



## **The Effect Of Increasing Dietary Sulfur Levels On The Performance Of Young Growing Animals**

As a cattle producer goes about his daily activity of feeding his growing animals, whether it is beef or dairy, probably not much thought is given to the level of the mineral sulfur in the diet. Sulfur does play a major role in the performance of cattle. Sulfur is a required mineral by all animals where it plays a major role in energy, protein, and fat metabolism. However, this is a case where more is not always better. The sulfur requirement is set at 0.20% of the dietary matter (2001 Dairy NRC). Some research has shown that when feeding diets in excess of this level, there was a decrease in dry matter intake and average daily gains, but in more recent research trials this decrease has not been noticed. Excessive levels of dietary sulfur can interfere with copper and selenium absorption.

Dietary sulfur can come from many sources. Corn byproducts such as distillers grains, corn steep liquor, and corn gluten feed tend to contain moderate to high levels of sulfur.

With the increase in ethanol production and with higher levels of distillers grains and corn gluten feed being fed to cattle, sulfur toxicity has to be more of a concern to the producer.

One of the major challenges for producers using corn byproducts is the variation in nutrient concentrations in the product. We have known for a long time that corn gluten has a large variation in nutrient content for protein. The reported range has been from 14% to 26% protein in corn gluten feed. In a study of distillers grains coming from the ethanol plants, a South Dakota State University study reported they found variations in

nutrient content in product coming out of the same plant. There also was significant variation in product coming from different plants.

Some ethanol plants provide product specifications with guaranteed nutrient contents; however, these values are only estimates of the minimum or maximum nutrient content. Testing each load of byproduct is the preferred method of determining the nutrient content of the product. Sulfur variations in dried distillers grains with solubles have been found to range from 0.27% to 1.06% of the dry matter.

Excessive levels of dietary sulfur can result in lower daily gains and feed efficiency in both beef and dairy animals, but more importantly it can cause complications and death of the animal. Acute sulfur toxicity causes Polioencephalomalacia (PEM), a noninfectious central nervous system disorder. It is defined by symptoms of blindness, head twitches, circling, coma, and death. It is most often seen in young growing animals. PEM has historically been associated with impaired thiamine utilization. It appears that excess sulfur interferes with thiamine utilization in the rumen. Oklahoma State University ran a study on the effect of different levels of dietary sulfur on the incidence of PEM. They used 14 beef heifers weighing approximately 400 lb in a completely randomized design to evaluate the effects of three levels of dietary sulfur. Corn gluten feed was used as the base feed. The corn gluten feed contained 0.445% sulfur and cottonseed hulls were used to reduce the sulfur level to 0.386% in the basal diet. The three treatments were 0.386% sulfur

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designated as moderate (M), 0.5540% sulfur designated as moderately high (MH) and 0.701% sulfur designated high (H). Ten of the heifers developed PEM during the 37 days the trial ran. The first two cases occurred in the first two weeks and five cases occurred in the last three days of the study. All of the ten heifers that developed PEM were in either the MH group or the H group. When an animal showed symptoms of PEM, it was euthanized within 36 hours and checked for microscopic lesions to confirm PEM. At the end of the study the remaining four heifers, all in the M group that was fed the 0.386% sulfur level, were euthanized and found to have brain lesions even though they did not develop clinical PEM. There

was no difference in feed intake between the groups in this study. There was no acclimation to the high sulfur levels as evidenced in the five heifers showing symptoms in the final three days of the study.

Based on information in the literature, there is the opinion that the NRC 2001 maximum feeding level of 0.4% sulfur in the diet should be lowered to below 0.35% or maybe even lower as there is some research showing lower rate of gains on diets as low as 0.25% sulfur content. Also, it's best to test each load of corn byproduct and balance the diet accordingly. Feeding additional thiamine in the diet may be of benefit to the animal.