COPPER TOXICITY IN SHEEP

Sheep are unique in the way they utilize copper. Copper is required by all farm animals and it can be potentially toxic to all farm animals. However, sheep are the most susceptible of all farm animals to copper toxicity. Copper status of sheep is influenced by breed, age of sheep, health status of sheep, levels of other minerals consumed, and even levels of some feed additives in the diet.

It quickly becomes apparent that copper nutrition in sheep can be pretty complicated. In the diet of sheep, the presence or absence of other minerals and some ionophores affects the copper metabolism of sheep. Especially the level of molybdenum and sulfur in the diet. Molybdenum and sulfur act as antagonists to copper. The presence of these compounds bind with copper and prevent gut absorption and increase excretion of absorbed copper in the liver and body tissues. Molybdenum is often added to sheep diets to try to help prevent copper toxicity. However, molybdenum added at too high of levels can actually result in sheep having copper deficiency. Also, feeding ionophores to sheep can result in increased efficiency of copper absorption by sheep.

Sheep have a narrow range between required levels of copper and levels where copper toxicity can occur. Depending on breed, sulfur and molybdenum levels in the diet, in general, sheep need four to eight ppm of copper in the diet. A sheep diet of 80% mix hay and 20% grain mix can have a copper level of 14 to 16 ppm, without adding any copper to the diet. It is easy to see why copper toxicity can be a problem. However, sheep with molybdenum levels at three ppm or higher in the diet can usually tolerate 20 to 25 ppm of copper. Sheep fed diets lower in molybdenum than this tolerate lower levels of copper.

There are two distant states of copper toxicity: acute or chronic. The acute state occurs quickly, usually after ingestion of high amounts of copper. The chronic state occurs when sheep are fed diets over a period of time that are marginally higher in copper content relative to the level of copper antagonists in the diet. Depending on the actual copper intake by the sheep, this could be over a period of weeks or months. Copper buildup in the liver occurs because sheep do not excrete copper from the body as efficiently as other farm animals. Sheep bind absorbed copper tightly in the liver. When the liver becomes saturated with copper, tissue damage occurs and large amounts of copper are released into the bloodstream. This causes the death of red blood cells and subsequent tissue damage. Mucuous membranes turn yellow and bloody urine may be passed. However, often the first noticeable sign of copper toxicity is dead sheep. This many times may follow some stressful event for the sheep.

The most practical method of dealing with this problem is to prevent copper toxicity. This entails communicating with feed company representatives supplying feed. Carefully investigate copper levels in feeds. Some feeds will have high levels of copper while others will not. Do not feed swine or poultry feed to sheep. Avoid grazing sheep on pastures where swine or poultry waste is applied.