

# Copper deficiency: The Profit Robber

by Heather Smith Thomas

**C**opper deficiency can create several problems and can be hard to recognize. One of the more visible signs is change in hair color. Black animals may develop a red tint, brownish streaks or grey around the eyes. Hair is dull and coarse instead of shiny.

Clive Gay, a veterinarian at Washington State University, says other indications of copper deficiency are decreased weaning weights and more diseases in calves due to impaired immunity. The incidence of scours and abomasal ulcers is increased in calves born to copper-deficient dams.

Lameness and a stiff gait in calves are also indications. Fetlock joints may become enlarged and painful. Pasterns may be upright; the calf might appear to have contracted tendons, walking on its toes. Bones become fragile; calves may suffer leg or shoulder blade fractures when being processed through chutes or in other situations where you would not normally expect to see fractures.

Fertility in heifers may be impaired, especially when copper is tied up by molybdenum and is unavailable to the body. A study in 1987 indicated dietary molybdenum delayed puberty 8-12 weeks in yearling heifers and dramatically reduced conception rates in cows.

Copper-deficient impaired immune systems do not respond well to vaccines. When calves are weaned, vaccinated and go on feed, vaccinations may not be effective. More calves succumb to respiratory diseases. Even if a calf is not treated for clinical disease, it may not gain well, suffering from "silent" pneumonia.

## Primary vs. secondary

"Primary deficiency occurs when copper levels in soil and forages are low," Gay explains. Secondary deficiency occurs when copper concentrations in forages are normal, but something interferes with the body's ability to utilize it. This commonly occurs with the presence of molybdenum, sulfur or iron.

"In the West we have problems with molybdenum. This is common with alkaline soils. Molybdenum uptake by plants is

influenced by the pH of the soil," Gay says. "In the East, soils are more acid, and producers have problems with primary copper deficiency. Other soils with risk are peat, organic soils or high water tables, depending on pH. Sulfur tends to combine with molybdenum but can be a problem by itself, especially in acid soils, or in conjunction with lime fertilizer. Molybdenum is often a problem in valley bottoms. There is more molybdenum in these soils than in uplands."

In the South and Southeast many soils are low in copper. The problem is often accentuated by the use of fast-growing species of grasses; they don't have time to pick up as much copper from the soil as do slower-growing grasses.

## Testing calves

"Test calves before they are weaned. Weaning stress, especially if calves get sick, can disturb copper values. You won't get an accurate test," Gay says. "There is some argument that liver tests (biopsies) are more accurate than blood tests, but we've found blood tests [to be] effective."

Cattle on copper-deficient pasture will start to show low copper concentrations in the blood by mid-season. "Don't wait until fall to test, or it's late to correct it for those calves. If you test too early, the deficiency may not show up yet," Gay says, adding that it is best to test in the middle of the grazing season.

"To tell if you have primary or secondary deficiency, take a composite forage sample from each soil type. Molybdenum is taken up in higher concentrations in legumes than in grass. Look at the copper-to-molybdenum ratio," he explains. The best diagnosis is a response trial; supplement the cattle with copper and see if weight gains improve. They should be tested again the following year to see if you have, in fact, repaired the deficiency, he says.

## Treatment

The common way to deal with copper deficiency is to put copper in a salt/mineral mix, but some animals won't consume

enough that way. Cattle don't eat much salt when grazing on alkaline soils.

"The best method we've found is copper oxide needles — very tiny needles inside a gelatin capsule, put into the rumen," Gay says. "The gelatin dissolves and the needles are released, lodging in the papillae of the rumen. They gradually pass into the abomasum where they slowly dissolve, and the copper is made available for absorption. One bolus, given at the beginning of the grazing season, will prevent copper deficiency for six months."

Products for treating with an injection or by drench, dosing each calf early in the grazing period, are also available. Individual treatment by bolus, injection or drench is the best way to make sure each animal gets the proper dose.

Chelated minerals are better utilized by the body than is copper oxide powder, which goes through the gut too fast without being absorbed. And chelated minerals are less toxic than copper sulfate.

"If you supplement, test the cattle afterward, preferably in August or September, to be sure the copper level you have added is sufficient to correct the deficiency," Gay recommends. "If you have high molybdenum concentrations, you need substantially more copper supplement than if you have a simple copper deficiency."

You must add the right amount to a mineral mix. Too little or the wrong kind does no good. Though cattle are relatively resistant to copper poisoning, Gay says, too much can eventually be toxic. A commonly used supplement, copper sulfate is toxic in itself if cattle eat too much.

Most cases of copper toxicity occur when excess copper builds up over time. The animals seem normal for a while, but if you keep feeding too much copper, eventually too much accumulates in the liver and poisoning becomes evident. Work with a veterinarian and a nutritionist or with your state or county Extension agent to make sure you are on the right track and are giving the cattle the proper amount of supplement for your specific forage conditions.