

S-06-06

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Drought Stressed Corn and Forage Sampling for Nitrate Analysis

With a late spring and early summer drought gripping most of Alabama, many non-irrigated corn fields will not be harvested for grain. Many will be used for forage, either grazed or cut for hay, haylage or silage. Anytime a heavily fertilized grass (including corn) is drought stressed, high nitrates can build up in the forage leading to nitrate poisoning in cattle. This may be especially true with corn heavily fertilized with broiler litter. The only way to be

certain that drought-stressed forage is safe is to have it tested for nitrates.



Photo of drought-damaged corn taken 6/19/06 by Brandon Dillard, REA, Houston County, Alabama

The Auburn University Agricultural Services Lab (Soil Testing, Feed and Forage Analyses, etc.) has already tested several dozen samples for nitrates this spring and found high nitrates in some drought stressed corn forage samples.

Sampling Drought-stressed Corn Plants

Reliable results depend upon good sampling. The idea is to get a

representative sample of what will be used for animal feed. Cut whole corn stalks a few inches above the ground at about the height a cutter bar would cut - somewhere between about 4 to 8 inches above the soil surface. About 6 to 10 stalks collected from about the field should be sufficient. (More stalks yield large amounts of green material that must be dried before further processing.) If corn plants are to be grazed, split the stalks into tops and bottoms. Animals may graze the leaves but leave the stalks. Sample the stalks from the ground to the topmost earleaf. This should be considered the "bottom" sample. From the ear leaf to the top of the plant would be the "top" portion. Severely stunted corn should not be split but treated as one whole plant.

Sampling Pastures and Hayfields

Grass forages may be sampled by cutting all the grass from a one square foot area in multiple (10 to 20) areas and combining all into one sample to be submitted. Cut grass forages to leave as little stubble as possible (about 1 inch) as might a cutter bar on a hay mower, or a grazing animal.

A single sample collected in one relatively small area can yield enough material for analysis, but might not truly reflect conditions across an entire field, and wouldn't be worth the time spent to take and package the sample.

Understanding the Results

Auburn University's Agricultural Services Laboratory reports nitrates in forages on a dry basis as nitrate-N with a working range as follows:

0 to 1500 ppm nitrate-N – SAFE. Generally safe in the lower end of the range; avoid feeding to pregnant or lactating animals in the upper end of the range.

1500 to 5000 ppm nitrate-N – CAUTION. Use caution, but may be fed with limitations.

>5000 ppm nitrate-N – TOXIC! Consult with your Extension agent or specialist concerning your specific circumstances. Feeds containing toxic levels may be used in a controlled feeding setting without harming the animals being fed.

Other Considerations

- Under drought conditions plants can and do accumulate nitrates; with a little rain the plant will put on growth and deplete nitrates to tolerable, acceptable levels within a very few days. Once dormant, however, the nitrate level does not change appreciably and won't change even after long storage dried in a barn. Similarly, silage and haylage made of material that is high in nitrates when cut will still have high levels of nitrates once the ensiling process has been completed. There may be some reduction of the level of nitrates in the ensiling process, but it is dangerous to let wishful thinking lead us to assume that nitrates will be reduced to safe levels.
- Nitrate content of harvested material may be managed to some extent simply by raising the cutter bar and leaving a foot or so of corn stalks (and tall stubble of grasses cut for hay) in the field. Nitrates are stored in the basal portions of corn and forage grasses and so some of the greatest concentration is then left in the material not harvested.
- Some plants are more likely to accumulate toxic levels of nitrates than others. In particular, sudangrass, sorghum-sudan hybrids, pearl millet, and corn are forage crops that are likely to be toxic. In addition, pigweed, smartweed, ragweed, lambsquarter, goldenrod, and nightshades are among weeds that can accumulate dangerous levels of nitrates.
- When grazing drought-stricken corn and forage grasses, animal behavior affects the degree of the threat, although the threat is still very real.
- Packaging – Paper bags are better packaging material than plastic bags, although plastic bags outside the paper packaging are quite acceptable and will survive shipment better than the wet paper. Mark samples so as to identify them clearly for yourself, and indicate which is the "top" sample and the "bottom" sample.

Prepared by:

Hamilton Bryant, Program Assoc. & Laboratory Director, AU Agric. Services Laboratory, and
Charles Mitchell, Extension Agronomist-Soils

With information from:

Darrell Rankins, Extension Animal Scientist, **Don Ball**, Extension Forage Crop Agronomist, and **Cindy McCall**, Extension Animal Scientist