

Manganese

Manganese is needed in the body for normal bone structure, for reproduction and for the normal functioning of the central nervous system. It is found stored primarily in the liver and kidneys. Its functions are believed to be in the activation of several enzymes.

Studies with dairy cattle indicate that 40 ppm of manganese in the ration would appear to meet the requirements with a margin of safety. Most dairy rations contain levels of manganese in excess of the suggested requirements. This is especially true where forages are available. Excessive amounts of manganese in the diet increase blood lipids and cholesterol and change the composition of fatty acids in the blood, liver and heart which could affect their normal function.

General symptoms of manganese deficiency include impaired growth, skeletal abnormalities, disturbed or depressed reproductive function, nervous disorders of newborn, and defects in lipid and carbohydrate metabolism.

Copper

Copper is essential to the activity of certain enzymes and, along with iron, is necessary for the synthesis of hemoglobin. It is also an important element for normal immune function. Low copper status may contribute to increased susceptibility to infections such as mastitis. Studies have shown that liver copper stores decrease dramatically in late pregnancy, and reach their lowest point five weeks prior to calving.

A variety of copper deficiencies have been reported, including anemia, retarded growth rate, failure to fatten, loss of body weight, diarrhea, and depigmentation of hair. A characteristic of copper deficiency is a swelling of the ends of the leg bones above the pasterns.

A recent study in Florida showed that 11% of animals on nine dairies were deficient in copper, while 52% had marginal copper status. Only 38% of the cattle had normal copper levels. According to the study, heifers and dry cows in particular had marginal or deficient copper levels in their blood and livers. Some Florida soils are high in molybdenum which is a copper antagonist.

Most data indicate that rations containing 10 ppm of copper are adequate. In areas where rations may be fairly high in molybdenum and sulfate, the copper requirement may be increased two-fold.

Zinc

Zinc is closely associated with a number of enzymes in the body and is a component of the enzyme carboxypeptidase and the hormone insulin. It appears that zinc is required for normal mobilization of vitamin A from the liver. This is verified by the fact that skin lesions and corneal changes in zinc deficient animals are similar to those occurring in animals deprived of vitamin A. In calves, a zinc deficiency has resulted in leg and bone disorders, parakeratosis, impaired vision, and rough and thickened skin.

Zinc deficiencies reported are similar to many other nutrient deficiencies. This observation indicates that zinc is probably involved in the metabolism of one or more nutrients. A number of sources of zinc are available.

Supplemental zinc in organic form has often been beneficial in prevention of, and as a therapeutic aid to, hoof problems of dairy cattle and of foot rot. The role of zinc in maintaining skin tissues and the inflammatory response is probably responsible for this effect.

Cobalt

Cobalt is a component of vitamin B₁₂ and therefore affects blood formation. A nutritional anemia in cattle and sheep living in cobalt-deficient soils has successfully been treated with cobalt. Microorganisms in the rumen of these animals utilize cobalt to synthesize B₁₂.

Adding cobalt and copper to the diet of ruminants has been shown to increase rumen microbial activity and enhance digestion of some forages. A general recommendation for ruminants is 1 mg per day per 1000 lbs body weight. Converted to ppm, a total level of 0.1 to 0.15 ppm in ruminant rations should be adequate to prevent any possible cobalt deficiencies.

Cobalt carbonate has been reported to be a good source of cobalt. Other sources are cobalt sulfate and cobalt oxide.