controls, 17 *mycoplasma*-free calves with no abnormal clinical signs were also enrolled in this study. Single blood samples were collected by jugular venipuncture from all calves. The BALF samples were obtained during bronchoscopic examination using a standard protocol. Immediately prior to testing, plasma and BALF samples were diluted 20- and 100-fold in endotoxin-free water, respectively. Plasma was then heated for 10 min at 176 °F (80 °C). Endotoxin activities in plasma and BALF were measured by traditional kinetic turbidimetric (KTA) and chromogenic analysis (KCA), respectively. The lower limits of detection for this assay in plasma and BALF were 0.042 and 0.140 EU/ml, respectively. The mean values for each dependent variable were compared with the normal values, using the Student's *t*-test after ANOVA as *F* test. ROC curves were used to characterize the sensitivity and specificity of each parameter to *mycoplasma* bronchopneumonia-associated changes.

## Results

In healthy calves, plasma endotoxin activity was below the limit of detection in 14 out of 17 calves (82.4%) with a median plasma endotoxin activity of 0.042 EU/ml. The median endotoxin activity in BALF obtained from control calves was 2.44 EU/ml. The median endotoxin activities in plasma (0.334 EU/ml, $P<0.001$) and BALF (105.8 EU/ml, $P<0.001$) were significantly higher in calves with bronchopneumonia compared with the control. The proposed optimal cut-off point for plasma endotoxin activity was determined to be 0.078 EU/ml (AUC=0.929, $P<0.001$, Se 92.9%, and Sp 100%). In the same manner, the proposed optimal cut-off point for endotoxin activity in BALF was determined to be 6.05 EU/ml (AUC=0.933, $P<0.001$, Se 81.3%, and Sp 84.6%). Plasma endotoxin activity was significantly and positively correlated with that of BALF ($r^2=0.916$, $P<0.001$).

## Significance

In healthy calves, plasma endotoxin activity was below the limit of detection in 14 out of 17 calves (82.4%) with a median plasma endotoxin activity of 0.042 EU/ml. The median endotoxin activity in BALF obtained from control calves was 2.44 EU/ml. The median endotoxin activities in plasma (0.334 EU/ml, $P<0.001$) and BALF (105.8 EU/ml, $P<0.001$) were significantly higher in calves with bronchopneumonia compared with the control. The proposed optimal cut-off point for plasma endotoxin activity with regard to Se and Sp (J) was determined to be 0.078 EU/ml (AUC=0.929, $P<0.001$, Se 92.9%, and Sp 100%). In the same manner, the proposed optimal cut-off point for endotoxin activity in BALF was determined to be 6.05 EU/ml (AUC=0.933, $P<0.001$, Se 81.3%, and Sp 84.6%). Plasma endotoxin activity was significantly and positively correlated with that of BALF ($r^2=0.916$, $P<0.001$).

# Prevalence and characteristics of radiographically confirmed juvenile tarsal osteochondrosis in purebred Angus bulls

**S.E. Emerson**, *DVM*[1]; **M.F. Barrett**, *DVM, MS, ACVR*[1]; **T.N. Holt**, *DVM*[2]; **L. Bass**, *DVM, MS, DABVP (Equine)*[2]; **S. Rao**, *BVSc, MVSc, PhD*[2]

[1]*Colorado State University, Department of Environmental and Radiological Health Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523*
[2]*Colorado State University, Clinical Sciences Department, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523*

## Introduction

Hindlimb lameness in breeding bulls is a source of significant financial loss, with a proportion of bulls having osteochondrosis (OC). The objective of this study is to determine the characteristics, change over time, and sire association of radiographically identified tarsal OC lesions in a purebred Angus breeding herd.

## Materials and Methods

Fifty purebred Angus bull calves were randomly selected from the 2014 bull calf crop of the CSU Beef Breeding and Genetics Herd. Exams were performed at 3 time points: median ages 7.5 months, 50 bulls; 12.5 months, 49 bulls; and 19.8 months, 9 bulls. All tarsi were clinically and radiographically examined. Effusion and presence and location of OC lesions were evaluated.

## Results

The likelihood of OC was significantly lower at both time point 2 ($P=0.0003$) and 3 ($P=0.04$) after adjusting for repeated measures on the bulls. There was a significant decrease in the number of distal talus lesions at time point 2 ($P<0.01$). Significant associations were observed between clinical joint effusion and OC location ($P=0.04$); and between joint effusion scores and OC grades between time points 1 and 2 ($P<0.05$). Four sires (out of 16) produced bulls having significantly higher numbers of lesions in time point 1 ($P=0.02$) and time point 2 ($P=0.01$).

## Significance

The number of OC lesions decreased over time, particularly distal talus OC lesions. A significant association of tarsal OC between sires was identified, suggesting radiographic screening performed at approximately 1 year of age may be beneficial in breeding herds.

# Incidence of health events and the associations with death and culling on 3 dairies

**P. Bacigalupo-Sanguesa**, *DVM*[1]; **J.E. Lombard**, *DVM, MS*[2]; **C.S. McConnel**, *DVM, PhD, MS, BS*[1]; **F.B. Garry**, *DVM, MS, DACVIM*[1]; **A. McNeil**, *MS candidate*[1]

[1]*Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523*

[2]*USDA-APHIS-VS-Center for Epidemiology and Animal Health, Fort Collins, CO 80526*

## Introduction

Some of the least available and most variable dairy herd data comprise records of disease and removal events. Although there are many studies based on the epidemiology of common diseases of dairy cattle, most studies solely focus on a specific disease with or without its effect on removals. Few studies have evaluated the combined impact of multiple diseases on culling and mortality. The objectives of this study were to estimate incidence of common dairy cattle disease and measure their subsequent impact on mortality and culling from the herd.

## Materials and Methods

Health and removal (culling and death) records were obtained from 3 Kansas dairies with approximately 2,500 lactating and dry cows each. All dairies were owned by a single family and managed similarly. Data were collected for cows that started a new lactation from January 1, 2014 to December 31, 2014 and included all recorded events through May 25, 2015. All events and health data were entered into Dairy Comp 305 on-farm and exported into Microsoft Excel. Data were imported into SAS® for validation and statistical analysis. Health events were categorized into the following disease syndromes: abortion, digestive, non-ambulatory, hypocalcemia, ketosis, lameness, mastitis, metritis, pneumonia, and retained placenta. PROC FREQ was used to calculate incidence estimates and PROC LOGISTIC was used to model the health events and obtain odds ratios for events that were statistically ($P<0.05$) associated with individual cows being culled or dying.

## Results

Records from 8,804 cows that calved in 2015 were included. A similar percentage of cows were enrolled from each of the 3 dairies. A third of enrolled cows were in the 1st lactation, a quarter in 2nd lactation, and the remaining 40% in 3rd or greater lactation. The lactational incidence risk (LIR) for lameness was 21.3 and for mastitis was 20.3. There was no difference in LIR by lactation group for lameness. However, the mastitis LIR for 1st lactation cows was 10.6, 19.6 for 2nd lactation, and 28.6 for 3rd and greater lactation cows. The abortion LIR was 11.4 for all cows. Metritis LIR was highest for 1st lactation (16.0), lowest for 2nd lactation (6.0), and 10.1% for all cows. Ketosis was not routinely evaluated or recorded on these dairies. Adjusting for other diseases experienced at the individual cow level, all disease events with the exception of metritis were sig-