractures of the bones of the foot.
Suppurative changes in the joints and tendon sheaths may be found in severe cases.

**Treatment and control**

Early administration of systemic antibiotics or sulfonamides and local treatment of the foot lesion usually result in rapid healing with only one treatment. However, the response to treatment should be evaluated and animals retreated as necessary. The main purposes of local treatment are to rule out foreign body involvement in individual cases and to clean the foot and keep it clean. Antibacterial ointments and bandages can be applied. When large numbers of feedlot cattle are involved, examination of the foot and local treatment are often omitted because of the time involved. It is helpful if the animals can be prevented from access to wet, muddy areas. Whenever mass treatment is needed to stop an outbreak, either sulfamethazine in the drinking water or chlortetracycline in the feed is effective.¹

In severely advanced cases in which treatment is delayed or ineffective, the organism penetrates to adjacent tendon sheaths, joint capsules, and/or bone. At this point, prognosis is bleak. When one claw shows involvement and the other one doesn’t, as is frequently the case, the affected claw can be surgically removed, thereby restoring the animal to productivity.

Preventive measures include minimizing abrasive surfaces and wet areas, especially in feeding and watering areas where cattle spend a lot of time. Other methods of prevention include the use of footbaths, feeding a low level of chlortetracycline, feeding zinc methionine, and/or vaccination.³ Footbaths containing 5-10 percent copper sulfate or 5-10 percent zinc sulfate placed in locations where cattle must walk have been used, but maintaining clean solutions is a problem.³ A dry footbath containing a mixture of 10 percent copper sulfate and 90 percent slaked lime also has been used.³ Feeding 500 mg chlortetracycline per head per day to feedlot cattle for 28 days, followed by 75 mg per day throughout the finishing period has been recommended, but controlled comparative trials have not been done.³ Oral zinc has been used successfully to treat and prevent foot rot, but the mode of action is unclear. It has been theorized that the added zinc promotes antibody production or accelerates tissue repair.³ A commercial vaccine has recently been approved for use, but the manufacturer specifically states that two doses must be given to be effective. Early results have shown up to 70 percent reduction in morbidity in controlled tests.⁶ Your veterinarian can identify local factors that may be important in treating and preventing foot rot.

**References**