



# Importance of Copper for Cattle Fertility and Health

By Jackie Nix

## Copper Deficiency a Common Problem

Marginal to severe copper deficiency in cattle is widespread across the United States, especially in the Appalachian mountain and Coastal plains regions. Typical deficiency symptoms include: rough, discolored hair coats (See Figure 1); winter coats that are slow to shed; decreased conception rates; increased days open; hoof problems; depressed immunity; anemia; reduced growth rate and, in some cases, diarrhea. Copper deficiency in cattle is brought on by a combination of factors including: low soil copper levels; high soil concentrations of minerals known to antagonize copper; plant effects and breed factors.

Forage surveys conducted across the United States overwhelmingly reveal forage samples that are marginally to severely deficient in copper (See Figure 2). Additionally, a high number of samples contain levels of antagonistic minerals (sulfur, molybdenum and iron) high enough to induce copper deficiency in cattle (See Table 1). These antagonistic minerals bind with copper making it unavailable for use by cattle. Excessively high levels of these minerals will increase copper requirements in cattle. In other words, when these antagonistic minerals are excessive cattle will need more copper in order to meet their nutritional needs.

Copper levels in forages are not only dependent on mineral levels in soils but also the forage type and maturity. Grasses tend to be lower in copper than legumes grown under the same conditions. Also, copper concentrations are higher in leaves compared to stems. Therefore, as a plant becomes more mature (stemmy) its value as a copper source decreases.

In addition to presence of antagonistic minerals, forage type and forage maturity, breed also influences the need for additional copper supplementation. For example, Simmental and Charolais cattle have higher copper requirements than Angus cattle under the same conditions. For all of the above reasons, many situations exist in which cattle respond favorably to copper supplementation.

## Why is Copper so Important?

Copper is needed by a variety of key systems in the body. Numerous enzymes necessary for reproduction, immunity and growth need copper. In addition, copper is necessary for proper metabolism of iron, maintenance of connective tissue, pigmentation of skin and hair, maturation of hoof tissue, and many other functions.

## Copper and Immunity

Proper copper nutrition is essential for a healthy immune system in cattle. Copper is needed for proper development of antibodies and white blood cells in addition to antioxidant enzyme production. Copper deficient cattle are more susceptible to infections and do not respond as well to vaccinations. In addition, they tend to be less resistant to parasitic challenge. Studies have shown that cattle receiving proper

copper nutrition tend to be less susceptible to infections and have less severe infections when disease does occur.

### **Copper and Reproduction**

Reproductive problems cost beef producers about \$15.00 per cow per year. This translates into \$750 per year for a 50-cow herd. It is widely known that copper deficiency in cattle results in reduced reproductive efficiency and performance. It is theorized that low copper levels alter enzyme systems involved in reproduction. Typical copper deficiency symptoms include decreased conception rates, increased days open, increased cases of retained placenta, delayed puberty, and increased repeat breeders in cows and decreased libido and semen quality in bulls.

Proper copper nutrition in pregnant females is critical to the health of newborn calves. Newborns are very dependent on copper acquired during the prenatal period since milk is a poor source of copper. Calves have a high copper demand during the first few months of life. Additionally, copper status in the dam is critical to the production of high quality colostrum. Colostrum provides passive immunity for the calf until its own immune system develops fully. Also, copper nutrition has been shown to be an important component in a newborn's ability to withstand cold stress. Calves born to copper deficient cows experience increased death losses, reduced growth, reduced immunity and poor production efficiency.

### **Copper and Stress**

Stress increases an animal's mineral needs and tends to exacerbate existing mineral deficiencies. This is especially important with weaned calves. Studies have shown that copper deficient calves have more health problems, gain weight less efficiently and have lower net returns. For this reason it is vital that calves receive adequate mineral nutrition BEFORE weaning because even a proper mineral program cannot overcome existing mineral deficiencies once stress sets in. Calves going into stocker or feedlot situations will perform better when they have received adequate copper nutrition prior to weaning.

### **How Can I Provide Enough Copper for My Cattle?**

The key in providing adequate copper is to provide YEAR-ROUND access to a free choice mineral that contains sufficient copper. The amount that is sufficient will vary according to current mineral status of your cattle, soil mineral levels, season, breed of cattle, etc. Do not skimp on mineral supplementation during spring and summer months when forage quality is good. Remember that most soils are deficient in copper so the forages grown on those soils will be deficient too. It is also important to eliminate use of yellow sulfur salt blocks. These sulfur blocks can artificially increase sulfur levels to the point of inducing copper deficiency.

Cattle producers who have observed the following symptoms in their cattle: rough, discolored hair coats (red tinge on black hair or loss of pigment around the eyes); winter coats that are slow to shed out; decreased conception rates; increased days open; hoof problems and/or depressed immunity should consider use of one of the **Sweetlix<sup>®</sup> CopperHead<sup>™</sup>** mineral supplements for cattle. These mineral supplements are scientifically formulated to combat copper deficiency in cattle.

All CopperHead supplement products deliver enhanced levels of copper as well as balanced levels of other essential minerals and vitamins. The CopperHead line of mineral supplements contains organic forms of not only copper, but also zinc, manganese and cobalt for optimum bioavailability and thus optimum productivity. Organic minerals are particularly beneficial during times of stress such as calving, lactation and weaning. Sweetlix CopperHead supplements also now have the added advantage of **RainBloc<sup>™</sup>** for improved resistance to moisture.

### **CopperHead Max 16:8 with RainBloc**

- Enhanced levels of trace minerals for maximum productivity
- Contains 2500 ppm copper for enhanced copper nutrition
- 2:1 Ca to P ratio (16% Ca : 8% P)
- Ideal for brood and growing cattle on summer pastures

### **CopperHead Max 12:4:14 with RainBloc**

- Enhanced levels of trace minerals for maximum productivity
- Contains 2500 ppm copper for enhanced copper nutrition
- High magnesium to help protect against grass tetany
- Ideal for brood cattle on spring or fall pastures

### **CopperHead Max 12:12 with RainBloc**

- Enhanced levels of trace minerals for maximum productivity
- Contains 2500 ppm copper for enhanced copper nutrition
- High phosphorus for enhanced growth and reproduction
- Ideal for growing and brood cattle on forages known to be low in phosphorus

### **6% CopperHead with RainBloc**

- Contains 1800 ppm copper for enhanced copper nutrition
- Moderate phosphorus level – 6%
- Highly palatable, economical supplement
- Ideal for summer pastures and when hay is being fed

### **CopperHead Hi Mag with RainBloc**

- Contains 1800 ppm copper for enhanced copper nutrition
- High magnesium for protection against grass tetany
- Highly palatable, economical supplement
- Ideal for brood cattle on spring and early fall pastures

### **6% CopperHead LS with RainBloc**

- Low salt version of the original 6% CopperHead
- Ideal for coastal regions with high soil salt levels
- Logical choice for coastal cattle that have had mineral consumption problems in the past

Any of the **Sweetlix CopperHead** minerals will work especially well in conjunction with use of **Sweetlix Poured Protein Blocks** as a part of a balanced overall winter-feeding program. Ask for **CopperHead** by name at your local Sweetlix dealer or call 1-800-325-1486 to learn more about these and other Sweetlix supplement products for cattle.

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Figure 1. An example of a calf displaying a rough, discolored hair coat typical of copper deficiency. Note the red tinge on the hair.

## Percent of Forage Samples by Copper Level Classification

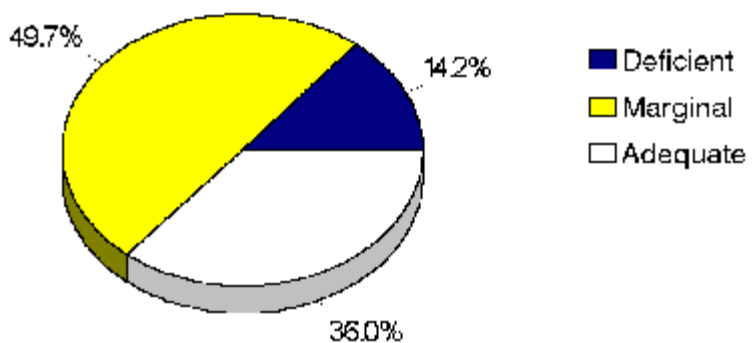


Figure 2. Copper levels in forage samples conducted during a USDA forage audit in 1992. Almost 64% of all forage samples ranged from marginal to severely deficient in copper.

Mineral	Spring Level	Summer/Fall Level
Copper (ppm)	8.54	6.76*
Calcium (%)	0.48	0.54*
Phosphorus (%)	0.43	0.38*
Sodium (%)	0.01	0.01
Magnesium (%)	0.21	0.32*
Potassium (%)	2.73	2.65
Sulfur (%)	0.25	0.31*
Manganese (ppm)	101.10	112.52
Zinc (ppm)	23.61	27.01

\* Mineral levels that were statistically different between Spring and Fall samples (P<0.05 level of significance).

Table 1. Mineral levels in Fescue samples from a 2001 Forage Mineral Survey conducted by the University of Tennessee.