

# Factors Associated with ELISA Sample/Positive Ratio Scores for Paratuberculosis in an Angus-Brahman Multibreed Herd of Beef Cattle

M.A. Elzo, PhD<sup>1</sup>; D.O. Rae, DVM, MPVM<sup>2</sup>; S. Lanhart, BS<sup>2</sup>; J. Wasdin, BS<sup>1</sup>; P. Dixon, BS<sup>1</sup>; J. Jones<sup>1</sup>

<sup>1</sup>Department of Animal Sciences, College of Agricultural and Life Sciences, University of Florida, Gainesville, FL

<sup>2</sup>Department of Large Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, Gainesville, FL

## Introduction

Paratuberculosis is a chronic disease of ruminants that causes economic losses in beef and dairy cattle due to diminished production and eventually death. Dam and calf genetic and environmental factors were evaluated for their association with enzyme-linked immunosorbent assay (ELISA) sample to positive ratio scores for paratuberculosis in a multibreed beef cattle population.

## Materials and Methods

Blood samples were drawn from dams at the end of May in each of two years (2003 and 2004). Outcomes of the ELISA test were represented by sample to standardized positive control (s/p) ratios. The linear mixed model analysis used 359 ELISA s/p ratio scores from 240 dams: 52 Angus (A), 41 Brahman (B), 45 (3/4 A 1/4 B), 34 (1/2 A 1/2 B), 34 (1/4 A 3/4 B) and 34 Brangus (5/8 A 3/8 B). Dams were assumed to be unrelated. The MIXED procedure of SAS was used to perform computations. The mixed model included: 1) the fixed subclass effects of year and age of dam (3, 4, and 5 years and older), 2) the fixed regression effects of fraction of Angus, dam heterosis, birth weight of calf, calf gain between birth and weight on the date of their dam's blood sample, age of calf at date of dam blood sample, dam change in weight between her last weight the previous year (late November) and her weight on the date of the blood sample, dam condition score on the date of the blood sample and days pregnant at palpation, and 3) the random effects of dam and residual.

## Results

Year affected ( $P < 0.0001$ ) ELISA s/p ratio scores, but not age of dam, which was anticipated to be significant because of the chronic progressive nature of this disease. Important dam regression effects were: 1) B – A effect was positive ( $0.610 \pm 0.240$ ;  $P < 0.012$ ), indicating an upward trend of ELISA scores towards 100% B dams, and 2) weight change from before calving (late November) to the date of the blood sample in May ( $-0.006 \pm 0.002$ ;  $P < 0.001$ ), indicating a negative association between weight maintenance and ELISA scores. Relevant calf regression effects were: 1) birth weight ( $-0.023 \pm 0.01$ ;  $P < 0.021$ ), 2) calf gain from birth to the date of the dam blood sample ( $-0.008 \pm 0.002$ ;  $P < 0.002$ ), and 3) calf age on the date of the dam blood sample ( $0.005 \pm 0.003$ ;  $P < 0.043$ ).

## Significance

Although the estimated sensitivity of ELISA was only 50%, these results suggest that subclinical paratuberculosis may be negatively affecting dams and their offspring. Dams with high ELISA s/p ratio scores produced smaller calves at birth, gained less weight (or lost weight) during the preweaning season and their calves had smaller preweaning gains, likely due to lower milk production. Factors identified here as associated with ELISA s/p ratio scores contribute to our understanding of the impact of paratuberculosis in the beef cattle population.