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Pinkeye Management in Cow Calf Operations: A Practical Guide for Veterinarians

Based on results of the scoping review: Dr. Gaby Maier; Sheedy et al. 10.1016/j.animal.2021.10024

This guide outlines the basics of diagnosis, treatment, and prevention of pinkeye in cow calf operations.

***Infectious bovine keratoconjunctivitis (IBK)**, commonly known as pinkeye, is the most common ocular disease of cattle. In a survey of California cow-calf operations conducted in 2017 by the California Department of Food and Agriculture, IBK was named as the disease that led to the most frequent administration of antimicrobials to cattle in this production system. [1] There are opportunities for veterinarians to promote antimicrobial stewardship through the judicious use of drugs and by employing evidence-based strategies to reduce disease.*

DIAGNOSIS

Diagnosing IBK early in the course of disease can reduce corneal and ocular damage and may lead to better clinical outcomes for affected cattle.

1. Base your diagnosis on these factors: **signalment, environmental factors, clinical signs, laboratory diagnosis** [2]
    A. **Signalment**
        i. Calves are more frequently affected compared to older cattle [3-5]
        ii. Lack of eyelid pigmentation (e.g., Hereford breed) predisposes cattle to IBK [6, 7]
    B. **Environmental factors**
        - Warm months with increased sunlight and prevalence of face flies increases the risk of transmission

C. **Clinical signs**

- Blepharospasm, epiphora, serous or mucopurulent discharge, chemosis, conjunctival hyperemia
- Central corneal ulcer that is round or oblong in shape
- Lack of systemic disease [2]

D. **Laboratory diagnosis**

i. Ocular swab collected into Amies charcoal transport media for culture

- Collect samples from the periphery of the corneal ulcer (NOT the periphery of the eye) to maximize recovery of the agent and minimize contamination with other flora
- Samples should be shipped cool (refrigerator temperatures) and arrive at the lab as soon as possible after collection

ii. Can also include advanced diagnostic techniques such as aerobic culture and identification including MALDI-TOF mass spectrometry, which is standard for identification of *Moraxella* species

> **NOTE:** The isolation of *Moraxella* spp. supports, but does not prove, a diagnosis of IBK
>
> - *Moraxella* is abundant in the microbiome of normal cattle eyes [8, 9]
> - The absence of *Moraxella* spp. does not necessarily rule out a diagnosis of IBK because samples may be contaminated, resulting in overgrowth from other bacteria within the culture and leading to false negative results for *Moraxella* spp. Ocular samples could also contain *Mycoplasma* spp., which can also cause IBK but require special culture conditions and may require molecular methods for detection.

TREATMENT

A variety of treatment options are available and may vary based on clinical experience and opportunities to manage affected cattle.

1. Antimicrobial treatment often leads to a more favorable outcome when used for the management of active IBK lesions [10]
   A. In the U.S., two antimicrobials are approved for the treatment of IBK caused by *Moraxella bovis* [10]
      i. Oxytetracycline
      ii. Tulathromycin

B. Minimum inhibitory concentration (MIC) testing to assess susceptibility to these antibiotics is not routinely performed due to a lack of validated interpretive criteria for *Moraxella* spp. Pharmacokinetic behavior of antimicrobials in the eye have not been published.

C. Treatment using subconjunctival administration of penicillin has shown variable results
    i. Injection in the bulbar conjunctiva has led to better outcomes in one study than injections in the superior palpebral conjunctiva with or without the addition of dexamethasone in a different study [11, 12]

D. IM or SQ florfenicol or SQ ceftiofur have shown efficacy in managing IBK when compared to placebo treatments or to non-treated animals in a control group [13-15]

> **NOTE:** Follow AMDUCA guidelines for extra-label drug use when using alternatives to the antimicrobials approved for IBK treatment (oxytetracycline and tulathromycin). No antimicrobials are approved in feed for the treatment or prevention of IBK, according to the Code of Federal Regulations, Title 21, Part 558. [16]

E. **Improve antimicrobial stewardship** by counseling producers to forego or discontinue antibiotic treatment once the corneal lesion has been vascularized [17]

2. **Ancillary treatments** that may be helpful in managing IBK include:
    A. **NSAIDs**
        i. Provides pain relief and reduction in ocular inflammation
    B. **Hypochlorous acid spray** (0.009%; Vetericyn Plus™ Pinkeye Spray)
        i. Lower pain scores and smaller corneal lesions were observed in calves treated Q12 hours for 10 days [18]
        ii. Curicyn™ pinkeye spray has a similar active ingredient- but no clinical studies have been completed as of this publication.
    C. **Eye patches**
        i. May help improve healing time, which can be assessed by how fast the corneal ulcer shrinks [19]
            - Protects from additional corneal damage by face flies and trauma from plant awns

PREVENTION

A variety of different strategies are available to help prevent IBK.

1. **Face fly control**
    A. A higher number of face flies per cow has been shown to correlate with a higher proportion of the herd affected by IBK [20, 21]
        i. Fly mouth parts cause microscopic damage to the cornea and conjunctiva during periods when flies feed on ocular secretions [22]
        ii. Resistance of face flies to insecticides is less common than in other fly species because they spend most of their time off the host
        iii. Horn flies have increased resistance to insecticides, so cautious and judicious use of fly tags is essential [23]
            - Remove fly tags after the manufacturer-specified lifespan or at the end of fly season
            - Fly species identification services are available at UC Davis: https://bohart.ucdavis.edu/services.html
        iv. Rotate drug classes for insecticides
        See the Veterinary Entomology database (VetPestX) to review the pesticides for control of specific insect pests of animals: https://www.veterinaryentomology.org/vetpestx

2. **Ultraviolet light**
    A. In regions with intense UV radiation, cattle may benefit from available shade to reduce the incidence of IBK [24]
        i. Corneal epithelial cells lose their surface projections, microvilli and microplicae, over time and transition from light to intermediate and, finally, dark cells [25]
            - This process seems to be accelerated with UV light exposure
            - *Moraxella bovis* preferentially binds to corneal dark cells, which may expose receptors for *M. bovis* adhesins [26]

3. **Plant awns**
    A. May cause corneal irritation and abrasions while cattle are grazing, which may predispose cattle to IBK
    B. Clipping pastures or controlling weeds can be used as an IBK management strategy, although no published data exist to support this claim

4. **Vaccination**
    A. There are several commercially available bacterins for the vaccination of cattle for the prevention of IBK
        i. All commercial vaccines for IBK prevention target *Moraxella bovis* except for a conditionally licensed bacterin that targets *Moraxella bovoculi*
        ii. Autogenous vaccines based on strains isolated from cases specific for each herd can also be produced
    B. Published peer-reviewed clinical field studies currently do not show statistically significant efficacy of commercial or autogenous vaccines for IBK prevention [27-31]
    C. American Association of Bovine Practitioners vaccination guidelines caution veterinarians to carefully weigh the possible side effects of an additional vaccine for a Gram-negative organism in vaccine protocols before recommending vaccination for IBK [32]

GENETICS AS A RISK FACTOR

Heritability is the proportion of phenotypic variation that is due to variation in genetic values [33]

1. **Studies evaluating heritability** for IBK most often use detection or treatment of IBK as the phenotype
    A. Most of these studies have found low to moderate heritability of IBK
        i. Slightly higher IBK heritability in Angus and Hereford breeds and their composites ranging between 0.25 - 0.28 in the largest study [34]
        ii. One study found negative genetic correlations between IBK incidence and weight gain, suggesting that cattle prone to IBK infection also have slower growth [35]
        iii. More studies are needed to ensure no negative traits are selected together with resistance to IBK

For more information on pinkeye, please visit UCANR to view a helpful video from the Beef Cattle Health Webinar Series:
https://ucanr.edu/sites/Rangelands/CattleHealth/

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