# Characterization of neonatal beef calf behavior and associations with weight gain and intake of colostral immunoglobulins

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## Introduction

Failure of adequate colostrum intake in neonatal calves contributes to increased morbidity and mortality in both beef and dairy calves. Characterizing neonatal calf behavior predictive of future production has not been fully explored in beef cattle. Research objectives included characterization of behavioral indices from birth until day 7 in beef calves born to primiparous (Calves-H) and multiparous dams (Calves-C). Evaluation of body weight, serum total protein, and IgG concentrations were performed to determine correlations between activity, transfer of passive immunity, and weight gain during the first 7 days of life.

## Materials and Methods

Activity data were collected from a total of 70 mixed breed beef calves using accelerometers (IceQube™, IceRobotics™). Accelerometers were placed on the hind limb of calves within 6 to 8 hours of birth, and body weight and blood samples were collected on day 0 and 7. 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

Calves-C had significantly higher IgG concentrations and increased weight gains compared to Calves-H. A positive correlation between change in body weight and IgG status on day 7 was present for both Calves-C and Calves-H. For Calves-C, but not calves-H, statistically significant correlations existed between serum IgG concentrations and behavioral indices, indicating that calves with greater intake of colostrum were less active than calves with lower rates of passive transfer. Although not statistically significant, Calves-C with higher weight gains also tended to take fewer steps than Calves-C with lower weight gains.

## Significance

Characterization of neonatal calf behaviors and their correlations with weight gain and immune status were achievable in pastured beef calves using accelerometers.

# A descriptive analysis of the commensal luminal and mucosal microbiome of the duodenum using a cannulated calf model

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## Introduction

The gut microbiome provides important metabolic functions for the host animal. Bacterial dysbiosis as a result of bacterial, viral, and parasitic gastrointestinal infections can adversely affect the metabolism, productivity, and overall health. The objective of this study is to characterize the commensal microbiome present in the lumen and the epimural surface of the duodenum of cattle, as we hypothesize that due to metabolic processes and/or host proprieties, there are differences in the natural microbiota present in the epimural surface and luminal contents of the bovine duodenum.

## Materials and Methods

Duodenal lumen contents (LS) and epimural surface biopsies (EPS) were collected from 6 dairy crossbred steer calves. A flexible video-endoscope was used to harvest 4 biopsy samples via a T-shaped intestinal cannula. In order to assess as much environmental and individual calf microbiota variation as possible, each calf was sampled 3 times over a 6-week period. A total of 36 samples were collected, 18 LS samples and 18 EPS specimens. The DNA was extracted from the samples and submitted for16S rRNA gene PGM bacterial sequencing.

## Results

The top 5 phyla present in the LS consisted of Firmicutes (52%), Bacteroidetes (32%), Proteobacteria, Spirochetes, and Fibrobacteres. In contrast, in the EPS, 75% were Firmicutes and 10% Bacteriodetes, followed by Proteobacteria, Tenericutes, and Cyanobacteria (t-test, $p<0.001$). Firmicutes and Bacteroidetes composed over 80% of the microbiome present in both sample locations. The percentages overall bacterial diversity for the phylum Firmicutes and Bacteroidetes between sample locations were also considered to be statistically different (t-test, $p<0.001$).

## Significance

Changes in the ratio of Firmicutes to Bacteroidetes can adversely affect the ability of the gut to absorb or secrete metabolic byproducts. Characterizing the gastrointestinal microbiome in vivo is imperative. This study satisfied the hypothesis, as differences in the natural microbiota of the LS and EPS were found. Further study is warranted to explore the impact of medical therapy and/or environmental effects on the metabolically active gut microbiome of ruminants.

# A survey to describe beef producer opinions on antibiotic use and consumer perceptions of antibiotics in the beef industry

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## Introduction

Antibiotic use is of interest to all involved in the beef industry, including producers, veterinarians, and consumers. Beef producers and veterinarians are constantly working together to improve animal health and production, especially in regards to antibiotic use. This survey was created by industry veterinarians at Kansas State University to explore producers' use of antibiotics in the beef industry, their opinions on antibiotic resistance, and their perceptions of consumer opinions of antibiotic use. To date, no other literature exists exploring these topics at the producer level.

## Materials and Methods

A 26-question survey was developed and distributed to beef producers throughout the United States and Canada via popular industry outlets. The data were collected via Kansas State University's online survey service, Qualtrics Online.

## Results

Two-hundred sixty (260) surveys were submitted from producers in 43 states and 1 province in Canada. Producers with cow-calf production units most frequently reported, followed by stocker, backgrounder, and feeder operations, represented in equal proportions. Eighty-five percent (85%) of producers indicated they use the services of a veterinarian regularly, while only 23% reported that they have a written, documented, and signed veterinary-client-patient relationship. Oral and injectable antibiotics are rarely used by participants, and most antibiotics are used for treatment of bovine respiratory disease, foot rot, and pinkeye. Seventy-two percent (72%) of producers indicated that Beef Quality Assurance is an important industry program for addressing antibiotic use and prevention of antibiotic residues and resistance. When asked if familiar with the Veterinary Feed Directive rule, 81% of respondents indicated they are.

## Significance

This survey provides valuable insight into the practices and opinions of beef producers in the United States and Canada. The results of the survey show that beef producers are willing to share information about their production practices, including antibiotic use, and have valuable opinions on industry issues such as antibiotic resistance.