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Contribution of forage sulfur to grazing cow mineral status following ammonium sulfate application

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This past spring I have received numerous questions regarding the use of ammonium sulfate as a nitrogen fertilizer source. The questions are related to the potential for sulfur toxicity in grazing cattle. This month's Ona report is a good time to discuss this issue and clarify some simple, albeit important, management concepts.

Research from the Range Cattle Research and Education Center has shown that bahiagrass yield may be increased with the inclusion of sulfur in a fertilizer application. The use of ammonium sulfate as a nitrogen source is a good method of supplying both nitrogen and sulfur from a single source. Our data suggest that a yield response may be achieved when existing forage sulfur concentrations are below about 0.20% sulfur on a dry matter basis. When concentrations exceed this threshold, a yield response is unlikely, although the bahiagrass will typically continue to accumulate sulfur in its tissue. An example of these data can be seen from the results of a three year study conducted on established bahiagrass pastures near LaBelle, FL. In that study, the annual application of ammonium sulfate fertilizer (60 lb nitrogen per acre) increased bahiagrass yield only in the first year when initial plant sulfur concentrations were less than 0.20%, but produced a substantial increase in plant sulfur concentration each year, which averaged 0.50% over the three-year study.

The resulting accumulation of forage sulfur is the point of concern that needs explanation. Typically, the accumulation does not reach a great enough concentration to impact grazing cattle; however, when concentrations reach or exceed 0.30 % then consideration to withholding any additional sulfur should be made. These conditions will impact trace mineral metabolism, specifically copper and selenium, which are two of the most limiting trace minerals in Florida's grazing cattle. Cows from study pastures that received ammonium sulfate fertilizer had lower liver copper concentrations at the end of

the grazing season compared to ammonium nitrate and no-fertilizer (72, 137, and 204 ppm copper for ammonium sulfate, ammonium nitrate, and no fertilizer, respectively). Liver copper concentrations greater than 125 ppm are considered adequate, 75 to 125 ppm are marginal, and less than 75 ppm are deficient.

The decision to apply ammonium sulfate to bahiagrass pasture should be based on plant sulfur need and cost per lb of nitrogen compared to other nitrogen sources. Ammonium sulfate fertilizer may improve bahiagrass yield when initial plant sulfur concentrations are below 0.20%. Application of ammonium sulfate will increase forage sulfur concentration. If this increase in forage sulfur causes the total diet to exceed 0.35% sulfur, there may be a decrease in cow response to copper and selenium supplementation. In addition to forage, there are other sources of sulfur contributing to the total diet. These include, 1) water, 2) supplemental feeds, and 3) mineral. For additional information on sulfur fertilization of bahiagrass, see the The Florida Cattleman and Livestock Journal, Ona Report, May 2003. The following general guidelines can be used to assist producers in making choices relative to the application of sulfur through fertilization.

Table 1. Guidelines for assessing the influence of existing forage sulfur concentrations and subsequent sulfur fertilization on established bahiagrass yield and cow mineral status.^a	
Forage sulfur	Comments
< 0.20 %	Yield of established, grazed bahiagrass may be improved by the application of sulfur, such as ammonium sulfate
0.20 - 0.30 %	This is the normal sulfur range found in Florida bahiagrass. Bahiagrass containing sulfur within this range will not likely benefit from additional sulfur application. As well, the trace mineral status of cattle consuming this forage will not likely be impacted as a result of dietary sulfur. Nitrogen fertilization decisions should be made based on cost per unit of nitrogen.
>0.30 %	Excess sulfur concentration for established, grazed bahiagrass. This sulfur content will antagonize copper and selenium metabolism in grazing cattle. Additional sulfur should not be added.
^a Forage sulfur values are expressed on a dry matter basis. Forage samples should be collected during the growing season and should comprise of green plant leaves. Sulfur analysis of forage can be conducted at a number of private laboratories for about \$8 to \$12 per sample.	

