The Oklahoma Cooperative Extension Service
Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 42 cents per copy. Revised 0615 GH.

Pinkeye

Melanie Boileau, DVM, MS, DACVIM
Associate Professor and Section Chief,
Food Animal Medicine and Surgery
Oklahoma State University Veterinary Medical Hospital

Elisabeth J. Giedt, DVM., MBA
Director of Continuing Education, Extension
and Community Engagement
Center for Veterinary Health Sciences
Oklahoma State University

David Lalman, PhD
Extension Beef Cattle Specialist
Oklahoma State University

Barry Whitworth DVM
Area Food/Animal Quality and Health Specialist
for Eastern Oklahoma
Oklahoma Cooperative Extension Service

Oklahoma Cooperative Extension Fact Sheets are also available on our website at:
http://osufacts.okstate.edu

Pinkeye is a common, widespread and contagious bacterial eye disease 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. Pinkeye rarely affects just one animal, but spreads throughout the herd. According to a 1993 study, costs resulting from decreased weight gain, weaning weight, milk production and treatment were estimated to be $150 million in the U.S. alone. Although newer figures have yet to be published, it is likely current losses greatly exceed this estimate.

Cause

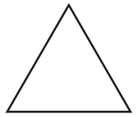
M. bovis is the primary infectious agent initiating pinkeye in cattle. Other microorganisms capable of initiating similar clinical signs include bacteria *Moraxella bovoculi* and *Mycoplasma spp.*, or viruses such as the Infectious Bovine Rhinotracheitis (IBR) virus, which can either add to the severity of the disease process or may serve as predisposing factors permitting a secondary infection with *M. bovis*.

The normal bovine eye has adequate defense mechanisms to prevent the growth of *M. bovis*. For the causative bacteria to invade the eye, there needs to be some underlying irritation. Factors instrumental in causing eye irritation and allowing for invasion of *M. bovis* and subsequent disease, are excessive ultraviolet (UV) light (sunlight); the face fly (*Musca autumnalis*); and wind, plant material and dust. UV radiation or exposure to sunlight can sensitize the eye, resulting in inflammation and increased likelihood of subsequent pinkeye infection. UV light is especially a problem for white-faced cattle lacking pigmentation around the eye. Flies not only serve as irritants as they feed on secretions from the eye, but they also provide a means of transporting, thus 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, whereas it is common when flies are 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. Foreign body irritation 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 for grazing cattle.

PINKEYE Triad

Bacteria
(*M. bovis*) from eyes of carriers
or newly infected cattle.



Susceptible cattle
Non-immune cattle
Those not previously exposed.

Environmental Triggers
Causing eye irritation and tearing.
Flies, Sunlight, Dust, Pollen, Weed, Grass seeds and Awns

Transmission

M. bovis, the bacteria commonly causing pinkeye is often carried by cattle showing no signs of disease. These animals have been previously exposed to the disease and recovered, but still maintain the organism in their nasal cavities and conjunctiva (inner surface of eyelids). These carrier animals become the source of infection for herd replacements and calves. Carriers allow the persistence of pinkeye in the herd and expose susceptible animals year after year. Once animals develop clinical signs of pinkeye, they also serve to infect other animals. Generally, most cattle will recover from pinkeye (with appropriate treatment).

Transmission of *M. bovis* occurs through direct contact, flies and inanimate 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. UV radiation, face flies, growing plants and pollen production are at their peak in the summer and fall. These account for the high incidence of pinkeye during this period. Stress associated with weaning, increased stocking density (concentration of cattle), exposure to other infectious agents (IBR virus, *Mycoplasma spp.*, etc.) and hay feeding often are contributing factors to increased disease incidence in late fall, winter and early spring.

Clinical signs

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 is dependent upon 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 days to three days, and in experimental trials has extended to three weeks. Swelling and redness of the conjunctiva (inner surface of eyelids and outer perimeter of eyeball), excessive tearing and squinting are the initial clinical signs. Frequent blinking may be noticed by an astute stockman. Cattle have a decreased appetite due to the excessive pain, and either no or mild to moderate elevation of body temperature. A small opaque area may appear in the center of the cornea in about two days, and by the sixth day, the entire cornea may 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, but can occur from time to time. More often, complete recovery occurs in three weeks to five weeks (with appropriate treatment), with only a few affected eyes having a persistent white scar on the cornea. Large corneal scar can contribute to partial blindness in the affected eye(s).

Treatment and Management

Ideally, remove affected animals from the herd. Isolate and treat them according to your veterinarian's recommendations. It may be a good idea to use an isolation pasture so affected animals do not expose their herd mates. Most cases of pinkeye are responsive to systemic antimicrobial treatment. Your veterinarian may recommend the use of additional antimicrobials

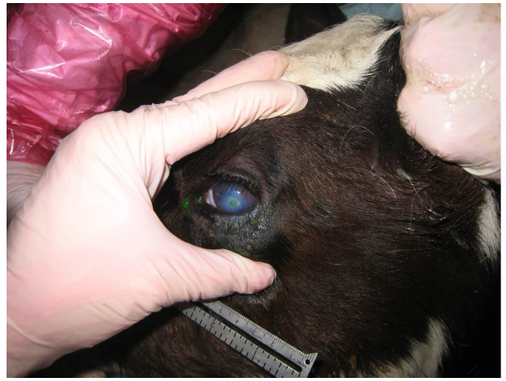


Figure 1. Pinkeye in a calf. Note the white halo surrounding the corneal ulcer (circle). The green color is due to positive uptake of fluorescein stain by the corneal ulcer.

administered topically (or under the conjunctiva), along with non-steroidal anti-inflammatory drugs (NSAIDs) to provide pain relief. This extra label usage of topical antibiotics and NSAIDs would require a prescription from your veterinarian. Milder cases may resolve without treatment with systemic or topical medications.

Affected animals benefit from protecting the eye from UV sunlight. Provide these animals with shaded areas. Consider the use of eye patches, suturing eyelids or creating a third eyelid flap. Consult your veterinarian for assistance in these methods to enhance the healing process. Utilize fly control to reduce the annoyance of flies and reduce the spread of pinkeye. Feed animals from the ground to reduce chaff and seed heads from falling into the eyes. In confined feeding, manage the dust in the area to reduce irritation to the eye.

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. Use of feed through growth regulators may help reduce the fly population. Manure management can be beneficial in controlling stable and house flies in confinement operations. See Extension Fact Sheet VTMD-7000, http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-1932/VTMD-7000web.pdf

Grass, weed and brush control - grazing management, mowing, brush mowing and spraying to 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 round bales. Increase bunk space to decrease direct contact.

Ultraviolet light (sun light) - breed for pigmentation around the eye, consider introducing Brahman influence into the herd, provide shade or tree rows with ample room to prevent overcrowding

Disease management - isolate infected animals, and decrease environmental and nutritional distress. (See Extension Fact Sheet VTMD-9123). Provide proper vaccinations as recommended by your veterinarian to improve overall animal health.

Vaccination - commercial and autogenous pinkeye vaccines are available. Results reported by producers and veterinarians have been mixed from their use of these products. Vaccines obtain the best results when they are specific to the causative agent in the herd and administered prior to infections. Culture, serotyping and sensitivity should be performed to determine the bacterial pathogens and serotypes involved in the outbreak, providing information about treatment and the choice of vaccines. Check with your 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.

Maintain current health records - identify cattle that repeatedly become infected and those that seem more tolerant to infection. This information can help with culling decisions.

Keys to prevention

- Observe cattle carefully and identify the disease early for effective response to treatment (systemic antibiotic).
- Isolate new purchases.
- Isolate affected animals to reduce spread of disease.
- Consider what can be done to control environmental triggers for pinkeye.
- Consider the use of vaccines on the advice of your veterinarian.
- Maximize herd immune status through optimum nutrition; a proper vaccination program; and decrease the stresses of weaning, shipping and handling.