



Trace Minerals Important for Cattle Reproduction

By Jackie Nix

Reproduction is arguably the most important production parameter in attaining profitability in a commercial cattle operation. If cows do not consistently produce a calf every 12 months, your costs per pound of calf raised will increase due to the costs of carrying open/non-productive cows and/or sub-fertile bulls from year to year. Think of your cattle as farmhands. You pay your farmhands a daily wage and in return expect a daily return in terms of work. Similarly, you pay to maintain cows and bulls every day and in turn they need to provide you with milk or meat in order to “earn their keep.”

Good management practices and good nutrition are critical for maintaining cattle fertility. Once energy and protein needs are met, cattle need adequate levels of necessary trace minerals in order to maintain high levels of reproductive efficiency.

But don't they get what they need from forages?

While most cattle receive adequate mineral levels from available forages in order to survive, the vast majorities are not receiving the mineral nutrition needed for high levels of production. An important point to remember is that the mineral content of forages are limited by the mineral make-up of the soils. If it's not in the soil, it can't get into the plant. And while soil types vary, no one soil type provides optimum levels of all the minerals needed by cattle, therefore mineral supplementation is advisable. Other variables such as plant species, plant maturity and climate conditions will also play a role in the mineral content of forages.

When most people think of mineral deficiencies they think of severe clinical deficiencies, which have easily identifiable symptoms (such as white muscle disease in selenium deficiency). However, as shown in Figure 1, subclinical trace mineral deficiencies will adversely affect immunity, reproduction and growth long before clinical deficiency symptoms are observed. Subclinical trace mineral deficiencies are quite common in all livestock (not just cattle) and most producers do not recognize these deficiencies as a problem since they are hard to identify. Animals grow and reproduce seemingly normally; they just do so at reduced rates, more inefficiently and at higher input costs. For these reasons, it is imperative that cattle producers supplement trace minerals in order to maintain efficient production. In many cases, it could be the difference between profitability and loss.

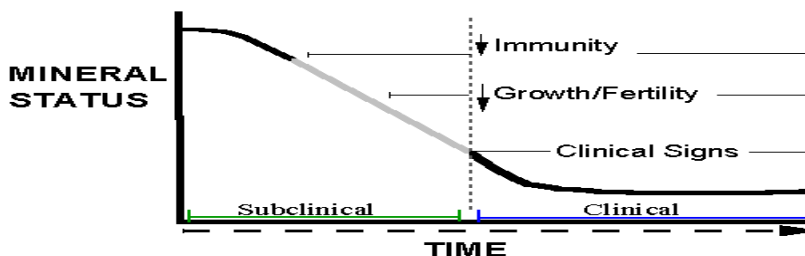


Figure 1. The relationship between mineral status and onset of subclinical and clinical disease symptoms. Based on S. Wikse, 1992. Texas A&M Univ. Beef Cattle Short Course.

What minerals are needed and what do they do?

Minerals are loosely grouped into two categories: the macro-minerals and the trace or micro-minerals. Macro-minerals include: calcium, phosphorus, magnesium, potassium, sulfur and salt and are needed in relatively large amounts in the body. The trace minerals include: cobalt, copper, iodine, iron, manganese, selenium and zinc and are needed in very small or “trace” amounts in the body. While adequate amounts of all of the above mentioned minerals are important to proper nutrition, copper, selenium, and zinc supplementation make the biggest impact on reproduction since they are the trace minerals most likely to be deficient in the diet and therefore, I will focus on these for the remainder of this article

Copper. Copper deficiency is a serious problem for grazing cattle in the United States. Copper is essential for enzyme functions, immunity, connective tissue metabolism and iron metabolism among other functions. It is theorized that reproductive efficiency is reduced due to alterations of enzyme systems caused by low copper levels. Copper deficiency can result in delayed estrus, reduced libido, decreased conception rates, infertility, early embryo death, necrosis of the placenta and central nervous system abnormalities in offspring. High levels of iron, sulfur or molybdenum in the soil or additional feed supplements can further exaggerate these deficiency symptoms.

Newborns are very dependent on copper acquired during the prenatal period since copper levels in milk are poor. Therefore, proper copper nutrition in gestating females is critical to body stores in newborns. Maternal copper deficiency has been linked to increased mortality and morbidity in lambs and calves.

Selenium. Selenium is an anti-oxidant that works in conjunction with Vitamin E to prevent and repair cellular damage in the body. Selenium and/or Vitamin E deficiency has been shown to impair immune response. Selenium is also associated with thyroxine, a thyroid hormone that regulates metabolism, reproduction, circulation and muscle function. Selenium also protects the body from heavy metals by forming complexes to render them harmless. Selenium is readily transferred through the placenta and milk; therefore, a cow’s selenium status will directly affect the health and thriftiness of her calf.

Most of the soils in the U.S. are marginal to deficient in selenium, but there are areas in the Western U.S. that are abundant in plants that accumulate selenium (for example locoweed). Severe clinical selenium deficiency can result in white muscle disease, characterized by stiffness and heart failure. Marginal selenium deficiencies can result in impaired fertility, silent heats, cystic ovaries and the birth of unthrifty kids with poor immunity. Selenium requirements in cattle have been shown to increase under the following conditions: high levels of legumes in the diet, high sulfur intake, low vitamin E intake, and high levels of heavy metals in the diet.

The United States Food and Drug Administration tightly regulates selenium as a result of toxicity concerns. Selenium is highly toxic if excess amounts are consumed. Unfortunately, the amount of selenium required is very close to the toxicity level, thus great care must be taken when supplementing selenium. The maximum level of selenium that can be legally be fed to cattle in the United States is 3 mg per head per day or 0.3 ppm in the total ration (dry matter basis).

Zinc. Zinc is known to be essential for sexual maturity, and onset of estrus. Zinc plays a role in epithelial integrity, meaning that zinc is essential for maintaining the lining of the reproductive organs. Adequate zinc levels are vital for repair of the uterine lining following calving, return to normal estrus cycles and maintenance of the uterine lining necessary for implantation of embryos. Inadequate zinc levels in cattle

have been associated with abortion, fetal mummification, lower birth weights and prolonged labor. Zinc is also vital to sperm quality in males.

Zinc and copper also affect reproduction indirectly through hoof and joint health. Bulls that are lame will not actively seek out cows in heat, follow and mount them. And even if they mount, they may not ejaculate due to associated pain. Therefore, structural soundness of feet and legs is vital to bull reproductive efficiency.

What if I feed trace-mineralized salt?

Unfortunately, trace mineralized salt in loose or block form will not meet all cattle nutritional needs. Trace mineralized salt is mostly salt (typically 92 to 98% salt) and contains relatively low levels of trace minerals as compared to complete mineral supplements. Because of the high salt content, consumption of these supplements will be very low; resulting in sub-optimum intakes of needed trace minerals. In addition, trace mineralized salt does not deliver needed macro-minerals or vitamins. For these reasons, I strongly recommend use of a complete mineral supplement either in a block or loose form.

Think of Mineral Supplementation as an Insurance Policy

Just like you pay every month for car insurance “just in case” you get into an accident, it is best to provide a complete mineral supplement “just in case” your cattle aren’t receiving adequate levels of minerals from forages. The cost of auto insurance seems high until you think about how much an accident would cost, then it seems like a bargain. In the same sense, the cost of mineral supplementation seems high until you factor in the costs in lost profits and reduced production caused by inadequate mineral nutrition. By maintaining high quality pastures you can meet the majority of your cattle’s nutritional needs, but by providing free choice access to a complete mineral & vitamin supplement you can make sure that ALL cattle nutritional needs are being met. For a cost of pennies per day, you can ensure that your production objectives are not being hampered by inadequate mineral nutrition.

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