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IBK (pinkeye) in Black Angus Cattle

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Abstract
Infectious Bovine Keratoconjunctivitis (IBK), commonly known as pinkeye, is a contagious bacterial disease that affects cattle worldwide. IBK is characterized by excessive tearing, inflammation of the conjunctiva, and ulceration of the cornea. In severe cases, perforation of the cornea may occur, leading to permanent blindness. The incidence rates reported in the ISU beef herd range from 30–52% in the last four years(Figure 1). As a result of the economic impact of pinkeye in the cattle industry, estimated at $150 million/year, the lack of effective treatments against the disease and the increased demand for'organic' products, research in the area of disease resistance is needed. The objectives of our study were: a) to estimate genetic parameters that could aid in the selection of cattle resistant to IBK; b) to evaluate the effects of pinkeye on production traits; and c)to study immunologic factors involved in ocular defense mechanisms.

Keywords
Animal Science

Disciplines
Agricultural Science | Agriculture | Animal Sciences

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Introduction

Infectious Bovine Keratoconjunctivitis (IBK), commonly known as pinkeye, is a contagious bacterial disease that affects cattle worldwide. IBK is characterized by excessive tearing, inflammation of the conjunctiva, and ulceration of the cornea. In severe cases, perforation of the cornea may occur, leading to permanent blindness. The incidence rates reported in the ISU beef herd range from 30–52% in the last four years (Figure 1). As a result of the economic impact of pinkeye in the cattle industry, estimated at $150 million/year, the lack of effective treatments against the disease and the increased demand for 'organic' products, research in the area of disease resistance is needed. The objectives of our study were: a) to estimate genetic parameters that could aid in the selection of cattle resistant to IBK; b) to evaluate the effects of pinkeye on production traits; and c) to study immunologic factors involved in ocular defense mechanisms.

Materials and Methods

For the estimation of genetic parameters, data from 2003–2005 were collected on preweaned black Angus calves. The data was collected at the Rhodes and McNay research farms and provided to us by other Midwest farms. A total of 1,878 records were used in the analyses. We developed a scoring system from 0–4 to assess severity of infection (Figure 2). A linear model including fixed effects of contemporary group, infected groups, and linear effects of age at weaning was used to evaluate the effects of pinkeye on production traits. Binary response variables were used to estimate heritability and other variance components. Tear samples were collected by swabbing the eyes of cattle during the pinkeye season to quantify the IgA levels, n=636. Antibody Sandwich ELISA's were used to quantify the amount of IgA in tear samples. SAS procedures were utilized to analyze the data from the quantitation assays.

Results and Discussion

The analysis of the field data indicates a major effect of pinkeye on weaning weight (Figure 3). Similar effects were observed with yearling weights. Affected calves weighed 30 lb less than their contemporaries. The effects of pinkeye on carcass traits were evaluated. Furthermore, the severity of infection resulted in lower weights exhibited by affected individuals (Figure 4**)**. Our analysis indicated that there was no difference in the rate of infections between sexes or between eyes. Heritabilities, ranging from 0.07 to 0.11, were estimated for resistance to IBK. These estimates are considered low, suggesting that slow progress can be achieved through selection of resistant cattle.

The analysis of the IgA quantitation assays indicates a difference in the levels of IgA levels between infected and healthy calves. Infected animals had lower levels of IgA (Figure 5**).** Further analysis, indicated that as the severity of the disease increased, the IgA levels in tear samples decreased (Figure 6**)**. These results suggest that IgA is playing an important role in the protection of bovine eyes to IBK.

Acknowledgments

Appreciation is extended to Kevin Maher and Dennis Maxwell from the McNay Farm for their cooperation with the project.

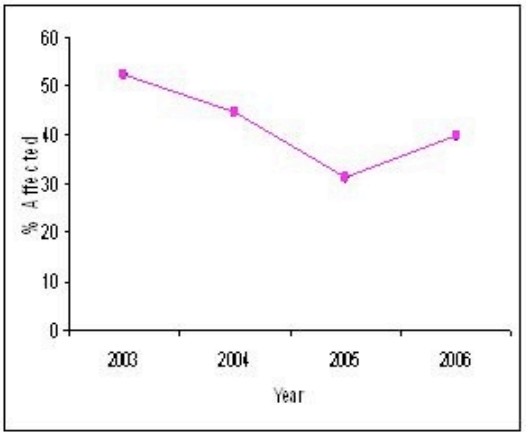

Figure 1: IBK incidence in Rhodes/McNay

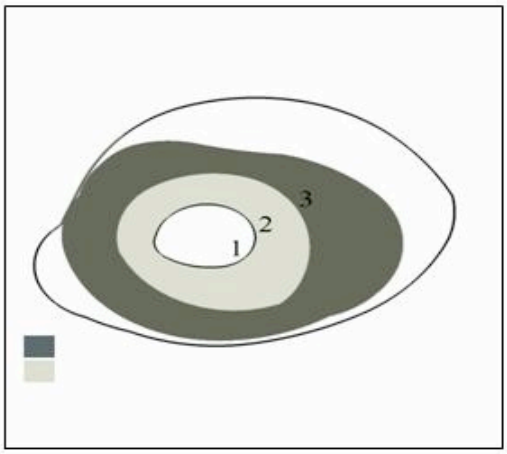

Figure 2: Illustration of the criteria used to assign severity scores

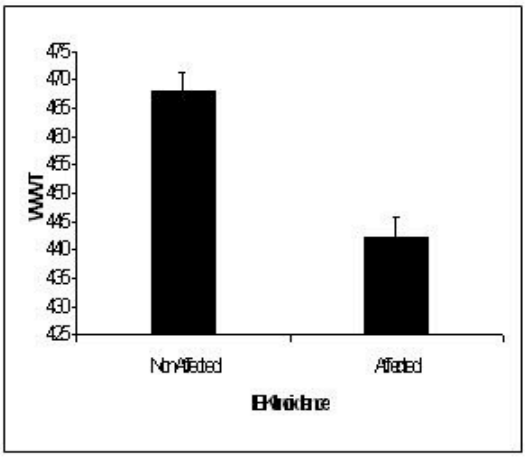

Figure 3: Effect of pinkeye on weaning weight

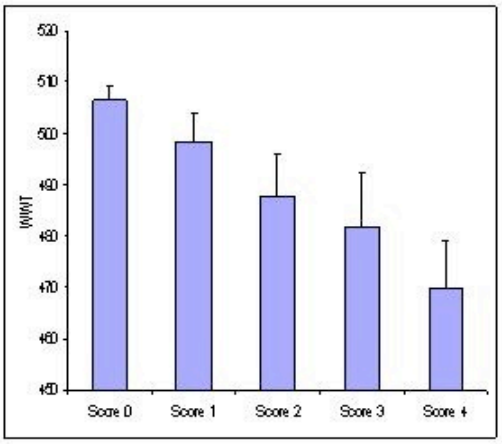

Figure 4. Effects of severity of infections on weaning weight

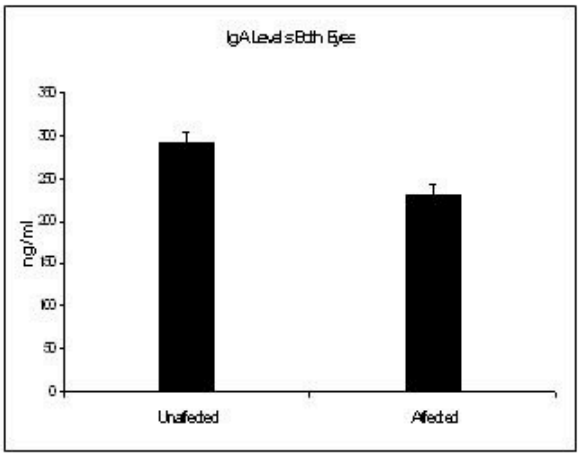

Figure 5. Levels of IgA in affected vs unaffected calves

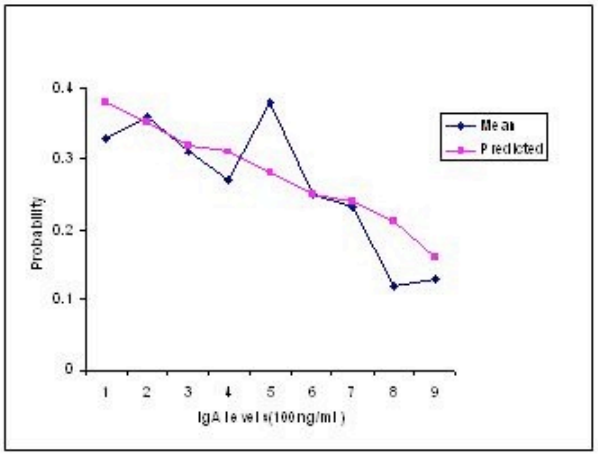

Figure 6. IgA Levels and Odds of Infection.