Hemophilosis

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Take Home Message

Hemophilosis is a common infectious disease seen in feeder calves in large feedlots in western Canada during the fall and winter. This disease manifests itself most commonly as myocarditis (infection of the heart), pericarditis (infection of the heart sac), pneumonia and pleuritis (infection of the lining of the lung), polyarthritis, and sleeping sickness (infectious thrombotic meningo-encephalitis). Vaccines against infection by *Hemophilus somnus* are currently available, but their effectiveness in reducing mortality in feedlot calves has not been well documented. Prophylactic antimicrobial medication of the starter ration has been shown to be the most useful preventive therapy at this time in reducing death losses from hemophilosis.

Introduction

Hemophilosis refers to a disease complex caused by the bacterium *Haemophilus somnus*. Historically, this disease manifested itself as ‘sleeping sickness’ in cattle, which is known as infectious thrombotic meningo-encephalomyelitis (ITEME). This organism is now capable of manifesting itself in other clinical forms of disease in cattle, including respiratory disease, myocarditis, reproductive problems, otitis (infection of the ear), conjunctivitis (infection of the lining of the eyelid and eyeball), mastitis, and polyarthritis (arthritis of multiple joints) (1-3). Myocarditis, pleuritis, bronchopneumonia and polyarthritis have been commonly observed in feedlot calves in large feedlots in western Canada.

Infection with *H. somnus* can occur in any month of the year and disease has been observed in cattle as young as one week of age and as old as 10 years. Hemophilosis has been seen in beef cow-calf herds and dairy herds, but it occurs most commonly in feedlot calves, 6 to 10 months of age, during the fall and winter seasons (2, 3). Since the late 1980’s, this disease has been reported to be the most significant cause of mortality in fall-placed beef calves in large feedlots in western Canada (2, 3). Death losses have been as high as 2% and *H. somnus* may be responsible for up to 50-60% of all fatal disease in
feedlot calves. Economic losses from hemophilosis can be substantial when we add up the costs of treatment, death, lost growth, extra labour, and salvage slaughter values of chronically ill animals. In one large western Canadian feedlot, annual death losses due to apparent hemophilosis during 1989 to 1993 averaged $5 per calf fed.

Causes and Spread

*Haemophilus somnus* is a bacterium that resides in the reproductive and urinary tract of healthy cattle. Many different strains of *H. somnus* can be isolated from the reproductive tract, but most do not cause disease. It is not known which strains of bacteria or environmental conditions increase the risk of disease and why different forms of disease occur. This may be due to the variable susceptibility of individuals to infection with *H. somnus* because of previous immunity, or to differences in the virulence of various strains of *H. somnus*.

*Haemophilus somnus* can be isolated from the respiratory tract of healthy cattle anywhere from zero to 50% of the time (1, 2). The infection is picked up orally from excretions or secretions from the reproductive or urinary tract, or by inhaling aerosolized droplets containing the bacteria. Although *H. somnus* survives for less than 2 hours in urine in the environment, it may survive for an extended time in blood and nasal or vaginal mucus. Thus, the environment may serve as a possible source of transmission of infection, particularly during the cold seasons.

Once *H. somnus* enters the respiratory system, it can cause disease locally or invade the blood stream and circulate to other tissues, including the brain, spinal cord, heart, skeletal muscles, liver, kidney, joints, and reproductive tract. Once localized, the bacteria damages the cells of small blood vessels, resulting in the formation of a clot, thus disrupting blood circulation. The surrounding tissue is destroyed, producing the various clinical forms of disease.

Clinical Forms of Disease

**Septicemia**

If *H. somnus* enters the brain, it causes ITEME. Calves suffering from ITEME are initially depressed, have a transitory fever, stumble and knuckle at the rear fetlocks, appear blind, and eventually can not stand up (3). Calves may lie flat on their side with neck extended and head tilted backwards (Photo 1). Occasionally, they have muscle tremors and convulsions.
ITEME occurs most commonly 3 to 4 weeks after calves enter the feedlot in the fall (3). Calves with ITEME are often found dead in their pen or die within 2 days following treatment. When *H. somnus* enters the spinal cord, cattle are lame in the hind end and paralyzed; yet they may appear bright and alert.

If *H. somnus* localizes in the heart, it can affect the muscles of the heart wall (myocarditis), producing one large abscess (Photo 2) or multiple small abscesses, or it can affect the sac enclosing the heart (pericarditis). Calves are found dead in their pen or die following a short treatment for difficult breathing (3). Calves that survive for a while following infection of the heart often develop swellings of fluid under their jaw and brisket. These are classical signs of heart failure. A review of treatment records suggests that the majority of these calves were treated for fever 3 to 4 weeks after feedlot entry (3). The interval from treatment to death varies from 0 to 49 days, and calves die approximately 6 to 7 weeks following arrival at the feedlot (3).

*H. somnus* may also localize in joints and cause polyarthritis. The large joints are often affected, such as the stifle and hock. These animals are lame and there are obvious swellings over the joints. Swellings may extend down the legs over time as the infection spreads to tendons and muscles. There may be a concurrent infection with *Mycoplasma bovis*, increasing the severity of damage. Calves with polyarthritis may also have myocarditis, ITEME, pneumonia or pleuritis since *H. somnus* can affect multiple organs in the body. The calf’s response to treatment is often poor. A few animals may recover after prolonged convalescence, but most waste away and must be euthanized before they become downers.

Photo 1. Feedlot calf with classic signs of sleeping sickness (ITME = infectious thrombotic meningoencephalitis).

Photo 2. Cross section of a bovine heart with abscesses (myocarditis). This is a syndrome of hemophilosis which is commonly observed in feedlot calves in western Canadian feedlots. These calves are often found dead in their pen or treated for laboured breathing and die shortly thereafter, despite attempts at treatment.
Respiratory

When *H. somnus* enters the upper respiratory tract, it can infect the voice box (laryngitis) or the windpipe (tracheitis). Calves with laryngitis or tracheitis may cough and are noisy breathers. In the lower respiratory tract, *H. somnus* can cause pneumonia, either singly or in combination with other infectious bacteria and viruses. Additionally, it may cause pleuritis (inflammation of the membrane lining the lung and chest cavity). Early signs of disease include depression, fever, and lack of appetite. Later signs include a cough, discharges from the eyes and nose, rapid or difficult breathing, and weight loss. Pneumonia and pleuritis tends to occur within the first month of arrival at the feedlot (2, 3).

Other

*H. somnus* may cause infections of the ear (otitis). Cattle may have a droopy ear, a tilted head, a clear yellow discharge from the ear, and a fever. Conjunctivitis has also been reported and these calves have reddened eyes.

Treatment and Control

In general, *H. somnus* is susceptible to most broad spectrum antimicrobials. The most commonly used antimicrobials are those that achieve high blood levels, such as injectable oxytetracyclines and potentiated sulfonamides (trimethoprim sulfadoxine). It is recommended that cattle be treated for 4 to 5 days (see bottle labels for specific product use). In ITEME, it is recommended that the first treatment be with an antimicrobial which can be given intravenously to achieve immediate blood levels. In addition, thiamine hydrochloride at 10 mg/kg body weight is recommended for ITEME since it appears to have some beneficial effect in diseases of the brain and it is difficult to clinically differentiate calves with ITEME from those with polio (thiamine deficiency). Once animals are down and unable to rise, if they do not respond to treatment in 24 hours, they generally will not recover. These animals should be humanely euthanized as soon as possible.

Since the various forms of hemophilosis are so difficult to diagnose in the live animal, it is difficult to come up with the best treatment regime. In general, an animal will respond the best to treatment if treatment can be given soon after infection. Hemophilosis occurs sporadically; therefore, it is hard to know whether to recommend mass medication of groups of cattle in the apparent face of an outbreak. Although feed, water and parenteral mass medication have been used to treat groups of sick cattle, there is no scientific evidence...
available to indicate whether or not it is beneficial or cost-effective against outbreaks of hemophilosis. In feedlot calves, constant surveillance and early individual treatment are recommended. The effectiveness of vaccination in the face of an apparent outbreak is not known.

**Prevention**

Mass medication of feedlot calves with injectable long-acting oxytetracycline at various times after arrival in the feedlot has been used in an attempt to prevent death from hemophilosis. However, results of field trials have not shown a significant reduction in death losses (4). A recent study conducted in high risk feedlot calves showed that feed medication with Aureo S-700 G for the first 56 days of the feeding period, at 350 mg/hd/day of chlortetracycline and 350 mg/hd/day of sulfamethazine, reduced death losses from hemophilosis, resulting in an economic advantage of $10.93 per animal medicated (5). However, feed medication did not reduce treatments or death from bovine respiratory disease. Based on the results of this field trial, prophylactic feed medication post-arrival may help reduce death losses from hemophilosis.

Another method to prevent hemophilosis is vaccination, which increases the animal’s resistance to infection. Various killed vaccines for *H. somnus* are sold by your veterinarian. They include bacterins, which contain the whole cell bacteria which has been killed, and extract vaccines, which contain only parts of the killed bacteria that are important to increase immunity. In experimental challenge studies, calves immunized twice with the vaccines prior to experimental infection, appear to have less disease (6, 7). These studies suggest that vaccination prior to infection may reduce the risk of hemophilosis. However, in field studies, where calves were immunized on feedlot entry, the effectiveness of the *H. somnus* vaccines has been variable (8, 9). To date, no published information is available from controlled field trials that indicates vaccination on feedlot entry, either once or twice, will reduce losses from the various clinical forms of hemophilosis. Current research is being conducted to improve vaccines and vaccination strategies. Additional field studies are needed to determine when natural infection with *H. somnus* occurs so that we can develop effective management and vaccination programs for cow-calf beef herds and feedlots to prevent costly losses from hemophilosis.


