

BOVINE PINKEYE RESEARCH: NEW DIRECTIONS NEEDED

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Pinkeye, also technically called infectious bovine keratoconjunctivitis (IBK), is a major economic problem in cattle raising. Affected calves are reported to be from 36 to 40 lbs lighter than nonaffected animals at weaning (1). Also, the time and expense involved in treating affected calves is considerable.

A bacterium, *Moraxella bovis*, is most often blamed as the causative agent (2-5). The majority of research relating to this disease has been aimed at using procedures to create an effective vaccine utilizing various strains of *M. bovis* (6-9). None of these vaccines have proven to be practical preventives. However, recovery from the disease does produce good immunity, which suggests that other organisms or factors are also involved in the immune process.

Recent reports (10-11), that *Mycoplasma bovoculi* and *Ureaplasma* can produce IBK or enhance the severity of this disease, should cause a shift in thinking and research relative to IBK. When the various organisms or factors involved in causing this disease are identified, prospects for creating an effective immune response against IBK will be improved.

PINKEYE RESEARCH AT NORTH DAKOTA STATE UNIVERSITY

During the summer of 1981, a mini-epidemic was created in an outdoor pen of experimental calves. This was accomplished by first instilling a live culture of *Mycoplasma bovoculi** into the conjunctival sac of the left eye followed five days later by instilling a live culture of *Moraxella bovis* into the same eye. Different calves received one of six different *M. bovis* isolates. Only one isolate, designated 131ML, proved to be dependably pathogenic. When combined with the *Mycoplasma*, 131ML produced clinical symptoms of IBK in 15 of 17 calves challenged. Calves ranged in age between four and 10 months.

Prior to challenge, no calf in the group showed any symptoms of IBK. Moderate to severe inflammation, lacrimation and photophobia first showed in challenged calves by the sixth day after the *M. bovis* challenge. Some calves developed perforating corneal ulcers. Flies were abundant, and within eight days after introducing the *M. bovis* ML131 organism, two unchallenged penmates also showed slight photophobia and lacrimation which progressed into typical IBK symptoms. Other unchallenged calves within the group continued to develop IBK for as long as 68 days after the first challenge. In the pen of 53 calves and one adult, the adult and 17 calves remained free of symptoms.

After challenge with a live *M. bovis* culture other than 131ML, a few calves were rechallenged with 131ML but failed to develop symptoms. Further trials could reveal if live nonpathogenic strains of *M. bovis* instilled into the conjunctival sac could be used to produce immunity to the more virulent strains of *M. bovis*. It should also be determined if a virulent strain of *M. bovis* would produce typical IBK in the absence of other potential pathogens or ocular insult.

Some researchers use ultraviolet irradiation combined with *M. bovis* to produce IBK. After flies were eliminated in December of 1981, four penmates inside a closed building were used as challenge calves. Two calves had *Mycoplasma bovoculi* instilled into the left conjunctival sac followed by *M. bovis* 131ML five days later when *M. bovis* 131ML was also given in the left eye of the other two calves. All four calves developed typical IBK, first in the left eye and later a somewhat less severe reaction in the right eye as well. These were fed grain in a 22-inch long trough and the crowding to eat could have spread either or both organisms between calves. In any case, all four calves developed IBK in the absence of sunlight, ultraviolet irradiation or any type of known ocular insult other than the challenge organisms.

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Culturing from normal bovine eyes preceding the usual pinkeye season was performed in 1980 and 1981. This was done to determine the relationship between certain eye inhabiting organisms and resistance or susceptibility to IBK. Only two of the herds sampled developed IBK after being sampled. *Moraxella bovis* had been commonly isolated from five of the six herds sampled. The herd from which no *M. bovis* could be isolated was one which later developed IBK. No *M. bovis* could be isolated from affected animals in this herd, though eye lesions were typical for IBK.

Mycoplasma isolations were not attempted from the eyes of the herds sampled in 1980 and 1981 but will be included during 1982. Some virus testing was done in 1980. The herd which yielded no *M. bovis* isolations from either normal or affected animals showed positive fluorescent antibody tests for both bovine virus diarrhea and infectious bovine rhinotracheitis. This herd had been vaccinated against these diseases three months previously.

Carrier animals are blamed by some for harboring causative organisms and causing summer pinkeye epidemics. With the prospects of eliminating carrier animals, all eyes of separately pastured segments of six herds were treated with antibiotics prior to going on pasture. Only one of these groups developed IBK, with the first cases developing in late July. One herd, which the owner reported had always had serious epidemics, reported no IBK for two subsequent summers following the eye spray procedure. More information is needed regarding both the spray procedure and the eye inhabiting organisms.

CONCLUSIONS

Considerable effort has been exerted over many years in attempts to create an effective pinkeye vaccine by manipulating various strains of *Moraxella bovis*. Prospects are dim that this approach will succeed. New approaches are necessary.

Research in North Dakota has indicated that typical clinical symptoms of bovine pinkeye can occur in the absence of the *M. bovis* organism, and that herds with considerable *M. bovis* inhabiting the cattle's eyes remain free of the disease during a given season.

Cattle recovering from pinkeye have superior immunity to that produced by presently available vaccines. The factors whereby the disease produces immunity must be identified and utilized.

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An investment today in agricultural research will pay the dividends in the future when food, produced by a technology developed by agricultural research, becomes a continuing renewable resource. A strong agricultural research base is, and will continue to be in the long run, the source of "food strength" for this state and nation.