

# Understanding pinkeye

Pinkeye *Infectious Bovine Keratoconjunctivitis*, is a bovine eye disease caused by an infection with the bacterium *Moraxella bovis*. Since the bovine eye can only respond in a limited number of ways to disease or injury, there are many times when a case may be referred to as pinkeye yet not involve *M. bovis*.

Pinkeye is considered to be the single most important ocular disease of cattle and occurs worldwide wherever cattle are raised. Economic loss due to pinkeye has been estimated at \$150 million per year in the United State alone. This estimate is based on lack of gain in feedlots and on greatly diminished weaning weights (25 to 40 pounds) in calves. This estimate does not include time and money spent treating bad eyes in cattle or lost milk production due to diminished lactation or milk discarded due to antibiotic residues.

## Clinical signs of pinkeye

The disease starts with eye(s) tearing. Tear streaks are usually evident from the inner corner of the eye and cattle often will keep the eyelids of affected eyes closed. Usually within a day after tearing, close examination of the eye will reveal pits (one-sixteenth inch or larger) called lesions or ulcers on the surface of the eye.

For the next few days these will enlarge, the eye turns blue and then white. There may be a blood-red border around these ulcerations. In severe cases the surface of the eye may become cone shaped and may rupture. Animals infected in both eyes are usually blind. Pinkeye normally starts in one or two animals and is quickly spread to other animals by face flies or direct contact. Usually within two weeks of the initial case the herd outbreak is at its most severe stage. Recovered cattle will have bluish to white scars on the eye and the eye surface is sometimes enlarged or misshapen.

Although pinkeye can and does occur at

any time of year, it's primarily a seasonal disease with the greatest occurrence being associated with exposure to peak periods of ultraviolet light (UV) irradiation. Most outbreaks are associated with a number of predisposing factors which can be important in managing the control of pinkeye. These factors include:

- Age of cattle — calves experience significantly more pinkeye than yearling cattle, which in turn have a higher rate of pinkeye than do older cattle. The assumption is therefore, that an acquired immunity is developed over time.
- Breed of cattle --- purebred cattle vary susceptibility to pinkeye. Herefords (especially those with unpigmented eyes) have the highest rate of pinkeye while Angus and Zebus have the lowest rate. It should be noted, however, that when Angus cattle do develop pinkeye the lesions tend to be quite severe and recovery may often be incomplete.
- Crossbred cattle also seem to have varying rates of pinkeye. For example, Hereford crossed to non-Angus may have up to 10 times the pinkeye rate as compared to Herefords crossed with Aberdeen Angus.

Keep in mind that the eyes of cattle are covered with a single layer of cells and that the ability of *M. bovis* to invade the eye may be dependent on some sort of damage to that single cell layer.

Other pinkeye predisposing factors involved in damaging the cells include:

- UV irradiation (bright sunlight) has been demonstrated to aid corneal colonization by *M. bovis* and microscopic examination has shown the cell damage initiated by UV burning.
- Infectious Bovine Rhinotracheitis (IBR) a viral infection, is capable of damaging the

protective cells covering the eye, not only on the cornea, but also on the eyelids.

- Physical trauma such as blowing dust and sand, weed seeds and stubble; face flies, tail switching or antibiotic powders can scratch the cornea and allow entry of *M. bovis*.
- Chemical trauma such as fresh nitrogen on the pasture can bum the protective cell layer.

A number of factors may interfere with the immune response in cattle.

Once again, UV irradiation may play a role. It's well-documented in the human population that excess UV exposure leads to a depressed immune status at least in the skin if not overall. Laboratory mice can have their immunity severely depressed by exposure to a sun lamp. Nutritional deficiencies in cattle can occur even under the care of the best managers. Pasture and hay may look acceptable yet on analysis be low in vitamin A, zinc or selenium. Sometimes a little corn or mineral supplement can greatly improve the immune status of a herd.

It has been documented that various viral agents can severely suppress the immunity of the host. It has been shown that Bovine Viral Diarrhea (BVD) attacks the thymus which is an important source of immune cell production in the animal.

Stress from shipping, processing or insects can be very immunosuppressive.

Another possible predisposing factor is photosensitivity. Photosensitivity may be a result of ingestion of a toxic substance in the forage. In the case of a mild photosensitivity that may be inapparent on the skin due to the hair coat, it has been suggested that the cells covering the eye may well suffer damage, thus allowing penetration of *M. bovis*. This may also explain why bordering pastures may have vastly differing pinkeye rates in the animals grazed on them. The photosensitivity possibility is strictly theoretical at this point.

Pinkeye is a very contagious disease. The bovine eye, nasal passages and sometimes the vagina are where the organism lives and presumably over winters.

It's not unusual to find that cattle begin to break with pinkeye two to three weeks after processing in the spring. If we consider that the organism may be shed in high numbers in tears or nasal secretions and that the animals are crowded and extremely stressed during processing, we obviously have all the right circumstances for the spread of disease in general and pinkeye in particular.

It's not known how long *M. bovis* can

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survive in the body secretions or on environmental surfaces, but it has been known to survive for up to three days on the feet of a face fly. Therefore, we should assume that all surfaces contaminated by infected animals — crowding chutes, clothing, instruments trailers and barn walls — are potential sources of disease for at least several days. Insects, especially face flies, should be considered to be mechanical vectors.

Aerosols (sneezing) have been incriminated in the spread of *M. bovis* and we can't rule them out as possible modes of transmission as cattle carry high numbers of organisms in the nasal passages.

## Treatment of pinkeye

When an animal is run through the chute to be treated for pinkeye producers should do everything possible while the animal is being restrained. Common treatment procedures include:

1. Antibiotic therapy, either topically, eyelid

injection or intramuscular (IM). Topical application is easy to do but it's difficult to maintain effective levels of topical antibiotics on the face with heavy tearing. From a purely psychological view, many cattle producers feel better when the cow has "purple stuff" on its face because they can see that they have at least done something for their animal. An IM injection of antibiotics such as long-acting tetracycline has the added advantage of helping to reduce the numbers of *M. bovis* in other tissues in the body as well as the eye.

2. Protecting the eye from sunlight and other irritants may accelerate healing as well as make the patient more comfortable. Sutures, eye patches and isolation in a dark barn are all options to be considered.
3. Vitamin A can be injected and nutritional deficiencies can be rectified.
4. Vaccination with a *M. bovis* bacterin may

initiate an amnestic antibody response. Significant improvements in pinkeye cases have been observed as quickly as three to five days post vaccination.

## Prevention

Minimizing predisposing factors can be helpful. Pay attention to fly control programs, clip pastures, perform forage analysis to help ensure adequate nutrition and provide shade.

Vaccination for *M. bovis* with some of the newer vaccines has proven to be advantageous.

Pinkeye is an economically important disease in cattle worldwide. Having a more thorough understanding of pinkeye and educating ourselves on treatment and control measures can play an important role in positively effecting the profitability of raising cattle.

— **J. Bruce Addison, president  
Addison Biological Laboratory**

