

# Behavioral attitude scores associated with bovine respiratory disease identified using calf lung ultrasound and clinical respiratory scoring

M.C. Cramer,<sup>1</sup> BS, MS; K. Proudfoot,<sup>2</sup> MSc, PhD; T.L. Ollivett,<sup>3</sup> DVM, PhD, DACVIM

<sup>1</sup>Department of Dairy Science, UW-Madison, WI 53706

<sup>2</sup>Department of Veterinary Preventive Medicine, Ohio State University, Columbus, OH 43210

<sup>3</sup>Department of Medical Sciences, UW-Madison School of Veterinary Medicine, WI 53706

## Introduction

Understanding how behavioral attitude differs among calves with subclinical respiratory disease, clinical respiratory disease, and unaffected calves, diagnosed by clinical respiratory scoring and lung ultrasound, can provide insight into how BRD affects animal welfare and inform management strategies. The Wisconsin Calf Health Scoring Chart includes a commonly used 4-level attitude score which is an additional way to find abnormal calves, requires little handling, and is financially feasible. However, we currently do not have a clear understanding of how this attitude scores varies based on severity of respiratory disease. Therefore, the objective of this cohort study was to determine if calves with respiratory disease, diagnosed by lung ultrasound and clinical respiratory scoring, exhibit different behavioral attitude scores at the onset of disease.

## Materials and Methods

Data collection for this study took place in Ohio, USA between February and August 2016 on a dairy cattle facility that raised heifer and bull calves and freshened only nulliparous heifers. Preweaned dairy calves ( $n=280$ ;  $21 \pm 6$  d) were enrolled at entry into a group-housed automated milk feeder barn. Twice weekly health exams included a clinical respiratory score (CRS; - or +), a lung ultrasound to identify consolidation, and an attitude score (0 = normal: bright, alert responsive; or 1 = depressed: dull but responds to stimulation or depressed, slow to stand or reluctant to lie down). BRD status for each calf was defined as SBRD ('subclinical BRD' calves with lung consolidation  $\geq 1\text{cm}^2$  and CRS-;  $n=164$ ) or CBRD ('clinical BRD' CRS+ with or without lung consolidation;  $n=79$ ), based on their first BRD event. Calves with NOBRD ( $n=37$ ) never had lung consolidation  $\geq 1\text{cm}^2$  or CRS+. For calves with SBRD and CBRD, attitude scores on the day of BRD diagnosis were used in the analysis. For the NOBRD calves, we selected the attitude score from the day that most closely

corresponded with the mean age of SBRD and CBRD calves ( $31 \pm 8$  d old). A multivariable mixed logistic model was used to determine if BRD status was associated with attitude score.

## Results

Calves were  $21 \pm 6$  d (mean  $\pm$  SD) old at entry to the automated calf feeder barn and were housed in groups of  $13 \pm 3$ . Twenty-eight percent (79/280) and 59% (164/280), of calves were identified with CBRD and SBRD at their first BRD event, respectively. Thirteen percent (37/280) of calves were never identified with CBRD or SBRD and were therefore categorized as NOBRD. The age (mean  $\pm$  SD) of calves with NOBRD ( $33 \pm 5$  d), calves with CBRD ( $27 \pm 9$  d), and calves with SBRD ( $30 \pm 8$  d) on the day of the health examination from which the attitude score was collected was not different between BRD groups ( $P=0.73$ ). The multivariable model showed an effect of BRD status on the probability of having a depressed attitude score ( $P=0.0008$ ). Calves with CBRD were 5.2 (95% CI: 1.1 – 23.7) times and 4.5 (95% CI: 2.0 – 10.4) times more likely to have a depressed attitude score compared to calves with NOBRD ( $P=0.0350$ ) and calves with SBRD ( $P=0.0004$ ), respectively. There was no difference in the odds of having a depressed attitude score between calves with SBRD and NOBRD ( $P=0.87$ ). The sensitivity and specificity of the attitude score to identify calves with CBRD were 23% and 95%, respectively

## Significance

In group housed calves, attitude score was associated with clinical respiratory disease, but it failed to identify all clinically affected calves and was not associated with subclinical disease at all. Producers and veterinarians should be cautious when using attitude as the primary means of detecting calves affected by respiratory disease in similar settings.