Predicting Cumulative Risk of Bovine Respiratory Disease Complex using Feedlot Arrival Data and Daily Morbidity and Mortality Counts

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Introduction

Economic losses from bovine respiratory disease complex (BRDC) are substantial in commercial feedlots. The ability to estimate potential losses at arrival and during the feeding period would be valuable for health and economic management. Our objectives were to evaluate the use of arrival risk factor data and subsequent daily BRDC morbidity and mortality counts for predicting lot-level cumulative BRDC risk.

Materials and Methods

We collected data on 32,000 lots of cattle (n=4,597,411) arriving during 2006–2008 from 20 midwest feedlots. Data were randomly partitioned into two datasets (training and validation). We used negative binomial regression models with lot-level counts of first BRDC cases as the dependent variable (offset by number at risk), and feedlot, year, month, weight, gender, and relevant two-way interactions as independent variables. We then iteratively updated models with daily lot-level BRDC morbidity and/or mortality counts, resulting in new lot-level models for each day of the first 50 days of the feeding period. Following model building, the validation dataset was run through each iterative model and predictive ability was assessed.

Results

Cumulative BRDC risk within lots ranged from 0% to 98.4% (mean=8.8%). All risk factors and two-way interactions were significantly ($P<0.05$) associated with BRDC risk. Results and performance of predictive models varied among different classes of cattle. Factors associated with BRDC risk have been previously described, but our assessment of the predictive abilities of arrival risk factors and subsequent impact of daily health information obtained during the feeding period is unique.

Significance

Determining the predictive capabilities of data commonly collected at arrival and during the feeding period is an important step towards providing veterinarians and feedlot managers with quantitative information about important health outcomes.