

News Column
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MINERAL NUTRITION: THE BASICS

Spring has sprung and with it comes the realization that this year's grazing season is just around the corner. With spring, one of the more common topics of discussion is mineral supplementation and mineral programs in general.

Most beef cattle producers recognize that mineral nutrition is important. However, it is important to emphasize that a mineral program is only one component of an operation's nutrition and management plan. Thus, an exceptional mineral program will not compensate for deficiencies in energy, protein or management. Additionally, the classical signs often associated with clinical deficiency of a particular mineral (wasting, hair loss, discoloration of hair coat, diarrhea, bone abnormalities, etc.) are not often observed in production settings. The production and economic losses attributed to mineral nutrition in many situations are the result of sub-clinical deficiencies, toxicities and antagonisms between minerals which are often less obvious (reduced immune function, vaccine response and sub-optimal fertility). Many producers erroneously assume the science of mineral nutrition is relatively complete. However, mineral nutrition is one of the most complicated aspects of overall nutrition and our knowledge is actually relatively incomplete.

There are 17 minerals required in the diets of beef cattle. Daily requirements for gestating and lactating beef cows have been established for the minerals in the table below (NRC, 2000). However, no requirements currently have been established for several minerals that are considered essential (chlorine, chromium, molybdenum and nickel). Minerals may be broken down into two categories - macrominerals and microminerals. The requirements for macrominerals typically are expressed as a percent of the total diet. Macrominerals include calcium, phosphorus, magnesium, potassium, sodium, chlorine and sulfur. Micromineral, or trace mineral (required in trace amounts), requirements are expressed as parts per million (ppm) or milligrams per kilogram of dry matter consumed. Microminerals include chromium, cobalt, copper, iodine, iron, manganese, molybdenum, nickel, selenium and zinc. Additionally, the requirement for most trace minerals does not change with stage of production (i.e. gestation to lactation).

Mineral requirements of beef cows.

Mineral	State of Production	
	Gestating	Lactating
Macrominerals, %		
Calcium	0.16 - 0.27	0.28 - 0.58
Phosphorus	0.17 - 0.22	0.22 - 0.39
Magnesium	0.12	0.20
Potassium	0.06	0.70
Sodium	0.06 - 0.08	0.10
Sulfur	0.15	0.15
Trace minerals, ppm		
Cobalt	0.10	0.10
Copper	10.0	10.0
Iodine	0.50	0.50
Iron	50.00	50.00
Manganese	40.00	40.00
Selenium	0.10	0.10
Zinc	30.00	30.00

Mineral nutrition is inherently complex, and mineral nutrition of grazing cattle is even more complicated. Mineral status of an animal is influenced by the total diet, including both water and feed, and stored mineral reserves within the body. Water may be a substantial source of mineral; however, the variation in water consumption makes estimating the contribution of mineral from water sources difficult. Mineral content of forages is influenced by several factors, including plant species, soil characteristics, maturity and growing conditions. The combination of these factors, and others not mentioned, makes estimating the mineral content of the diet of grazing cattle challenging.

A survey that evaluated mineral content of forages in 23 states conducted by Mortimer et al. (1997) suggested the minerals most likely to be deficient in forage-fed cattle in the U. S. were phosphorus, sodium, magnesium, copper, selenium and zinc. Most commercially available mineral supplements are formulated to meet or exceed the requirements for a given stage of production. This ensures that deficiencies are unlikely, but providing supra-optimal levels of specific minerals within a mineral supplement may not necessarily be warranted, unless specific production problems are known.

A mineral program does not have to be complex or the most expensive to be successful. Selecting and comparing different mineral supplements for the upcoming grazing season can be difficult. If you have questions regarding your mineral program, contact your local county extension agent or a member of the K-State beef cattle extension team. Information provided by Justin Waggoner, extension beef systems specialist.