

Summer is Pinkeye Season

by Matthew Shapero

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(this article is adapted from an article by the UC Davis School of Veterinary Medicine and is based on the work of John Angelos, DVM, PhD; Dr. Angelos provided additional editing)

Pinkeye—or infectious bovine keratoconjunctivitis—is the most common eye disease of cattle in California and throughout the U.S. Pinkeye causes pain and suffering in affected animals that negatively impacts overall animal welfare as well as economic losses to cattle producers. One 2005 study showed, for example, that calves that had previously had pinkeye were on average 20 pounds lighter than unaffected animals at weaning. And another, earlier study showed that bull calves one-year post-weaning were 51 pounds lighter if they had had pinkeye in one eye and 103 pounds lighter if they had had it in two eyes. These studies emphasize that prevention is of the utmost importance.

Pinkeye is caused by infection of the cornea with *Moraxella bovis* (*M. bovis*) bacteria and results in painful corneal ulcers and inflammation of the eye and skin surfaces lining the eye (conjunctiva). If not properly treated, corneal infections can result in corneal scars or even eyeball ruptures leading to permanent blindness. Another bacterium that has been associated with pinkeye, but which has not been experimentally shown to cause corneal ulcerations typical of pinkeye is *Moraxella bovoculi* (*M. bovoculi*). Currently there are vaccines on the market against both *M. bovis* and *M. bovoculi* (see below).

Pinkeye is most common in the summer months with increased exposure to sunlight and dry, dusty conditions. Some outbreaks also occur during winter months. Plant awns such as foxtails can also predispose animals to disease by getting caught in the eye and damaging the cornea. Flies also increase the chances of exposure and spread of *M. bovis* (and probably *M. bovoculi*) bacteria by feeding around the face and eyes of affected cattle and then transferring infected eye fluids to other animals. Humans might also help spread the disease particularly when they are not wearing disposable gloves or applying disinfectants to halters or other objects involved in handling affected animals.

Common signs of pinkeye:

- Excessive tearing
- Frequent blinking or squinting
- Decreased appetite due to eye pain
- Corneal ulceration and cloudiness
- Potential blindness or eye rupture

- Can affect one or both eyes
- Younger cattle typically more susceptible

Prevention:

Fly control: Controlling flies should help to reduce the risks of disease spread between animals in a herd. Traditional methods have included the use of insecticide-containing ear tags, dust bags, and systemically- or topically-applied parasiticides. A 1990s study looked at four different fly control strategies: 1) Ivermectin pour-on (0.5% pour-on @ 500ug/kg); 2) insecticide ear tags with permethrin (10%); 3) insecticide ear tags with diazinon (20%); and 4) Ivermectin plus ear tag in mid-summer. **The best face fly control was the permethrin ear tags alone or in combination with Ivermectin (but not Ivermectin alone). Consider applying insecticide ear tags in the late spring/summer at preg-checking time. It is also a good practice to remove ear tags at the end of the fly season to help reduce chances for insecticide resistant fly populations to develop.**

Weed control: Since foxtails and other plant awns can lead to corneal ulceration and eventual pinkeye, one recommendation is to clip pastures that have already seeded out before turning cattle onto that pasture.

Practice good sanitation/hygiene: To avoid inadvertently spreading infective bacteria between animals, use disposable gloves when handling pinkeye-affected cattle. These gloves should be changed or at least disinfected between animals. In addition, consider changing clothes or wearing a plastic apron when handling affected animals. It is a good practice to also disinfect plastic aprons and halters between cattle. One commonly used disinfectant is 10% household bleach made by mixing one part of regular strength household bleach to nine parts water (or ~1-1.5 cups regular strength bleach per gallon of clean water). If using concentrated bleach you will only need ~1/2 cup per gallon of clean water. This mixture should be made fresh daily to maintain effectiveness. Also, bleach becomes less effective when it becomes heavily soiled with dirt or manure and other organic material. For that reason it may need to be refreshed more frequently, depending on use and working conditions.

Trace minerals: Some trace mineral deficiencies in cattle have been linked to reduced immune responsiveness and might also lead to elevated rates of pinkeye. When it comes to pinkeye prevention, maintaining adequate levels of copper and selenium is particularly important in this part of the country. Other trace minerals/vitamins which may be important for maintaining optimum immune responsiveness and therefore might impact pinkeye prevalence include chromium, Vitamin A, Beta-carotene, cobalt, and zinc. This is yet another reason to make sure you have a robust trace mineral supplementation program on your ranch!

Vaccinate: Vaccination is another important component of pinkeye prevention, however, even with vaccination, producers may still experience pinkeye problems with today's vaccines. When vaccinating animals, it is important to vaccinate well in advance (ideally start the vaccine series at least four weeks) of the anticipated summer onset of pinkeye in your herd, so that cattle will have enough time to mount an effective immune response following vaccination. Depending on the vaccine used, a booster shot 3-4 weeks following the initial vaccine may also be required by the manufacturer; it is a good idea to follow vaccine manufacturer recommendations regarding booster vaccines. Because young

animals tend to be most affected, it is critical that they are included in the vaccination program. No single vaccine recommendations work for all herds. If you have not used a pinkeye vaccine before, a reasonable approach is to start by choosing a commercial *M. bovis* vaccine. If your initial vaccine choice proves ineffective, a variety of options exist including: 1) a different commercial product; 2) an autogenous vaccine, based on eye swabs from infected animals you send in to the lab; or 3) perhaps both. The newest product available on the market (as of 3/2/17) is a Moraxella Bovoculi bacterin from the Addison Biological Laboratory. Dr. Angelos at UC Davis School of Veterinary Medicine has been developing an intranasal pinkeye vaccine that might provide better eye immune responses versus traditional subcutaneously injected vaccines.

Treatment:

Pinkeye is susceptible to a wide variety of antibiotics; however only two are specifically labelled for the treatment of pinkeye: tulathromycin and oxytetracycline. Other antibiotics are known to be effective, but the use of these drugs for pinkeye treatment is considered “off-label.” Using one of these other drugs should be done under the supervision of your veterinarian. An effective non-antibiotic treatment that might be worth considering is Vetericyn pinkeye spray. Research shows that Vetericyn reduced pain, infection, and healing time of corneal lesions in calves infected with pinkeye. While other treatments such as salt, condensed milk, and dilute povidone iodine have been used by producers, research has not been done on these types of treatments to determine if they are truly effective against pinkeye. Before squirting something in the affected cow or calf’s eye, it is always a good idea to ask yourself if you would want that material squirted in your own eye. If your answer is ‘no’, it is probably best not to put it in an animal’s eye. If ever in doubt, it is always a good idea to consult with your veterinarian for specific treatment recommendations.

Perhaps one of the most difficult aspects of pinkeye treatment is knowing when it is appropriate to use antibiotics. In many instances, eyes that may look like mild or developing pinkeye will heal spontaneously when given time. If you are able to hold the animal for a period of 7-14 days and regularly check the eye, you may choose to withhold antibiotics initially from the animal in order to monitor the eye’s progress. This is especially true for animals that have a foreign body (e.g. foxtail) in their eye, which can scratch and irritate the corneal surface around the perimeter of the cornea. Once the foxtail is removed, however, the eye will frequently heal on its own and will not become infected. In many production settings, however, holding an animal for multiple days and/or regularly restraining the animal to inspect the eye is unrealistic, thus an application of antibiotics upon initial identification is appropriate.

You may also encounter eyes that look like a developing pinkeye, when really they have already begun the healing process. Consider Figure 1, which shows an eye from the same cow on 5/22/12 and 6/5/12. This animal was not treated with antibiotics. The green color is fluorescein, which is a dye that is added to the eye to better identify corneal ulcers associated with pinkeye. On 5/22/12 the animal showed a typical ulcer (area in green); by 6/5/12 the eye had begun to heal. If you came across this animal on 6/5/12 on the ranch, however, you wouldn’t have the benefit of knowing the trajectory of the eye’s healing process. While antibiotics would not be necessary, it would be difficult to know not to apply them. One important indication that the eye is already healing (and thus does not require antibiotics) is the presence of red blood vessels covering the cloudy part of the eye (see 6/5/12 photo from Figure 1).

Other indications that an eye is well on its way to healing and may not need antibiotics is if the eye is not excessively teary or weeping and if the animal is not actively squinting or sensitive to light.

Some producers will apply an eye patch to a pinkeye-affected eye after they have treated the animal. Using old jeans and tag cement is common. Patches likely provide some comfort to the animal, as it protects the eye from sunlight and potentially dust and flies. Make sure to leave the patch open at the bottom for drainage and air circulation. One important point with patches, however, is that eyes should be checked regularly after applying a patch. Just because you can't see the eye when it's covered by the patch, doesn't mean the eye is doing well. Therefore, make sure you check under the patch frequently to know if the eye is healing or not; checking under a patch ideally a couple of times during the first week after putting it on will help you to know if the eye is improving or not.

All treatment programs should be overseen by your herd veterinarian who can assess the situation and recommend the best prevention and treatment protocol.

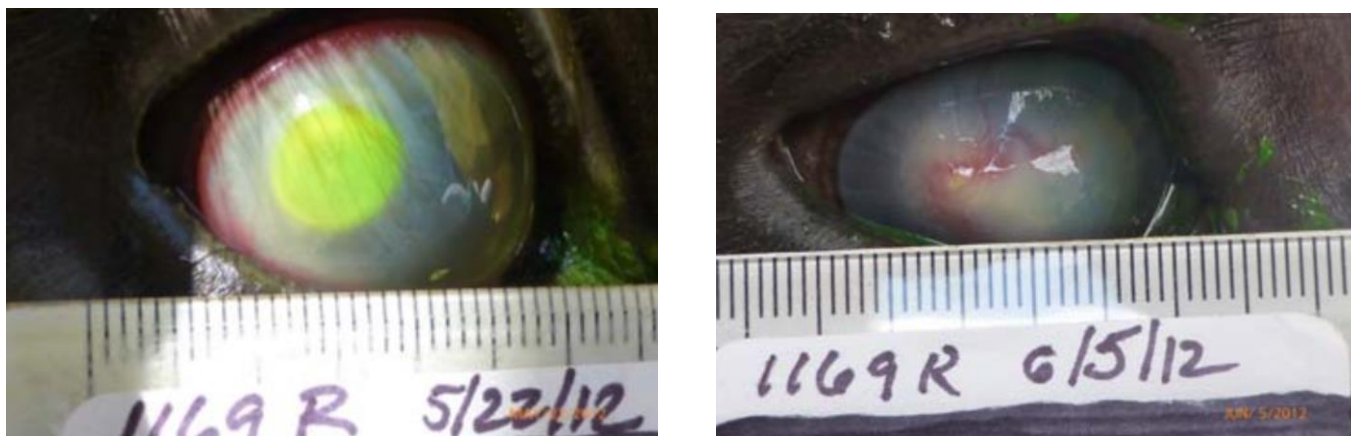


Figure 1. Same cow; different days



Dr. John Angelos administers an experimental intranasal pinkeye vaccination at the UC Sierra Foothill Research and Extension Center.



Eye stained with fluorescein after removing foxtail. Note ulcer (highlighted in green) on the right edge of the eyeball. Ulcers caused by foxtails or other foreign objects will present on the perimeter of the cornea. The eye healed without the use of antibiotics.

Fly impacts and control on cattle

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Fly season during the summer months is more than just an annoyance to cattle. The three main culprits are horn flies, stable flies, and face flies, and each of these flies can impact your bottom line. Both horn flies and stable flies feed on cattle blood with bites being quite painful to animals. Horn flies bite and feed on the back of cattle, moving to feed on the belly when daytime temperature is high. Between blood meals, horn flies remain on cattle leaving the animal only to lay eggs in fresh fecal pats. Stable flies bite the legs and sometimes belly of cattle, leaving the animal after feeding to digest the blood meal while resting in the nearby environment. While face flies don't feed on cattle blood, they do feed on eye and nasal secretions and are known to spread *Moraxella bovis* (bacteria causing bovine pink eye or infectious bovine keratoconjunctivitis), irritate open wounds, and cause tearing of the eye. Like stable flies, face flies leave their animal host after feeding and may be found resting on nearby structures or trees.

Economic Impact of Horn Flies: UC research in 1968 found cattle with horn flies spent more time in the shade fighting flies rather than grazing. To determine how much effect this had on weight gain, groups of cow/calf pairs were split into treatments of fly control and no fly control. The calves receiving fly control gained an average of ½ lb/day more than those receiving none (Loomis et al., 1969). Another trial suggested that each 100 horn flies per cow can decrease the calf's weaning weight by 17.9 lbs (Steelman et al., 1991). Similar yearling steer and heifer gain reductions have also been documented (DeRouen et al., 2003). In neither calves nor yearling cattle have compensatory gains been the norm, meaning these weight gain losses seem to follow fly infested cattle through their production life (Quiesenberry and Strohhahn, 1984). It is notable that in some areas, and in some cases with the Brahma breed, it has been found that some cattle are unaffected by fly levels, but in general, heavy fly

infestations significantly decrease production. How do horn flies cause cattle to gain less weight? Their painful bites elevate cattle cortisol levels, lessen cattle ability to retain nitrogen, and reduce water consumption, grazing and mastication efficiency (Harvey and Launchbaugh., 1982; Byford et al., 1992).

Economic Impact of Stable Flies: The bites of this fly are particularly painful – you may know this if you have been bitten by these flies which many ranchers simply call “biting flies” because they will bite people in addition to cattle. Like horn flies, the painful biting activity of stable flies is known to reduce cattle weight gains and feed efficiency (e.g. Campbell et al. 2001) resulting in economic costs to livestock producers estimated at nearly \$1 Billion (Taylor and Berkebile 2006). Stable flies are most abundant in spring and early summer (Mullens and Meyer 1987) and during years with greater rainfall during early spring (Mullens and Peterson 2005).

Economic Impact of Face Flies: These flies feed on secretions/excretions around the nose, mouth, and eyes of cattle. While they do not deliver painful bites, their mouthparts are adapted for scraping and this can greatly irritate the eyes of cattle on which they feed resulting in increasing eye secretions and tearing. In addition, these flies are known to transfer bovine pinkeye and eyeworms among cattle within a herd as they move among nearby animals during feeding. Pinkeye can result in a decrease in weight gain estimated between 15 and 30 lbs in affected calves at weaning (Thrift and Overfield 1974).

Given the production losses from heavy fly infestations, control of all three flies is economically warranted.

Control of Horn Flies: Fly ear tags, dust bugs and oil rubbers, and pour on applications are the most common insecticidal methods of dealing with flies, but how well do they work? In the UC trial mentioned above dust bags were very effective in controlling horn flies when placed in the entrance to water, which forced cattle through them. Multiple other trials found similar results. In most trials where cattle were given free choice to dust bags, as compared to being forced to walk under them, reductions in efficacy were seen. Pour on insecticides can also be effective in reducing horn flies. Research varies on how long they are effective, but most trials seem to fall between two and four weeks’ time. Feed-through insect growth regulators (IGR) that are commonly used in mineral supplements have demonstrated effectiveness since the 1970s. Horn flies develop only in fresh cattle manure, so insecticides that pass through the digestive system of cattle and are present in the feces can kill developing immature flies. Early research has shown these products can control 87% of horn fly development in the field (Harris et al., 1974).

Ear tags have been in use since the 1980s and have been very effective for horn fly control. (Williams et al., 1981). However, in recent years horn flies have become resistant to several of the insecticides used in ear tags. Resistance from not following label instructions on when to remove ear tags, using only a single ear tag on cows, or not rotating ear tags with different active ingredients are all possible causes. When control failures occur, ear tags containing a different insecticide should be used.

A trial that compared differing pasture sizes, rotational stocking rates, and continuous stocking found no difference in horn fly numbers associated with these factors (Steelman et al., 2003). It appears the flies are present regardless of grazing management and some form of control is necessary to lessen production losses.

Control of Stable Flies: The most effective way to reduce stable flies is to reduce their development sites near cattle. Stable flies will develop in wet, decaying organic material with urine soaked hay being a particularly productive material. Where cattle are fed hay to supplement pasture forage, the position of feeding stations should be altered regularly to reduce the build-up of soiled hay on the ground in these locations. Piled manure or silage will also produce stable flies unless this material is properly composting (including regular turning of the pile). Adult stable flies are challenging to control. Insecticides can be applied directly to cattle (apply insecticides to the legs and belly) or to cloth targets placed near feeding and watering locations where cattle congregate (Foil and Younger 2006) so that flies will rest on the treated targets between blood meals. Similarly, stable fly traps (e.g. “Bite Free”, Central Life Sciences) can be placed at cattle congregation sites to capture stable flies resting between blood meals. Ear tags will not provide control of stable flies. Another option to control stable flies and house flies is the release of parasitic wasps, although the research on the effectiveness of this method is sparse (Weinzierl and Jones, 1998). These predators need to be released where flies breed multiple times during the season and are best suited for feedlots or moist areas where cattle congregate (Greene et al. 1998). Parasitic wasps will reduce fly numbers by inserting their eggs into immature stages of flies. The emerging wasp larvae will kill their hosts as they grow and feed on them. The predator wasps need to be released regularly to make an impact and they do not sting people or animals. However, they may be negatively affected by the concurrent use of insecticides, such as macrocyclic lactones.

Control of Face Flies: Adult face flies are also difficult to control because they spend very little time on cattle. Insecticides can be applied by cloth wipe to the face of cattle with particular attention to the area around the eyes. Ear tags can provide some relief from face flies though a sufficient level of control is rarely achieved using only ear tags. The most effective means of control is through the use of feed-through insecticides as face flies, like horn flies, develop only in fresh cattle manure. It is important to understand that face flies can travel over a mile, so if an IGR is the only form of fly control, flies on a neighboring property are unaffected and may move in.

Summary: Fly control appears to be an economical practice with multiple tools being available. In some cases using several tools in conjunction with each other may be necessary to economically maintain weight gain.

Livestock Management during Drought: Tips for Making Difficult Decisions

by Julie Finzel, Livestock and Range Advisor, Kern, Tulare, and Kings Counties

It doesn't come as a surprise to any of you that we are facing another drought in the Southern San Joaquin Valley, and in much of California. As livestock producers, who live and work on the land you are very familiar with current range conditions. The National Weather Service tells me that rainfall is about 1/2 of usual; the majority of effective rainfall fell in January and March. It's dry out there. Most of you are probably looking into buying hay, thinking about culling some cows and the hard decisions ahead.

Culling Your Herd. When considering how to downsize your herd and which animals to send to market here are some criteria many ranchers use:

- 1) Early weaning – Weaning calves early can help your cows maintain body condition during a drought; dry cows have lower energy requirements.

- 2) Replacement heifers – Because young heifers are still growing and there is a shortage of feed, many ranchers choose not to keep replacement heifers in drought years, or keep very few.
- 3) Cull cows
 - a. Teeth – Missing teeth can make it difficult for a cow to properly chew her food and cud. Cows with a broken mouth are more likely to lose body condition in a drought and should be culled.
 - b. Open/Dry – open and dry cows are more expensive to feed because they will not or did not produce a calf to offset the cost of their maintenance. Regardless of cattle prices, pregnancy checks during drought are an important tool for managing expenses.
 - c. Age – I've heard a number of thoughts regarding the desired age to keep when deep culling a herd due to drought. Some say keep the youngest cows because they have the most productive years left in them. Others prefer to keep the cows that are 4 or 5, proven good mothers that know the country and produce nice calves without assistance. There's no one-size fits all, as each ranching operation is unique.
 - d. Body Condition Score – If a cow is thin at the beginning of a long, dry summer, she is more at risk from drought related issues such as eating a poisonous plant or (assuming she's pregnant) poor breed back next season. It is also likely that she tends to require more nutrition in general and may not be suited for your ranch.
 - e. Require extra handling – Cows that needed to be doctored or have a calf pulled have cost you additional money and time when compared with cows that did not require handling.
 - f. Soundness issues – Good legs and feet are important for a range animal. Blind or half-blind cows should also be considered for culling.
 - g. Poor disposition – Cranky cows tear up fences, endanger you and others, and cause added stress within the herd. In other words, they cost you money. Drought is a good time to bid them adieu.
 - h. Raise poor calves – Cows that tend to raise poor calves can be considered for culling. An easy way to identify them is at weaning. Sort off the poor calves, whatever your criteria might be, and turn them back out with the herd. Once they've mothered up you can go back and sort out those cows.
 - i. Outliers – Outliers are cows that don't just don't quite fit the objectives you have for your herd. Maybe a cow is too tall, calves late in the season, has horns or has bad udders. Use selection criteria established for your ranch and your herd.
- 4) Breeding Soundness Exam on Bulls – since bulls can eat up to 25% more than cows, culling unproductive bulls can save money and forage.

Managing your Rangeland. During a drought, sound range management practices facilitate better, faster recovery post-drought. When the rain returns your rangeland will be more resilient and productive if you follow two best management practices.

First is the practice of maintaining adequate residual dry matter or RDM. RDM is the old, dry grass left at the end of the growing season after the annual grasses have senesced. RDM provides a favorable seedbed for next year's grass by protecting the soil from the impact of raindrops and protecting young grasses by insulating them from temperature extremes and reducing wind speeds near the soil surface. Recommended levels of RDM vary based on tree cover and percent slope, but a good rule of thumb is

to leave between 2.5 to 3" at the end of the grazing season (about September or October). Over the summer, the sun degrades the dry grass on rangeland; the impacts of this process should be included in any consideration of when to pull cattle off of a pasture. Leaving adequate RDM may seem like you're leaving money on the ground, but it pays off. Rangelands managed to maintain adequate RDM levels produce more forage than severely grazed rangelands and are more resilient and productive, even in dry years.

Next is the concept of a 'sacrifice area'. This is an area where you can hold cattle for an extended period of time when they need to be fed hay. This area should be away from a riparian area and be large enough to hold the cattle comfortably. Cattle should be kept in the sacrifice area until adequate forage is available elsewhere. Having a designated sacrifice area is a good way to maintain adequate RDM on the rest of the ranch. Once the drought breaks the sacrifice area should be given a good long rest to allow it to recover. Keep in mind, conditions can get very dusty during a drought and dust can cause pneumonia. Control dust as best you can and talk to your vet about other measures to prevent pneumonia in your herd.

Risk Management. There are several risk management options that are available to buffer the financial impact of drought; to the best of my knowledge they are all federally subsidized. The USDA Farm Services Agency (FSA) administers the Non-insured Crop Disaster Assistance Program (NAP) and the Livestock Forage Program (LFP). Contact your local FSA office for more information on these programs. There is also drought insurance marketed through private drought insurance firms. Don't know how to find the FSA or a private drought insurance firm? Contact Julie at 661-868-6219 or jafinzel@ucanr.edu.

Marketing. During drought cattle markets often see an influx of cattle that can lead to lower cattle prices. Do your best to match cattle market trends to the needs of your operation.

Taxes. The federal tax code allows for deferral of capital gains during drought as long as cattle are replaced when the drought breaks. NCBA put together a helpful summary of some options. <https://ucanr.edu/sites/Kern22/files/347583.pdf> See your tax professional for more information.

The time to make a drought plan is before a drought strikes, take this opportunity to learn and plan for next time.

Further reading.

- How to Cull the Right Cow without Keeping Records, Burke Teichert, Beef Magazine 9/1/16
<https://www.beefmagazine.com/blog/burke-teichert-how-cull-right-cow-without-keeping-records>
- Drought Strategies for Beef Cattle Culling, UCANR Publication 8555
<https://anrcatalog.ucanr.edu/pdf/8555.pdf>

Until next time,

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The Roundup

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