Genetic parameter estimates for susceptibility/resistance to Infectious Bovine Keratoconjunctivitis (IBK) in Angus calves


Introduction

Infectious Bovine Keratoconjunctivitis (IBK) is a serious eye disease of cattle. Infectious Bovine Keratoconjunctivitis impacts cattle of all ages, with its greatest impact being reduced performance of calves during the preweaning period (Snowder et al., 2005). Greater than 29% of cattle operations surveyed by the National Animal Health Monitoring System (NAHMS) in 1998 reported IBK as an economically important disease. Infectious Bovine Keratoconjunctivitis affects 10 million calves in the U.S. noting an estimated economic loss of more than $150 million (Richey, 2003). Incidence of IBK has been observed to be greater for bull calves (Ward and Nielson, 1979) and greater for Bos taurus genetic types relative to Bos indicus genetic types (Snowder, 2005). Infectious Bovine Keratoconjunctivitis impacts marketability of breeding cattle, particularly bulls, because they utilize their sense of vision to detect females in estrus (Geary and Reeves, 1992). Increased IBK incidence has been associated with reduced eyelid pigmentation. Published estimates of genetic parameters involving incidence of IBK are limited. Snowder et al. (2005) reported an overall direct heritability of 0.22 ± 0.02, while direct heritability was 0.25 ± 0.04 for the Angus breed. Due to the evident issues related to IBK, and because of the extensive cow-calf production in the southern U.S., coupled with the popularity of the Angus breed, a genetic study of resistance/susceptibility of Angus calves at weaning could aid in establishing selection programs for this trait. The objective of this study was to determine genetic parameter estimates for resistance/susceptibility to IBK.

Materials and Methods

Calves were born in the spring and fall at three Arkansas locations in 2009 and 2010 under procedures of objective 1a, Southern Regional Project, S1045. All calves were sired by purebred Angus bulls registered with the American Angus Association, one of which was Bon View New Design 878, the in common sire among locations. At weaning, incidence of IBK was determined using a subjective scoring system where 0 = no evidence of IBK in either eye, and 1 = evidence of IBK in one or both eyes. Scarring occurred in 19.6% of calves. Heritability, genetic, environmental, and phenotypic correlations were determined using variance component obtained with a single and two-trait animal model and MTDFREML. Fixed effects of contemporary group generated by birth year, season of birth, location and sex were included in the mixed model procedures. Age of dam and age of calf at weaning were included as covariates. Standard errors for the phenotypic correlations were estimated using residuals from the mixed model analysis.

Results and Discussion

Infectious Bovine Keratoconjunctivitis occurred in 5% of fall born calves while 30% of spring born calves had evidence of clinical IBK. Non-Infectious Bovine Keratoconjunctivitis calves had greater (P < 0.05) adjusted mean weaning weight than calves with IBK (268 ± 2.1 vs. 250 ± 3.9 Kg). Single trait analysis, genetic, environmental, and phenotypic variances for IBK were 0.0778, 0.09099, and 0.09877, respectively. Estimates of heritability and environmental variance were 0.08 ± 0.074 and 0.92 ± 0.074, respectively. From the two trait analysis, genetic, environmental and phenotypic variation of IBK with birth weight were 0.27 ± 0.39, -0.03 ± 0.10, and 0.02 ± 0.03, respectively. The environmental and phenotypic correlations of IBK with weaning weight were -0.29 ± 0.10 and 0.05 ± 0.03, respectively.

Implications

Phenotypic variation in the incidence of IBK presents the producers the possibility of artificial selection for IBK resistant animals leading to several advantages including recovery of the annual cost of treating this malady and reduced antibiotic dependency. Furthermore, producers could recover losses due to poor animal performance. As a result, producers would see economic benefits, while public safety concerns regarding the environment and food would be reduced.

Literature Cited