Determining Effects of Supplemental Minerals and Inorganic vs. Organic Mineral Sources on Liver and Blood Serum Levels and Performance of North Dakota Beef Cows

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Cattlemen spend significant amounts of money on mineral supplements. Substantial variation in mineral status can occur due to cow diet, productivity, soils (glaciated or non-glaciated areas), weather, and other factors. Mineral supplements are offered without knowledge or observation of deficiency symptoms. Free choice mineral intake can be highly variable depending on diet, palatability, formulation, accessible location, weather effects, season, and other factors. Some producers provide little or no mineral supplement and cows are productive and healthy.

Mature crossbreed beef cow calf pairs (n=68) were randomly allotted to one of three mineral supplementation treatments in May 2006. The treatments consisted of a control (no mineral fed) (NM), organic or chelated mineral fed (ORG), or inorganic mineral fed (INORG). During the trial, cows were fed a diet of straw and co-products (primarily distillers grains and screenings) with some corn silage used in the lactation diets. Cows grazed aftermath from weaning in early October until the first week of December. Cow and calf performance were monitored for 18 months. Mineral status was determined by blood serum analysis and liver biopsies.

Cows receiving the organic mineral supplement gained less weight (P = 0.01) compared to cows on the inorganic or no mineral treatments (71.23 ± 11.12 lbs.; 104.11 ± 10.87 lbs.; 116.77 ± 10.41 lbs.). No differences in calf birth weight or gain through weaning were observed due to respective treatments. Calving data from 2007 also showed no difference among mineral treatments, indicating no residual effect due to mineral supplementation program.
Serum copper (Cu) levels increased in the inorganic treatment (P = 0.04), however, levels decreased in both the no mineral and organic groups (0.06 ± 0.04; -0.07 ± 0.04; -0.10 ± 0.05). Phosphorus (P) decreased in serum (P = 0.02) in the inorganic and no mineral groups but increased in the organic treatment (-4.70 ± 2.20; -4.30 ± 2.204; 3.78 ± 2.32). Zinc (Z) levels indicated a tendency (P = 0.07) to increase in all treatment groups (0.39 ± 0.08; 0.24 ± 0.08; 0.52 ± 0.09).

Mineral liver tissue levels were not the same as the serum levels. Cu levels decreased (P = 0.0009) in the cows receiving the no mineral treatment but increased in the inorganic and organic treatments (-29.83 ± 30.93; 127.57 ± 28.63; 163.50 ± 30.93). Phosphorus and Zinc levels did not show a significant change in liver tissue indicating stored mineral levels were not effected by either the inorganic or organic mineral supplementation.

Results of this study suggest mineral supplementation practices could be modified, but the long-term effects of reduced or no mineral supplementation could create significant problems that would affect breeding success, growth, and general health of the cows and calves.

Research specialist, Breanne Ilse, performing a liver biopsy.