DETERMINING TRACE MINERAL NEEDS FOR GRAZING BEEF COWS – A CASE STUDY

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Applying science based concepts to the ranch or farm should improve management and reduce production costs. Areas of concern for this case study were forage quality, water quality, and mineral supplementation.

A cooperating beef cattle producer from south central North Dakota provided range land and cattle to evaluate forage quality and mineral content. Forage samples were collected once a month during the 2002 grazing season using a technique that harvests only the forage the cows were observed consuming. In addition to summer and winter forage samples, water samples were collected for determining mineral contribution to cow diets. Using the analysis results, mineral supplementation needs were calculated after determining the cow's nutritional requirements based on cow weight, age, weight gain, frame score, and body condition score.

Sixty three samples were collected from May to November 2002. The samples were analyzed in duplicates for concentration of the following nutritional components: % Dry matter content, % Ash, % Crude Protein, % IVDMD (in vitro dry matter digestibility – used to calculate energy as TDN), % Acid detergent fiber, % Neutral detergent fiber, % Calcium (Ca), % Phosphorous (P), % Potassium (K), % Magnesium (Mg), % Sodium (Na), % Sulfur (S), % Copper (Cu), % Zinc (Zn), % Molybdenum (Mo), % Iron (Fe), and % Manganese (Mn). The total number of analyses was 4553.

Overall averages for nutritional components of forage samples collected in 2002 are listed in Table 1. Water quality ranged from 420 – 2650 parts per million total dissolved solids while fecal coliforms ranged from 70 to 3900 coliforms per 100 milliliters.

For this case study, the data suggest that the pastures provide adequate levels of nutrients for lactating beef cattle for the following major feed needs: crude protein, energy, calcium and phosphorous. However, the trace mineral content of the forages indicates a severe shortage of copper, an excess of molybdenum (which can further exaggerate a copper deficiency), and adequate amounts of potassium, magnesium, sodium, sulfur, zinc, iron and manganese.

The National Research Council – Nutrient Requirements of Beef Cattle 7th Ed. 1996, recommends 10 ppm (parts per million, or milligrams per kilogram) for copper in beef cattle diets. This case study averaged 3 ppm copper. Low levels of dietary copper might lead to copper deficiency symptoms that may be manifested in poor cattle health and reduced ability to fight diseases. High concentrations of molybdenum, as found in this case study, can lead to scours and poor feed efficiency. In addition, high concentrations of molybdenum will reduce the bioavailability of already low copper levels. Copper levels in the water were less than 3.5 ppm with most less than 1 ppm. In general, water appears to be a minimal source for trace minerals.

In this case study, the cattle are very adept in selecting high quality forages that contain adequate energy, protein, calcium and phosphorous. Although phosphorous concentrations in the grass decreased as the summer progressed, phosphorus concentrations did not drop below recommended levels.

Copper supplementation appears to be warranted. Providing additional copper could be as simple as adding copper sulfate/ proteinates to loose white salt or as complex as using a commercially formulated mineral supplement. In general, the cattle in this case study selectively grazed high quality forages that contain adequate energy, protein, calcium and phosphorous during the grazing season.

Table 1. Case study - nutritional and mineral content of range grasses for 2002			
Nutritional content	Overall	Nov-02	Winter hay 2002-03
% DM	95.8	95.372	97.390
% Ash	9.7	8.512	10.820
% CP	10.2	11.177	13.706
% IVDMD	58.4	50.111	58.410
% ADF	36.8	37.804	35.045
% NDF	66.6	62.340	56.030
% Ca	0.473	0.824	0.922
% Phos	0.181	0.152	0.239
% K	0.892654		
% Mg	0.199013	0.217	0.305
% Na	0.016671	0.013	0.021
% S	0.154746	0.103	0.181
Cu ppm	3.080891	5.158	4.348
Fe ppm	156.0697	292.175	189.511
Mn ppm	79.31061	111.527	100.300
Mo ppm	149.645	1222.430	400.505
Zn ppm	29.1856	26.575	24.804