

Trace Mineral Deficiencies (Cu, Se, Mg) Causing Reproductive Losses in a Purebred Angus Beef Herd

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Introduction

Trace mineral deficiencies have been widely reported in conjunction with a number of production limiting disease conditions in cattle. Clinical signs vary from apparent (profuse watery diarrhea) to sub-clinical (increased incidence of common diseases). The complex interactions of trace minerals with one another and important physiologic functions in ruminant animals are poorly understood. Reported here are results of a herd investigation that was undertaken to resolve chronic poor herd reproductive and neonatal calf performance in a sixty head purebred Angus beef herd.

Materials and Methods

A herd investigation was instituted in the fall of 2006 and the spring of 2007 by members of the Washington State University Field Disease Investigative Unit (FDIU). A complete herd history was obtained including management practices, vaccination history, herd reproductive data and pasture management. All cows were examined by a veterinarian, weighed and assigned a body condition score (BCS). Blood, water, feces, feed and forage samples were obtained for diagnostic testing. A repeat sampling was performed in the spring of 2007 at the time of pregnancy diagnosis. Animals that had experienced a stillbirth in the previous calving season (n=7), animals that had not experienced a stillbirth (n=12) and two year old heifers (n=10) were bled for serologic evaluation of trace mineral status.

Results

The fall calving herd had a cumulative incidence rate of stillbirths of 12% in 2004, 4% in 2005 and 10% in the 2006. The herd pregnancy and calving percentages (including twins) were: 2004 = 98% & 96%; 2005 = 88% & 94%; 2006 = 96% & 100%. The mean herd postpartum BCS = 6.8 ± 1.2 SD, weight = 1429 ± 206 lbs and age = 5.71 ± 3.3 years. The mean BCS, weight and age of animals experiencing a stillbirth was $6.75 \pm .95$, 1523 ± 242 lbs and 5.75 ± 1.1 years, respectively. Results

were negative for bovine viral diarrhea on serum PCR. In 2006, serum trace mineral analysis from ten cows revealed 80% below .70 mg/g Cu with 30% below 50 mg/g and 80% below 19mg/g Mg . In 2007, serum trace mineral analysis on stillbirth cows revealed 86% below .70 mg/g Cu with 57% below 50 mg/g and 57% below 19 mg/g Mg and 29% deficient in serum selenium < .05 mg/g. In 2007, serum trace mineral analysis on control cows revealed 52% below .70 mg/dl Cu with 50% below 50 mg/g, 8% below 19 mg/g Mg and 33% deficient in serum selenium. In 2007, serum trace mineral analysis on heifers revealed 100% below .70 mg/g Cu with 50% below 50 mg/g, 0% below 19 mg/g Mg and 10% deficient in serum selenium <.05 mg/g. All other trace minerals were within normal limits. Laboratory forage analysis of the primary grass pasture, a fescue/white clover mix, yielded expected nutritive components and a K / Ca + Mg ratio of 2.3 %. The forage Cu levels ranged from 5-8 PPM DM with a CU/Molybdenum ratio of 5.5:1 to 2.5:1 on repeated sampling.

Significance

The data indicates a herd with trace mineral deficiency indicated by low serum Cu, Se and Mg levels. A free choice mineral supplement was being provided however intake was low perhaps due to its high sodium chloride content (50%). A high percentage of animals in this herd had low Cu, Se and Mg serum levels and had experienced historic reproductive problems. Adequate serum magnesium status was a significant categorical variable when analyzed vs. risk of losing a calf (p<.05). Underlying causes and herd treatment programs for the trace mineral deficiency in this herd are being pursued. The plan for the upcoming calving season includes individual animal supplementation with 25 g of Cu oxide via oral boluses (Copasure™), reformulation of the free choice trace mineral mix and management changes designed to increase and monitor mineral intake. Management changes prior to the calving season will be directed at identifying cows that may need assistance during calving and moving them to special facilities for observation.