Perspectives on Pinkeye

EXPERTS EXPLORE ITS COMPLEXITY, HOW TO REDUCE ITS IMPACT

Cattle producers and their veterinarians are no strangers to infectious bovine keratoconjunctivitis (IBK/"pinkeye"), yet it continues to be a frustrating and costly problem. The truth is, it is a very complicated disease and there still are many unanswered questions. To explore it further and learn what tools can be used to reduce its impact, Merck Animal Health sought the expertise of renowned veterinarians and researchers well-versed in the science of pinkeye.

The experts generally agreed that damage to the cornea is likely a necessary first step in the development of IBK. However, there was also a general consensus that many host, environment and pathogen factors are involved in the disease process, making complete prevention challenging.

"Pinkeye can be frustrating. It is not uncommon to see huge problems with IBK in a given year or on a given operation, and little to no problem the next year or on the neighboring operation – and it is not at all clear what was different or what we did or did not do that led to the difference." "We can compare pinkeye with with bovine respiratory disease (BRD); they are very similar when we consider that **multiple factors contribute to the disease process.**" **DR. LOY**

DR. MIDLA

Bringing Pinkeye Experts to the Table

Leading experts participated in a Merck Animal Health roundtable to shed light on areas of pinkeye that warrant further exploration and to discuss how to equip producers and veterinarians with the most effective tools against pinkeye – both now and in the future.



Pictured left to right:

Lowell Midla | VMD, MS MERCK ANIMAL HEALTH

John Angelos | DVM, PhD UNIVERSITY OF CALIFORNIA, DAVIS

Bill Epperson | DVM, MS MISSISSIPPI STATE UNIVERSITY Paola Elizalde | DVM, PhD candidate UNIVERSITY OF SASKATCHEWAN

Annette O'Connor | DVM MICHIGAN STATE UNIVERSITY

Dustin Loy | DVM, PhD UNIVERSITY OF NEBRASKA-LINCOLN Not pictured:

Mac Kneipp | DVM, PhD UNIVERSITY OF SYDNEY



The Host. The Pathogens. The Environment.

Pinkeye is characterized by corneal infection and ulceration, as well as inflammation of the conjunctiva (non-corneal surfaces of the eye) that can involve one or both eyes. It is typically observed in calves. Clinical signs begin with tearing, tear staining and squinting. Corneal ulceration may ultimately lead to blindness in some cases.

The experts agree there is currently no silver bullet when it comes to preventing pinkeye.



DR. ELIZALDE

"This disease has many, many components. It is not just about bacteria. It is not just about the animal. It is not just about the environment. It is about all three."

THE HOST (ANIMAL)

As with any disease challenge, when the immune system is suppressed, disease frequency increases. Younger cattle are more susceptible to pinkeye, most likely because older animals have developed immunity from previous exposure. Stress to the host - such as from weaning, transport, or exposure to other infectious agents - can lead to a suppressed immune system, increasing susceptibility to pinkeye.

THE PATHOGENS

There is abundant evidence to support that *Moraxella bovis* causes IBK. Damage (e.g. using ultraviolet radiation) to the bovine cornea followed by instillation of a pathogenic strain of *M. bovis* consistently leads to IBK. The bacteria's surface is covered with finger-like structures called pili that facilitate attachment to the cornea. *M. bovis* secretes enzymes and toxins that damage the cornea leading to the typical lesion associated with pinkeye.

Diagnostic laboratories can run a panel to identify different pathogens associated with a pinkeye case. In addition to *M. bovis*, *Moraxella bovoculi* and *Mycoplasma bovoculi* are frequently associated with cases of pinkeye. Association does not prove causation, so more research is needed to understand their roles. Likewise, infectious bovine rhinotracheitis (IBR, BHV-1) is associated with a pinkeye-like syndrome.

THE ENVIRONMENT

Pinkeye is especially prolific in the summer and early fall months but can occur throughout the year due to environmental factors like UV light, dust, wind, tall grass and other regularly occurring eye irritants. Female face flies have microscopic sharp mouthparts that irritate the eyes to stimulate the ocular secretions upon which they feed. These environmental factors can set the stage for cornea damage, which then creates the opportunity for pathogens to wreak havoc.



"We have been able to reproduce pinkeye experimentally with *M. bovis*. The bacteria stick to surfaces in the eyes of the cattle. It can secrete enzymes and toxins that damage the eye and ultimately result in ulcers and inflammation of the mucus membranes around the eye. *M. bovoculi* is a close relative. It has similar types of pili that allow it to stick to surfaces and similar toxins. It is not clear how well it can cause disease, but we find it frequently associated with cases of pinkeye. There are other bacteria that are a little bit less likely to cause disease, as well as some viruses that can cause ocular disease."

DR. LOY



M. bovis and *M. bovoculi*. We've got to remember that they're recovered usually after the occurrence of the disease, so that doesn't make them causal organisms in veterinary science. There are several ways to establish if something is a causal organism, one of the tried-and-true approaches is a challenge study. We have challenge studies where we deliberately inoculate cattle to reproduce the disease model. And we've been able to do that with *M. bovis*, but we haven't got any publicly available evidence that a challenge model for *M. bovoculi* causes pinkeye."

DR. O'CONNOR

"What we see are organisms that are recovered from pinkeye cases are usually

Pinkeye is the stereotypical response to injury by the bovine eye - an umbrella term for corneal ulcers and or conjunctivitis.

Moraxella bovis is potentially a secondary invader but there are other risk factors to consider - genetics, nutrition, combination of host, parasite, and environment. Pinkeve tends to be an umbrella term that covers a lot of different things in the eyes. I think we need to re-look at and redefine this disease.



DR. KNEIPP

Preventing the Disease.

A combination approach provides the best opportunity for preventing the disease.

I advise producers to approach
pinkeye prevention from multiple angles.
Focus on things that you can control.
DR. ANGELOS

ANIMAL CARE AND ENVIRONMENTAL MANAGEMENT

Experts agreed that IBK is often secondary to an injury or insult to the eye, so look for ways to decrease corneal damage. Each operation's facilities and pastures should be evaluated individually to identify and manage sources of potential damage. Clipping pastures and controlling flies remain critically important methods to reduce the potential for corneal damage.



"Think about those environmental contributors – such as dust, UV light, tall grass – things that irritate the eye and might contribute towards having a pinkeye outbreak."

DR. LOY

"If we think about what kinds of things can create injuries or insults to the eye, we can all identify those at different times of the year. **It might be tall, stem-like grass that the animals must get through to eat the greenest luscious material. I advise people also about things like dust." DR. EPPERSON**

ENSURE ANIMALS ARE PREPARED FOR THE CHALLENGE

Experts say it is important to prepare animals for the disease challenge, which includes minimizing stressors, including parasitism. Healthy animals should have a better immune response to vaccines and disease challenges versus sick or heavily parasitized animals. Ensure animals have adequate protein, energy, vitamins and minerals, and consider vaccinating.

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If the host (calf) has undergone stress or immunosuppressive events, such as weaning stress or is sick due to BRD or diarrhea, this might reduce the animal's immune response.

DR. LOY

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In California, [and in most areas of the U.S.] copper and selenium deficiencies are common. **Consider what sort of mineral supplementation is needed.**

DR. ANGELOS

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What is my general nutrition program? Do I keep minerals out all the time for the animals? **These things are very important.**

DR. EPPERSON

VACCINATION

While vaccination alone is not the answer, some experts felt it was an important consideration. Vaccination should stimulate antibody levels in tear fluid, and potentially help to limit infections by Moraxella species and reduce severity of corneal ulcers in cases where Moraxella infections are involved.

To maximize the effectiveness of vaccination, timing is paramount, along with ensuring booster doses are given.



"It is important to identify when pinkeye is typically happening in a herd and if possible, to implement vaccination programs before pinkeye starts. I generally recommend starting a vaccine series at least four weeks prior to when a producer might expect to start seeing cases."

DR. ANGELOS



"It is important we get at least two doses in there. A booster dose is helpful, and we want to time those at least 30 days before we would expect an outbreak. **If we have some historical data from the herd, we can work backward and use that information to inform when to time the vaccine.** With pinkeye vaccines, we are not going to sterilize the animals from the bacteria that can cause it, but we can reduce severity of disease. It is a matter of working with your veterinarian and understanding what they are seeing clinically to determine if a vaccine might be helpful."

DR. LOY

DR. MIDLA

"If possible, **prepare the host with two doses of commercially available** *M. bovis* and *M. bovoculi* vaccine. Unfortunately,

available *M. bovis* and *M. bovoculi* vaccine. Unfortunately, depending upon when calves are born, vaccination timing can be challenging. We'd like to wait until calves are three months or so of age and therefore past the time of potential maternal antibody interference with vaccination, but we also need to get two doses of vaccine into the calves prior to the start of pinkeye season. Ultimately, optimizing dose timing will vary from one operation to the next depending on these variables."

Treatment for Pinkeye

EARLY DETECTION IS KEY

There are two injectable antibiotics, tulathromycin and tetracycline, that are labeled for the treatment of pinkeye. Early diagnosis can help improve treatment outcomes. Some experts suggested that producers not only consider antibiotics but also pain management.

The number one thing producers can do is be aware. Oftentimes the only initial signs you will see is excess tearing, maybe some more blinking than normal.

And that's usually it. When you do start to see those, treat those animals promptly to get the most impact in reducing the amount of ulceration and other production setbacks.

DR. LOY

We do have evidence that ocular lesions are painful in cattle. We also have evidence that using antibiotics reduces the duration that an animal has a lesion. Reducing the duration an animal has a lesion probably also reduces pain and brings the animal back to eating properly and gaining the weight that they should have.

DR. O'CONNOR

Pinkeye Takes an Economic and **Emotional Toll**

Not only is it painful for cattle, but it is also frustrating and costly for producers. No matter the operation type, pinkeye that is left unchecked can be economically devastating. It impacts weaning weights and market value. It can cause long-term vision issues in replacement heifers.

In beef cattle, affected calves are 30-40 pounds lighter at weaning compared to healthy calves.¹ In dairy cattle, milk lost to antibiotic use can cost \$352 per head.¹

"We know that economically there is an impact on lost weight from animals that have either one or two eyes affected." **DR. ANGELOS**

"There are two parts to the impact of pinkeye. One is the economic impact that we can measure. We know we are likely to have **lower weaning weights** and they might not perform as well as their non-affected pinkeye **cohorts**. If they have scars, they may have a discount at marketing. Longterm, if the cases are severe enough, there is the impact of replacement heifers who may have vision problems.

Then there is the impact on the producer. I grew up on a farm and you always hated when you would have pinkeye because you could tell those calves were in pain. There is an emotional toll to pinkeye, too." DR. LOY

Work with Your Veterinarian

The experts agreed that producers would benefit from working with their local veterinarian.



"The benefit of having a local veterinarian involved is that they have eyes and ears not only on your herd, but also on other herds in the area. It is critically important to get your local vet's eyes on the problem." **DR. ANGELOS**



"When producers are trying to decide whether antibiotic treatment is necessary, that's when I think they really need to be working with their veterinarian so they can understand when it is more likely to be pinkeye rather than some other cause of ocular lesions."

DR. O'CONNOR



DR. MIDLA

Looking to the Future

As the industry learns more about the nature of this disease, experts like those involved in this discussion are doing research and working on a better understanding of why the disease occurs, as well as tools to better prevent and manage the disease. Advancements in vaccines and perhaps even new administration methods offer hope.

Merck Animal Health is committed to finding answers that help veterinarians and producers manage pinkeye. This includes bringing experts together, as well as exploring new solutions. The company currently offers Bovilis[®] Piliguard® vaccines for protection against M. bovis as well as Bovilis 20/20 Vision® 7, which protects against clostridial diseases and *M. bovis*. It also offers Moraxella Bovoculi Bacterin, which includes eight different *M. bovoculi* isolates.

> "It is valuable to start to identify opportunities for future advancement, especially from these experts who have studied the disease in detail. Pinkeye vaccinations currently are administered SubQ and current research is looking at stimulating a local immune response."

"Consult with your veterinarian for specific guidance and to create an approach for pinkeye control - including vaccination, fly control and environmental **management** - that will provide the best results for your herd."

DR. EPPERSON





Poor herd health can lead to decreased market value for beef and decreased milk production for dairy.

calves infected with pinkeye can be **30-40** lbs lighter at weaning than healthy calves.¹

Dairy milk production losses can cost up to \$352 per animal.²

Vaccinations are an integral tool for preventing disease and for maintaining herd health.

For vaccinations to increase market value and productivity for both beef and dairy cattle, they need to be administrated according to label directions.

Producers should work with their veterinarians to decide on an optimum vaccination strategy for their herd.

"Weight losses, due to pinkeye, have been measured and quantitated in beef cattle. Economic losses in beef and dairy cattle due to antibiotic treatments should also be considered as a consequence of pinkeye."

- **Dr. John Angelos, DVM, PhD, DACVIM** Chair, Department of Medicine and Epidemiology, UC Davis School of Veterinary Medicine

For more information about the potentially devastating effects of bovine pinkeye and how vaccination can protect your herd, visit MAHcattle.com.



Keep your eye on Pinkeye

Cattle Pinkeye: What You Need To Know Right Now

When infectious bovine keratoconjunctivitis (IBK), also known as pinkeye, is introduced into an unvaccinated herd, it can have devastating effects on weaning weights in beef calves.



¹ Infectious Bovine Keratoconjunctivitis (Pinkeye) in Cattle (uky.edu) Michelle Arnold, Veterinary ² Merck Animal Health Pinkeye Quantitative Survey, 2021 MAHCattle.com • 800-521-5767 • Copyright © 2023 Merck & Co., Inc., Rahway, NJ, USA and its affiliates. All rights reserved U.S. Roy, 23300005