



Antagonisms Of Copper And How To Overcome Them

Antagonism of a mineral is when one mineral interferes with the utilization of another mineral. Copper antagonisms have become readily talked about over the past ten years. Copper deficiencies aren't just isolated to one area of the country. At least marginal deficiencies have been reported from the East Coast to the western mountain states.

University of Tennessee researchers did a ten-year study to find out why purebred black cattle in the state had hair coats with a reddish tinge that didn't shed off. They also noticed lower conception rates and more pinkeye problems in the cattle. These are some of the visual systems that show up with a copper deficiency. They tested blood samples from cattle in 20 herds in the state and found that 92% of the samples were marginally deficient for copper – less than 10 ppm. It has to be an extreme deficiency to detect a copper deficiency in the blood. Liver biopsies are the only reliable way to do so.

They questioned the low levels of copper in the blood. Why were they also lower in the fall of the year? Fescue toxicity, so often blamed for the rough, discolored hair coats, was partially responsible. Virginia Tech discovered the endophyte fungus found in fescue depresses copper availability.

The big problem in Tennessee was sulfur. Sulfur, along with molybdenum and iron, are known for tying up copper and making it unavailable to plants and animals. The forages showed sulfur levels high enough to tie up copper in 90% of the samples.

Texas A&M did a study in the late 1990s showing 90% of the forages in a nine state area were either

deficient or marginally deficient in copper. They looked at all the forage samples tested in the major testing labs in those states over a period of time. The average level of copper was 5 ppm in cool season perennials.

In other parts of the country, there is a reported increase in lameness, pinkeye, conception rates, and early abortions in cattle. Observations in these cases show that cattle are not consuming enough of the mineral to meet their needs. They should consume 3-6 oz per head per day of a good, balanced mineral. In the herds where these symptoms are being reported, the consumption level of the mineral is less than 2 oz. In the case of lower consumption, check the potassium level in the forage. In a recent study, the University of Minnesota found that potassium mimicked the flavor of salt, and since salt is the only mineral that cattle will eat at a level to meet their needs, the high potassium in the forage will lower the intake of free choice mineral. Most of the cattle in these cases were grazing cool season perennial forages.

When a copper deficiency occurs, check the level and the sources of the copper in the mineral being fed. Raising the level of copper may or may not have a positive effect on copper utilization. The ratio of copper and zinc, along other antagonists, must be considered. Copper oxide is not considered a very available source. Copper sulfate and copper carbonate are more effective. Also, the breed of the cattle must be considered. The Jersey breed is more susceptible to copper toxicity. Some levels we recommend for beef cattle and Holsteins will kill a Jersey.

In some cases, a copper deficiency may not be overcome by using inorganic sources of copper. In a situation like this, a producer may have to use a

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chelated source of copper. A chelated mineral is one that has been bonded to amino acids. Amino acids are highly absorbed across the gut wall – as high as 95%. When this happens, the attached copper will be pulled across the gut wall along with the amino acid.

The chelation process stabilizes the mineral so it is less likely to be tied up by the antagonistic mineral, making it more available for utilization by the animal. By using organic (chelated) copper, a deficiency may be overcome using a lower level of copper in the mineral.

In an Oklahoma State University breeding trial in 1988, second and third calf cows had three times higher first service conception rates than the control group. Even with the higher cost of the mineral with the organic mineral included, it appears the use of the chelates in a commercial herd would be economically feasible.

Finding and treating a copper deficiency is not easy and can be deadly if not approached properly. Be sure to use all the resources you have available to you. Qualified veterinarians and nutritionists can be very helpful in finding the source of a deficiency.