Pinkeye in Cattle Infectious Bovine Keratoconjunctivitis (IBK)

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Pinkeye is a highly contagious, infectious bacterial disease of the eye of cattle caused by *Moraxella bovis* (*M. bovis*). It has a worldwide distribution. Although pinkeye is non-fatal, it has a marked economic impact on the cattle industry. Costs resulting from decreased weight gain, milk production, and treatment were estimated to be $150 million in the U.S. alone, according to a 1993 study. Pinkeye (1.1 percent infection rate) was second to scours and diarrhea (1.7 percent infection rate) as the most prevalent condition affecting 1996 born unweaned calves over three weeks old, according to the Part II: Reference of 1997 Beef Cow-Calf Health & Health Management Practices report of the National Animal Health Monitoring System (NAHMS) of the USDA: APHIS: Veterinary Services. Pinkeye (1.3 percent infection rate) and foot rot (0.8 percent infection rate) were the two most prevalent conditions affecting all breeding beef females (replacement heifers and cows), according to the same 1997 report of 1996 conditions.

Cause

M. bovis is the primary infectious agent initiating pinkeye. Other microorganisms initiating pinkeye include Chlamydia, Mycoplasma, and Acholeplasma, or viruses such as the Infectious Bovine Rhinotracheitis (IBR) virus, which can either add to the severity of the disease process or may serve as predisposing factors permitting a secondary infection with *M. bovis*.

Other factors instrumental in causing eye irritation, thereby allowing for invasion of *M. bovis* and subsequent disease, are excessive ultraviolet light (sunlight), the face fly (*Musca autumnalis*), the house fly (*Musca domestica*), the stable fly (*Stomoxys calcitrans*), plant material, and dust.

Ultraviolet (UV) light is especially a problem for cattle lacking pigmentation around the eye. Lack of pigmentation allows increased UV radiation to sensitize the eye, resulting in inflammation and subsequent infection.

Flies not only serve as irritants as they feed on secretions from the eye, but they also serve as a means of transmitting *M. bovis* from infected to non-infected animals. Face flies can remain infected with *M. bovis* up to three days following feeding on infected material. Under experimental conditions, disease transmission is uncommon without the presence of face flies and is common with flies present.

Cool and warm season grasses, hybrid Sudan grass, and other forage sorghums, weeds, and brush produce air-borne irritants, pollen, and chaff, as well as serve as mechanical irritants. When animals eat out the middle of round bales, leaving a hay shelf over their heads, the incidence of foreign body irritation is greatly increased. The same situation occurs when hay is fed in overhead feeders. This is especially true with wheat hay or hay containing cheat grass.

Dust is more of a problem in confined feeding operations and is of minimal importance compared to UV radiation, flies, and plant material.

Transmission

Transmission of *M. bovis* occurs through direct contact, flies, and in-animate objects. The organism is located in the eyes and nasal cavities of infected cattle. Infected secretions from these areas are a source of infection for other cattle. Infected, asymptomatic (no symptoms) cattle may serve as carriers, and will harbor *M. bovis* in their nasal cavities for a period that may exceed one year. These carrier animals allow for the persistence of pinkeye at a particular site from year to year.

Ultraviolet radiation, face flies, growing plants, and pollen production are at their peak in the summer and fall, and account for the high incidence of pinkeye during this period. Weaning distress, increased concentration of cattle, increased exposure to other infectious agents (IBR virus, Mycoplasma, etc.), and hay feeding often are contributing factors to increased disease incidence in late fall, winter, and early spring.

Clinical signs or visible symptoms

Pinkeye most commonly occurs in summer and fall. Younger cattle are more susceptible to the disease because older animals have most likely developed acquired surface immunity (protective antibodies on the eye surface) as a result of previous exposure. The prevalence and severity of pinkeye on a particular site may vary from year to year and, as we now know, is dependent on multiple factors. Infection rates can range from a few cases up to 80 percent of the herd at the peak of infection rate, usually the third or fourth week of an outbreak.

The incubation period is usually two to three days, and in experimental trials has extended to three weeks. Swelling and redness of the conjunctiva, excessive tearing, and squinting are the initial clinical signs. Cattle have a decreased appetite due to the excessive pain, and a moderate body temperature elevation. A small opaque area appears in the

center of the cornea in about two days, and by day six the entire cornea will have a gray-white to yellow color with deep central ulceration of the cornea (Figure 1). Severe ulceration and corneal rupture with loss of eye contents, cone-shaped bulging of the eye, and blindness are infrequent outcomes of pinkeye. More often, complete recovery occurs in three to five weeks, with only a few affected eyes having a persistent white scar on the cornea.

Figure 1. Severe corneal opacity and central corneal ulceration in a steer with pinkeye; approximately eight days duration.

Treatment

According to antimicrobial sensitivity studies, *M. bovis* is most often susceptible to oxytetracycline (LA-200® IM or SQ, Bio-Mycin 200® SQ, and AnchorOxy 200® SQ), ceftiofur (Naxcel® for use by or on the order of a licensed veterinarian), penicillin, and sulfonamides. It must be remembered these sensitivity patterns can and do change, making it necessary for your veterinarian to sample a representative number of infected cattle in your herd to determine proper drug usage.

Long-acting oxytetracycline has shown to be an effective treatment in calves when used early in the disease process. Long-acting oxytetracycline has been shown to clear *M. bovis* from the infected eye within 24 hours of the first injection, thereby eliminating the treated animal as a source of infection for other non-infected animals. Penicillin injected subconjunctivally (the thin membrane covering the white of the eye), has had similar healing rates as long-acting oxytetracycline injected intramuscularly, but is more labor intensive.

A combination of intramuscular long-acting oxytetracycline, followed by feeding two grams per head per day oxytetracycline in alfalfa pellets, was reported effective in reducing the severity of naturally occurring outbreaks of pinkeye in six-month-old Hereford calves. Also, calves receiving the oxytetracycline combination required fewer additional treatments than did calves treated with only subconjunctival procaine penicillin. Other microbial products are used topically in the eye, but due to excessive tearing, their effectiveness is short lived and requires repeated treatments.

When severe corneal ulceration exists, protect the eye from UV light, flies, and other irritants through the use of eye patches, suturing the eyelids, or creating a third eyelid flap. Consult your veterinarian for assistance in these methods to enhance the healing process.

Follow all label instructions.

- **Administer all intramuscular (IM) injectables in the neck, and all subcutaneous (SQ) injectables in the neck, or behind the shoulder.**
- **Do not administer over 10 ml in one injection site.**
- **Recheck all withdrawal times with your veterinarian.**
- **A veterinarian - client - patient relationship is necessary for the use of all prescription drugs and drugs used off-label (at dosages and for purposes other than defined on the label).**

Prevention

Like many diseases, management is often the most effective and economical method of disease control. When environmental conditions, animal nutrition, and herd immunity are properly managed, animal health increases and disease frequency decreases. A decline in disease frequency results in a decrease in concentration of infective organisms on the premises; thus, a further decrease in disease frequency occurs.

Fly control - continues to be necessary due to isolated areas in Oklahoma having a significant face fly population. Insecticide fly tags, sprays, charged backrubbers, and dusts bags are products that can provide chemical control. Manure, weed, and brush management are necessary for total fly control.

Grass, weed, and brush control - Grazing management, brush beating, mowing, and spraying, minimize pollen and mechanical irritation.

Hay and/or feed bunk management - lower overhead hay feeders, spread hay out, do not feed hay containing mature seed heads or cheat grass in overhead feeders or in round bales, increase bunk space to decrease direct contact.

Ultraviolet light (sun light) - breed for eyelid pigmentation, introduce Brahman influence into the herd, provide shade or tree rows with ample room to prevent overcrowding.

Disease management – provide proper immunization against viral diseases (IBR and BVD), isolate infected animals, and decrease environmental and nutritional distress. (See OCES Fact Sheet VTMD-9123.)

Vaccination – Commercial and autogenous pinkeye vaccines are available. Reported results by producers and veterinarians have been mixed from their use of these products. Because pinkeye vaccines have not proven to be consistently

effective in prevention, check with a local veterinarian about the use of these products in a specific geographical area. It should also be emphasized that vaccination is only part of a disease prevention program.

Keys to prevention

1. Maximize herd immune status through optimum nutrition, a proper vaccination program, and decrease the distresses of weaning, shipping, and handling.
2. Minimize the concentration of *M. bovis* through the use of an effective vaccine that will prevent disease and eliminate carriers, early disease detection, effective treatment, and isolation of all affected animals.
3. Maintain an optimum irritant-free environment.

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