

# Associations between Transport Distance and Weight Loss during Transit with Health Parameters in Feedlot Cattle

N. Cernicchiaro<sup>1</sup>, DVM, MSc, PhD; B. J. White<sup>2</sup>, DVM, MS; D. G. Renter<sup>1</sup>, DVM, PhD; A. H. Babcock<sup>3</sup>, DVM, PhD; L. Kelly<sup>4</sup>, DVM, MPH; R. Slattery<sup>5</sup>, DVM

<sup>1</sup>Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan, KS 66506

<sup>2</sup>Department of Clinical Sciences, College of Veterinary Medicine, Kansas State University, Manhattan, KS 66506

<sup>3</sup>Work completed at the College of Veterinary Medicine, Kansas State University; currently with Adams Land and Cattle Company, Broken Bow, NE 68822

<sup>4</sup>Work completed while at Kansas State University, author currently at Boehringer-Ingelheim Vetmedica, Fort Dodge, IA 50501

<sup>5</sup>Work completed while at the College of Veterinary Medicine, Kansas State University; author currently with Kansas State University Extension, River Valley District, Washington, KS 66968

## Introduction

Bovine respiratory disease complex (BRD) is the most common disease of feedlot cattle. Most cattle are transported at least once during their lives and the physiologic changes associated with cattle transport stress are well documented. However, limited work exists evaluating how the risk of detrimental health outcomes changes based on the characteristics of the journey including distance cattle traveled or the weight loss in transit (shrink). The objective of this study was to determine potential associations between common measures of transportation (distance traveled (DTV)) and shrink (SHK) with feedlot health.

## Materials and Methods

Study inclusion criteria included: cohorts classified as male or female, cohort arrival mean weight greater than 500 lb (227 kg), cohorts containing more than 20 calves, and available information on either DTV or SHK. A cohort was considered as a 'lot' or group of cattle that were purchased, managed, and marketed similarly, but not necessarily housed in the same physical location during the feeding period. Study data consisted of 14,601 cohorts from 21 feedlots with available DTV data and 16,590 cohorts from 13 feedlots with available SHK data.

Data available about each cohort at arrival included distance traveled (calculated by using the origin zip code and the known location of the feedlot using a commercial program), weight loss during transport (calculated as [(cohort pay weight – cohort arrival weight)/(cohort pay weight)] \*100), mean arrival weight, gender, year of arrival, season, cohort size, and geographic region of origin. Health outcomes of interest included cumulative BRD morbidity and overall mortality risks. To be considered a BRD case, a calf had to be identified by feedlot personnel as showing clinical signs of BRD and subsequently be treated with an antimicrobial. Mortality was defined as cattle death related to any cause between the time of

arrival and final pen closeout. BRD morbidity and overall mortality were evaluated using random effects negative binomial regression models. Feedlot was modeled as a random intercept in all models.

## Results

For DTV cohorts, the mean BRD morbidity was 4.9% (range: 0 - 100%), and mean mortality due to all causes was 1.3% (range: 0 - 28.7%). Cohorts in the SHK data had mean BRD morbidity of 10% (range 0 - 100%), and mean mortality of 1.3% (range: 0 - 25.6%). The association between DTV and BRD morbidity depended on the season of the year, calf region of origin, gender and mean arrival weight after controlling for cohort size and arrival year. For instance, across all arrival seasons, little change was evident in BRD morbidity or mortality risks until DTV > 550 mi (888 km) when increased health risks were observed. The association of SHK and BRD morbidity depended on arrival weight, gender, and season. Lighter cohorts experienced higher BRD morbidity at all SHK levels. This finding was similar to DTV where lighter cohorts displayed an earlier rise in predicted BRD morbidity and this increase may be associated with the additive effects of transport stress and potential lower age in the lighter cohorts.

## Significance

We found that BRD morbidity and overall mortality were associated with common measures of transportation (DTV, SHK), but the effect of transport was modified by the region the calves originated from (DTV only), cohort gender, cohort mean arrival weight and the season calves arrived. Combining data on distance traveled and weight loss during transport with cohort demographics could allow a more precise grouping of calves based on their risk of respiratory disease and overall mortality, and thereby promote effective use of disease intervention measures.