

Cow/Calf Mineral Supplementation

Introduction

Various mineral elements are needed by animals to support life. These minerals are essential to certain physiologically important systems within the body and can only be provided through the diet. If not provided in the basal ingredients of the diet (for example, hay, grass, grains or water), supplementation of these minerals is required. This concept is particularly important in the third trimester of pregnancy and through rebreeding as range forages will be deficient in some minerals.

Minerals are characterized as either major (macro) minerals or trace (micro) minerals. The major minerals refer to those minerals needed by the animal in larger amounts and they include calcium, phosphorus, potassium, magnesium, sulfur, sodium and chlorine. Trace minerals are those minerals needed in smaller amounts and include zinc, copper, iron, manganese, cobalt, iodine and selenium. Although trace minerals are needed in smaller amounts than the major minerals, they are no less important to the physiological well being of the animal. In other words, deficiencies can result in major problems for the animal as well as the producer.

Some general physiological functions of minerals include regulating acid-base balance, providing essential components of cell membranes, certain proteins and the skeletal system, activating certain enzyme and immune systems, and as an important component of energy utilization and growth. Deficiencies of certain minerals can result in severe physical problems for the animals including poor performance and immune status. Therefore, providing adequate supplementary amounts of minerals can increase average daily gain, body condition scores, and feed efficiency in cattle on range.

The most critical time to ensure cattle are receiving adequate amounts of minerals is 90 days prior to calving (3rd trimester of pregnancy) and throughout lactation and rebreeding. If breeding cattle are deprived of adequate mineral at this time, energy utilization will be inhibited and uterine involution may be delayed. Subsequently, estrus will be suppressed and the cow will not be able to rebreed. As a result, more cows will come in open at the end of the breeding season. This will reduce production and economic viability of your operation.

Major minerals

Calcium is required in large amounts in the diet of cows because of the important role it plays in bone and teeth formation. The Beef NRC (1996) recommends the Ca concentration of the beef cow diet to be 0.25-0.27% of diet dry matter. Calcium is particularly important in early lactation because deficiencies may result in the condition known as milk fever. Milk fever occurs when the cow is unable to mobilize enough calcium from her bone for milk production. This lack of mobilization coupled with reduced dry matter intake results in low blood calcium levels. Although this condition is rare in beef cattle operations, some incidences have been observed in cows capable of high milk production. Deficiencies of calcium in cattle can also lead to osteoporosis, a condition where bones become weakened due to prolonged withdrawal of calcium deposits from the bone.

Phosphorus is also important to bone development in the beef cow and is the major mineral of the energy compound ATP, which is the molecule that provides energy to the cells. The phosphorus requirement of beef cows is approximately 0.18-0.22% of diet dry matter (Beef NRC, 1996). Phosphorus receives high consideration in mineral supplementation programs primarily due to the fact that most range forages are low in phosphorus and high in calcium. Due to the fact that most cow/calf operations utilize forage-based grazing systems, a need to supplement adequate phosphorus is critical. Since plants receive minerals from the soil, it is important to be familiar with phosphorus conditions of your soils. For instance, when soils are low in phosphorus,

forage material will also be low in phosphorus. Therefore, the mineral provided to your cattle must contain additional phosphorus. On the other hand, if your soils are sufficient, less phosphorus needs to be supplemented, saving you money.

Potassium needs of the range animal can usually be met mainly by the forage consumed. Potassium requirements are approximately 0.70% of diet dry matter. Potassium functions in the body by activating transport systems that move nutrients in and out of cells. Potassium needs are greatest when animals are stressed such as during transport or high ambient temperatures. The level of potassium following periods of stress should be increased to replenish potassium levels in the body.

Magnesium can be deficient in the early spring when lush pasture growth is utilized by cattle. Providing cattle with additional magnesium prior to turnout is critical to prevent a condition known as grass tetany. It is recommended cattle be given additional magnesium 45 days prior to turnout. Grass tetany incidence increases when cattle are placed on fertilized pastures and when grasses containing high levels of potassium are fed.

Trace Minerals

Trace minerals are just as important as the major minerals to the animal but are sometimes neglected in supplementation programs. Deficiencies in trace minerals in cows can lead to lower reproduction rates and immune compromised calves. Ensuring cows have adequate trace minerals status is especially important when producers retain ownership of calves through backgrounding and finishing. If calves are deficient in minerals, immune function will not be as strong and morbidity and mortality rates will be high.

Zinc activates certain enzyme systems in the cow and is particularly important in immune functions. Zinc has also been implicated as an important mineral for hoof health. The requirement for range cows is 30 ppm in the total diet (Beef NRC, 1996). It is important to remember that zinc and copper are antagonistic to one another. A zinc:copper ratio of less than 3- 4:1 should be maintained.

Copper is an important part of some enzyme systems as well. Copper requirements of beef cows are 10 PPM of the diet dry matter (Beef NRC, 1996). Copper, sulfur and molybdenum can form insoluble compounds known as thiomolybdates, which prevent the copper from being absorbed and utilized by the animal. Therefore, it is important that when grazing cattle in areas with high sulfate containing water and high molybdenum containing soils that the copper concentration in the supplement be increased to ensure the cattle are receiving enough copper. Deficiencies of copper can lead to poor performance, rough and discolored hair coats in cattle and lower resistance to disease.

Manganese functions in skeletal development and has been implicated as a contributor in reproductive efficiency. The cow requirement for manganese is 30 PPM Manganese deficiencies are not common; however it is important to monitor the diet to ensure adequate levels of manganese are being fed.

Iron is a component of the protein hemoglobin in the red blood cells which is responsible for transporting oxygen and carbon dioxide to and from the cells. The iron requirement of beef cows is 30 PPM of the diet dry matter (Beef NRC, 1996). Iron oxide, which provides the red color to mineral, has no value as an iron supplement due to low digestibility. Therefore, eliminating its use will allow more space within the formulation to add digestible ingredients.

Selenium is an important element in reproduction and immune functions. Selenium works in conjunction with vitamin E in reducing damage to cells caused by substances called free radicals. Low selenium diets have been involved in low reproductive performance due to retained

placentas. Also, cattle fed low selenium can develop white muscle disease and have poor immunity due to damage to cell membranes in the muscle and cells involved in the immune system. The legal limit for Se supplementation has been set at 0.3 PPM

Iodine requirements of the beef cow are 0.5 PPM Iodine functions in the thyroid gland and is important in growth and metabolism. Low iodine intake leads to unthriftiness and poor performance.

Cobalt is not utilized directly by the cow but is needed by ruminal microbes to synthesize vitamin B 12, which is used by ruminants to convert propionate to energy. Cobalt needs can be met by feeding a diet containing 0.1 PPM cobalt.

Vitamins

Vitamins are compounds that are involved in many systems throughout the body including energy metabolism, reproduction, nutrient absorption and tissue development and integrity. Vitamins that are needed in supplementation programs include vitamins A, D, and E. The B vitamins, and vitamin K are synthesized by ruminal microbes in sufficient quantities under normal conditions. Vitamin A enhances immunity and decreases the incidence of reproductive disorders. Supplementing cows with 40,000 IU of vitamin A 90 days before and throughout the calving and breeding season can increase conception rates 10 % and decrease calf morbidity by as much as 50 %. Vitamin D is important in Ca and P absorption from the small intestine and in bone formation. Normally, vitamin D is produced when cows are exposed to sunlight. However, supplementing cows with 4,000 IU of vitamin D may be beneficial to replenish stores during the low sunlight days that are common prior to and following the calving season. Vitamin is an antioxidant important in decreasing cell damage by neutralizing free radicals, which are byproducts of metabolism. Deficiencies of vitamin E can lead to white muscle disease in calves and decrease immune function due to free radical damage to immune cells. Supplementing brood cows with 50 IU of vitamin E prior to calving and throughout the breeding season can help to alleviate these problems.

Diet sampling

The easiest way to determine excessive or inadequate mineral content of the plants in your area is to obtain a representative sample of the plants your cows are eating and have it tested by a well respected forage lab. The Nutrition Consultant in your area can then recommend the mineral product that will best suit your particular operation.

Mineral Recommendations

Keep in mind the producer's goals, stage of production with brood cows, yearlings, local concerns of mineral interactions or tie-ups, and weather proof minerals we have available. Work with your local LOLPF representative to get the proper minerals into your market, and build displays to move the meter on sales. Don't forget the 225# mineral tubs, the perfect weather proof minerals!

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