Feeding minerals to beef cows seems to be an item of lowest priority to most cow-calf producers. This is partly due to the perception by most producers that minerals are not a problem, or that they are difficult to diagnose (i.e., masked by other problems such as energy or protein deficiency). In a survey of the 23 leading cow-calf states conducted by the Animal and Plant Health Inspection Service-National Animal Health Monitoring System (APHIS-NAHMS) of the USDA in 1997, 5.2% of the operations surveyed reported a known mineral deficiency in the five years previous to the survey. This total represented 9.7% of the cows covered by the survey, indicating that operations with larger herds more actively seek and discover mineral nutrition problems. In contrast, a total of 33% and 43% of 709 forage samples collected from the same 23 states were considered deficient for zinc and selenium concentrations, respectively (APHIS-NAHMS, 1998). Furthermore, 16% of the samples surveyed had copper:molybdenum ratios below 4:1, and were thus considered suspect to cause a copper deficiency because of molybdenum antagonism. A total of 13%, 8% and 8% of the forage samples had sulfur, iron and molybdenum, respectively, at sufficiently high concentrations to cause antagonisms. Although some unintended, mineral deficiency correction may result from "putting mineral out for the cows", these facts demonstrate that:

1) mineral nutrition is largely ignored, and
2) it is likely a greater factor in cow and calf performance than perceived.

The forage survey also demonstrated that alfalfa, brome grass, fescue, and orchard grass contained, on average, a minimum of 0.50% calcium and 0.20% phosphorus. Calcium and phosphorus requirements of mature beef cows are from 16 to 36 grams calcium/day and from 13 to 24 grams phosphorus/day. At a predicted intake of 26 lb/day (approximately 12 kg/day), the calcium and phosphorus concentration in the diet should be no less than 0.30% and 0.22%, respectively. Thus, in most circumstances requirements for both these minerals are not difficult to meet when feeding cool season forages and legumes available in the upper Midwest.

Supplementing magnesium may be necessary in certain areas to prevent grass tetany. However, producers need to understand that even with magnesium concentrations of forage in the range required for beef cows (from 0.10% to 0.20%), grass tetany may occur in pastures over-fertilized with nitrogen, especially in soils high in potassium or aluminum, or in pastures with a low concentration of legumes in the stand. Grass tetany occurs mostly in high-milk producing cows nursing calves younger than 2 months. Prevention practices involve using magnesium supplements, avoiding grazing pastures where sward height is less than 6 inches, and placing
high-producing cows with young calves in more mature pastures or those with at least 25% legumes.

Of the macro-minerals in animal nutrition (calcium, phosphorus, magnesium, potassium, sodium and sulfur), sulfur concentration in feed and water must be evaluated, because excess sulfur in forages, or sulfates in water may lead to antagonist interactions with copper absorption. Concentrations of sulfur in feeds or sulfate in water exceeding 0.30% or 300 ppm, respectively, should alert producers to prevent a potential copper deficiency. Another measure of water quality (total dissolved solids) associated with concentrations of mineral salts, including calcium, magnesium, and sulfur, must be monitored when high concentrations of salts or sulfate are suspected. When concentrations of total dissolved solids are greater than 3,000 ppm, producers must develop a plan of action to counter the effects of high salt or sulfur concentration, or switch their water to less contaminated sources.

Thus, after evaluating macro-mineral supply and possible antagonistic concentrations of sulfur, producer’s focus should turn to micro-mineral nutrition. Of the micro-minerals in animal nutrition (copper, manganese, zinc, selenium, iron, iodine and cobalt), copper, zinc and selenium may be found at concentrations that may compromise performance. In addition, molybdenum and iron, may be at sufficiently high concentrations to cause mineral antagonisms; producers must act to prevent copper deficiencies when dietary concentrations of molybdenum or iron are greater than 1 or 200 ppm, respectively. Results of recent surveys by APHIS-NAHMS in the leading 23 cow-calf producing states demonstrated that even where mineral supplementation was occurring, 60%, 43%, and 18% of the cattle surveyed had serum zinc, copper, and blood selenium concentrations considered marginally to severely deficient. Requirements for these minerals are 30, 10 and 0.10 ppm, respectively, although Simmental, Limousin, Charolais and Maine-Anjou cattle may have 50% greater copper requirements. The first step in preventing deficiencies of these minerals is to evaluate their concentrations in forages and supplements provided. The cost of most mineral analyses to evaluate zinc, copper, and even sulfur range from $20.00 to $50.00/sample depending on the lab and preparation procedures. Selenium concentrations of feeds may be tested for an additional $40.00 to $50.00/sample in most labs. Thus, the investment in determining the mineral status of feeds is relatively low when one considers the impact of low copper, zinc, or selenium concentration, or high sulfur concentration, on animal performance.

Once forage and water tests have been conducted, producers can then determine whether a specific trace mineral salt meets the needs of their herd. An evaluation of trace mineral premixes or salts conducted several years ago revealed that 5, 4 and 11 out of 12 formulations did not meet requirements of feedlot cattle. Thus, not all formulations are created to meet all mineral needs, and, when the appropriate formulation is found, it must be fed at the appropriate rate to get results. As a guideline, the following minimum trace mineral concentrations (when feeding 2 oz/cow/day) are provided for zinc, copper and selenium in the supplement: 4,000 ppm or .40% from zinc sulfate or zinc oxide, 800 ppm or .08% from copper sulfate, and 10 to 20 ppm or .001% to .002% selenium in areas where selenium is needed.