

# Determining associations of bovine respiratory disease intertreatment interval with case fatality risk and factors influencing intertreatment interval

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## Introduction

Judicious and appropriate antimicrobial therapy is a critical topic in beef cattle production. Bovine respiratory disease (BRD) is the most frequent syndrome requiring antimicrobial therapy in postweaned beef calves; however, little published information has described factors impacting the actual intertreatment interval (ITI) and potential associations of ITI with case outcomes. The objective of this retrospective research is to determine associations between ITI of first and second BRD treatment with antimicrobials with case fatality risk (CFR) and secondarily to identify factors influencing ITI in BRD cases treated at least twice with antimicrobials.

## Materials and Methods

Individual animal feedyard health operational data were collected, including cattle treated multiple times for bovine respiratory disease (BRD) from 2014 to 2020. Treatment dates were used to calculate the actual ITI between the first and second treatment for clinical BRD cases treated at least twice with antimicrobials. Metaphylaxis was included as a covariate, but not considered a first treatment for BRD. Data were cleaned removing ITI greater than 100, limiting arrival weights to 400 to 1200 lb (182 to 545 kg), and eliminating data that included additional gender classifications beyond steer or heifer. The final dataset for analysis consisted of 28,694 individual animal records from 13 feedyards. A multivariable model was created to evaluate potential associations of CFR with metaphylaxis status, ITI category (10-d increments), drug class of the first treatment, gender, number of head received in the group, arrival month, arrival year, and arrival weight. A second multivariable model was created to evaluate potential associations of the arrival and first treat-

ment information with the ITI interval. A random effect was included in all models to account for lack of independence due to observations from the same feedyard.

## Results

Multivariable model results indicated ITI was associated with CFR, and cattle with shorter ITI had higher CFR compared to cattle with longer ITI. Cattle with ITI of 0-10 d had higher CFR (34.4% ± 3.1) than cattle with ITI of 10 to 20 d (27.8% ± 2.7), and both were higher than all ITI other categories up to 70 d. Several factors were associated with changes in ITI including drug class of first treatment, arrival month, metaphylaxis status, initial weight, and gender. The class of drug was associated with varied differences in ITI (range 16.0 ± 1.9 to 25.4 ± 1.7 d) as different formulations have different durations of activities. Cattle in the 500 to 600 lb (227 to 273 kg) range at arrival had the longest ITI (26.0 ± 1.7 d), with shortest ITI in each subsequent category until 800 to 900 lb (364 to 409 kg) (20.8 ± 1.7 d). Steers had slightly longer ITI than heifers (22.8 ± vs 21.8 ± d). The arrival month of the calves also influences ITI, with September showing lower ITI (20.3 ± 1.7 d) relative to January through July.

## Significance

The ITI was significantly associated with CFR, and understanding this relationship could help influence case prognostication as well as potential modifications to subsequent therapy. Several factors influenced the actual ITI beyond the type of drug administered at first treatment, and understanding these factors may help in future treatment protocol design.