

Copper Toxicity

Frank Craddock

Copper is an essential element required by a number of enzymes involved in specific oxidase type reactions:

- Derived from plants (5-20 ppm)
- Legumes are higher than plants
- Absorbed in the intestinal tract and stored in the liver (40-70%)
- Normal copper levels are from 0.7-2.0 ppm

Copper Poisoning in feeder animals is often the result of feeding improperly formulated mixed diets:

- Closely related to molybdenum toxicity
- Sheep are 10 times more susceptible than cattle
- Many outbreaks can be traced to feeding supplements that have been formulated for cattle and swine

Causes and Disease Process:

- Triggered by stress
- Excessive copper stored in the liver (>15ppm)
- Hemolytic crisis – destruction of red blood cells

Clinical Signs:

- Chronic copper poisoning appears as an acute hemolytic crisis with death occurring in 24-48 hours
- The animals suddenly go off feed and become weak
- Mucous membranes and white skin are yellowish brown
- Hemoglobin in the urine is a dark red-brown color
- The number of animal in a group may be low (5-10%), the death of an infected animal may reach 75%

Postmortem Findings:

- Pale tan liver
- Dark green/black kidney

Diagnosis:

Very few conditions cause a severe hemolytic crisis. Phenothiazine and onion poisoning cause similar symptoms.

A definite diagnosis relies on copper serum or copper tissue levels.

Feed samples should be analyzed for copper and molybdenum concentrations before feeding.

Treatment and Prevention:

- Source should identified and removed immediately
- Avoid stressful conditions
- Treatment is based on inactivating the copper with molybdate and sulfate
- Drench with electrolytes and sodium thiomolybdate to flush kidneys and bind copper at a rate of 1 quart per hour