

2) evaluation of the clinical benefit of Zelnate relative to a commercially available antimicrobial when administered in a metaphylactic fashion.

### Materials and Methods

Phase 1 of the research program consisted of a *Mannheimia haemolytica* (Mh) disease model in which lung lesions were the primary outcome parameter. On day 0, 3 to 4 month old Holstein steer calves were intratracheally challenged with Mh. On day 5, lung lesions were scored by a trained and blinded investigator. In 2 separate studies, Zelnate was administered on either day 0 (Study 1; n=32/treatment group) or day 1 ([24 hours after Mh challenge] Study 2; n=40/treatment group) and compared to a no-treatment control group. Phase 2 consisted of a field BRD metaphylaxis study within a commercial US feedlot. Cattle at medium-risk for developing BRD were enrolled by the investigator. On day 0, cattle were metaphylactically administered either Zelnate or tilmicosin (Micotil®) (n=1002/treatment group), administered a standard feedlot processing regimen, individually weighed, and allocated to pens (167 head/pen). Following a 3-day moratorium, cattle were clinically evaluated daily for BRD until day 56. Cattle meeting the predefined BRD case definition were treated with a commercially approved antimicrobial. Calves that died/euthanized were necropsied. On day 56, a bodyweight was collected on all remaining calves.

### Results

In Phase 1 (Study 1), a reduction ( $P=0.03$ ) in lung lesions was observed among calves administered Zelnate (6.3%, 95% confidence interval [CI] = 4.3-8.3%), compared to no-treatment control calves (12.1%, 95% CI = 8.9-15.3%). In Study 2, a reduction ( $P=0.04$ ) in mortality was observed among cattle receiving Zelnate (2.5%; n=1) relative to the no-treatment controls (20%, n=8). In Phase 2, no significant differences were observed between treatment groups for BRD morbidity, repulls, chronicity, case fatality, average daily gain, and feed efficiency ( $P>0.05$ ).

### Significance

Within the Mh disease model, the outcomes from Phase 1 indicate that cattle administered Zelnate had significantly reduced lung lesions (Study 1) and mortality (Study 2) compared to no-treatment controls. Phase 2 outcomes indicate that cattle metaphylactically administered Zelnate performed in a comparable fashion to calves receiving tilmicosin. These data suggest that Zelnate may be non-antibiotic option for metaphylaxis among cattle at medium-risk of developing BRD.

## Assessment of periparturient behavior in beef cattle using accelerometers

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### Introduction

A large percentage of calf death loss in cow-calf operations occurs during the intrapartum period, with the majority a result of dystocia. The usefulness of commercial activity monitors to detect changes in behavior indicative of impending parturition has not been fully explored. Research objectives included characterization of behavioral indices during the periparturient period in beef cattle and the ability of changes in behavioral indices from baseline to accurately predict impending parturition in individual cows.

### Materials and Methods

Activity data were collected from 40 mixed-breed beef cows housed on pasture using accelerometers (IceQube™, IceRobotics™). Accelerometers were placed on hindlimbs of periparturient beef cows for a minimum of 30 days prior to calving and removed 7 days post-calving. The number of steps, standing time, lying time, and number of lying bouts were continuously recorded at 15 minute intervals throughout the study period.



## Results

Evaluation of behavioral data revealed an increase in the steps taken as parturition approached, starting approximately within 2 to 4 hours prior to calving. Lying bouts became more frequent and shorter in duration as parturition approached, and demonstrated the most striking deviation from baseline in all recorded behavioral indices. Immediately following calving, time spent standing increased and lying bout frequency decreased.

## Significance

Changes in behavioral indices during the periparturient period were demonstrable in beef cattle using accelerometers. The potential exists for algorithm development to better predict impending parturition as well as development of commercially available activity monitors in pastured beef cattle.

# Evaluation of digital Brix refractometry in assessing maternal colostrum quality and transfer of passive immunity in beef cattle

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## Introduction

Newborn calves depend on passive immunity acquired by the timely ingestion of colostrum containing adequate concentrations of immunoglobulin G (IgG). Failed transfer of passive immunity (FTP) in calves is defined as serum IgG concentrations <10 g/L, measured between 1 and 7 days after birth. It is estimated that up to 27% of beef calves suffer from FTP, which can affect calf health, survival, and growth. In contrast to dairy calves that are typically hand-fed prescribed volumes of colostrum, beef calves ideally suck from their dam and do not need human intervention. This requires the calf to be vigorous, the cow to allow the calf to suckle, and the colostrum to be of sufficient quality and quantity. However, beef producers rarely know the quality or quantity of colostrum available to, or consumed by, the calves in their care. Although measuring the volume of colostrum is not generally feasible for beef producers, there are on-farm tools available to estimate IgG concentration. Optical and digital refractometers are widely used to evaluate colostrum and serum of dairy cattle. However, there is minimal published research evaluating these tools in beef cattle. Objectives of this study were to evaluate the effectiveness of the Brix refractometer for estimating quality of maternal colostrum and levels of passive immunity acquired by commercial beef calves.

## Materials and Methods

During the 2013 to 2015 calving seasons, 148 cow-calf pairs from 2 large, commercial cow-calf operations in Alberta, Canada were enrolled. Maternal colostrum was collected shortly after calving and, when feasible, calf serum samples were collected 24 hours post-calving. A digital Brix refractometer (PAL-1, Atago Co. Ltd; WA USA) was used for colostrum and serum analysis. Thawed, chilled colostrum and serum were analyzed using radial immune diffusion (RID) to determine IgG concentrations. Descriptive statistical analysis was performed in SPSS 22 (IBM, Armonk, New York, USA). Scatter and Bland-Altman plots were used to evaluate agreement between 2 continuous outcomes. To determine the optimal percent Brix cut-point to identify colostrum below 100, 125, and 150 g/L, the accuracy, sensitivity, specificity, negative and positive predictive values, and kappa were calculated using percent Brix cut-points between 20 and 35%. A similar approach was used to evaluate serum percent Brix, testing cut-points between 7.6 and 8.6% to detect calves with serum IgG below 10 g/L.

## Results

Less than 3% (n=4) of colostrum samples had IgG concentrations below 100 g/L, while 9% (n=13), 22% (n=33),