



Selenium and Beef Cattle

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Wisconsin has soils in areas of the state that are deficient in Se and require supplementation to the cow herd. Selenium deficiency is often due to intake of forages containing marginal or low levels of Se. These forages with marginal or low Se levels typically result from low soil Se levels. Mineral interactions or imbalances can also affect the availability of certain trace minerals. An example of this interaction would be a situation where high sulfur, iron and molybdenum can lead to reduced copper availability. Likewise, because of their similar structure and chemical properties, sulfur and Se are expected to compete for absorption by plant roots and high soil sulfur content may reduce Se forage levels.

Data reported by NAHMS from a 1992 sampling of beef cows reported that cattle in the central area of the U.S. (IA, MO, AR, NE, TX, KS, OK) indicated approximately 10% of the samples collected were marginally to severely deficient in Se. According to a 1967 map by Kubota et al. the states representing the herds sampled by NAHMS had soils, for the most part, that were considered adequate for Se while the map shows most of WI to be low or variable for Se indicating a greater risk of low Se status in the cow herd. It is important to consider the large variability that exists in soil types within Wisconsin and consider that Se concentration in forages grown on these varying soils may differ.

Selenium deficiency symptoms may include white muscle disease in calves, retained placentas, low fertility, abortions, poor weight gain, and lowered immune response. Selenium has a narrow range between adequate and toxic levels. Therefore, Se supplementation is regulated by the Food and Drug Administration and can not exceed 120 parts per million (ppm) or an intake of 3 mg per day when delivered in free-choice mineral supplements. The 1996 National Research Council publication "Nutrient Requirements of Beef Cattle" lists the Se requirement for beef cattle at 0.10 ppm and the maximum tolerable level at 2.0 ppm.

Selenium supplementation may be offered in a variety of forms. The most common method of delivery is via free-choice mineral supplements. The form of Se in these products is typically an inorganic source from sodium selenite or sodium selenate and both forms are reported to have a high bioavailability. However, availability of Se may be reduced for cattle through the production of insoluble forms in the rumen. Selenium in most feedstuffs (i.e. forages, grains, etc...) is complexed with methionine as selenomethionine and readily available. Studies have illustrated Se supplemented as an organic form (selenomethionine or yeast-containing Se) was more available than inorganic sources as indicated by increased blood and milk concentrations. An injectable form of Se is also commonly utilized by producers in areas of Se deficient soils. These products provide a rapid response and assurance that each animal receives Se. Typically, these injectable products provide Se for a 28 to 45 d period. These products are also

effective in providing Se to calves as Se transfer via milk is reported to be poor. Sustained release boluses that are retained in the rumen and release Se at a constant rate for a length of time of approximately 5-6 months are also approved. However, such products are currently unavailable in the United States.

Selenium supplementation strategies require an understanding of what the potential threat for deficiency is. Soil tests and/or at least forage analysis will provide important information related to the potential risk of Se inadequacy in the beef cow-calf herd. Strategies may require utilization of more than a single delivery route as indicated by the above two examples in which Se fortified free-choice mineral supplements did not eliminate Se deficiency. If Se deficiency is suspected, visit with your veterinarian regarding testing. Additionally, because Se can be toxic, excessive supplementation is not advised and products should be used according to the label.