

Post-partum serum albumin as a predictor of metritis

J. Powell, DVM, MFAM; E. Rollin, DVM, MFAM
University of Georgia, Athens, GA 30609

Introduction

The transition cow is in a negative nutrient balance, recognized largely as a negative energy and calcium balance. In response to the negative energy state, the body begins to mobilize body fat. In response to the negative calcium balance, the body begins to mobilize calcium stores from bone. A negative protein balance has also been documented, and results in mobilization of protein reserves from skeletal muscles. Total serum protein has been associated with cow health, but serum albumin is more specific and plays an important role in transporting triglycerides and calcium. Albumin has been proposed as a potential biomarker for health in the transition cow. The objective of this study was to determine whether low serum albumin concentrations 2 days after calving would result in an increased risk of developing acute puerperal metritis (APM). A secondary objective was to establish whether total or ionized calcium levels 48 hours post calving were associated with serum albumin levels early postpartum.

Materials and Methods

An observational prospective cohort study was conducted on 150 primiparous and multiparous cows. Cows were enrolled at calving and examined daily by a single observer for the first 14 days-in-milk. A complete physical exam, including palpation per rectum, was performed on days 4, 7, and 10 postpartum. A screening exam, which excluded palpation per rectum, was performed on all other days through day 14. Any disease process or abnormal health event was recorded. Metritis was scored using a standardized scoring system. Blood was collected via the coccygeal vein 24 and 48 hours postpartum for total serum calcium and ionized calcium evaluation. Blood was collected on days 2, 4, and 7 postpartum for serum albumin evaluation. Data was analyzed using Stata 13.1. Univariate associations between categorical

and continuous predictors were evaluated using Pearson's chi-squared. Variables with a $P > 0.2$ were excluded from the model, with the exception of albumin, as it was the predictor of interest. Multivariable analysis was conducted using logistic regression. Variables were removed in a manual backward stepwise fashion until only those with a $P < 0.05$ were retained in the model. All tests were performed assuming a 2-sided alternative hypothesis, and $P < 0.05$ was considered statistically significant.

Results

Of these 150 animals, 38 were diagnosed with APM, for an overall incidence of 25.3%. Albumin at 2 days postpartum ranged from 2.8 to 3.9 g/dL, with a median of 3.4 g/dL. Using an 8.0 mg/dL cutpoint, 57 (39%) of these 150 animals were hypocalcemic at 2 days postpartum. Ionized calcium at 2 days postpartum ranged from 0.89 to 1.7 mmol/L, with a median at 1.2 mmol/L. Correlation was assessed between albumin and total calcium, as well as with ionized calcium. Both ionized and total calcium are poorly correlated with albumin based on a Pearson's correlation coefficient of -0.11 and 0.07, respectively. However, a very strong positive correlation was determined to exist between ionized and total calcium with a Pearson's R-value of 0.90. Results of the multivariable logistic regression revealed that albumin at 2 days postpartum was not a statistically significant predictor of APM ($P = 0.450$).

Significance

Overall this data shows that albumin at day 2 after calving is not a statistically significant predictor of APM. More research is needed in the area of periparturient protein balance. Albumin may still have significance as a biomarker for the transition cow, but perhaps this significance lies in the prepartum period.