

Nitrate analysis is important for drought-stressed corn plants destined for forage

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Pastures are not growing, hay production to date is below average and there is no expectation of another harvest this season, and the corn crop that looked so promising in May is not going to make much grain. The drought-stricken corn could be harvested to feed livestock, but there are concerns about nitrate levels in the corn vegetation that can impact the wellbeing of the livestock. It is imperative that your crop insurance agent be contacted about the possibility of using the corn as a forage resource before any harvest is made.



Drought stress on corn just beginning to tassel may result in little grain production because of barren plants. In some cases plant nitrate may be high, requiring a forage analysis to effectively utilize the corn plant as a feedstuff.

Why are nitrate levels high? Drought reduces both crop nitrate uptake from the soil and the conversion of nitrate to protein in the crop. If the effects of drought are greater on protein formation than on nitrate uptake, high concentrations of nitrate can accumulate in the crop. Even worse, rainfall on a drought stricken crop can result in a surge of nitrate uptake that may be poorly assimilated into protein for several days.

Nitrate is not evenly distributed in the corn plant. Stalks contain far more nitrate than leaves. The lower stalk has a higher concentration of nitrate than the upper stalk. However, in extremely severe cases even the nitrate concentration of the upper stalk can be high enough to limit utilization as a feed.

It is impossible to guess whether or not nitrate is high in forage. The only way to know the amount of nitrate in the forage is to have it analyzed. Reviewing information collected from the drought year of 1988 supports this conclusion. Based on 70 fresh corn samples, only 18% contained toxic levels of nitrate. In contrast, 71% of the sorghum-sudangrass samples collected contained toxic levels of nitrate.

Obtaining a representative sample of the forage is the most important step in determining forage nitrate. The results received from the laboratory will be meaningful only if you have collected a sample that represents the corn to be harvested. Contact the laboratories that you use for soil testing, tissue testing and/or feedstuff testing to see if they analyze nitrate content in plant tissue. Also inquire about price for an analysis, where to get a sample submission form, what the expected turn-a-round time will be, and their suggestions on sampling procedure. A list of National Forage Testing Association Certified Laboratories can be found at: http://www.foragetesting.org/index.php?page=certified_labs. Agricultural laboratories that perform soil tests may also do forage testing. A list of these facilities can be found at: <http://urbanext.illinois.edu/soiltest/>.

Leaving a foot or more of the lower stem un-harvested will reduce the risk of nitrate toxicity, but reduces per acre yield. If corn acreage is abundant and livestock number to be fed in comparison is small, it may be advisable to cut more acres at a higher cutting height to get the desired amount needed so nitrate level is reduced. If stalks are mostly barren, an estimate of yield is one ton of 35 percent dry matter forage per foot of stalk, excluding the tassel.

The best approach to obtain a representative sample is to cut a swath at the desired cutting height through a representative area of the field with a forage harvester. Composite a dozen or so handfuls from the chopped corn, mix thoroughly, and fill a half gallon-sized plastic bag that will be sent to the laboratory.

If a forage harvester is not available, sample at least 25 plants by cutting them at the intended harvest height. Chop and mix them in order to get a representative sample to fill a half gallon-sized plastic bag to send to the laboratory. A yard waste chipper/shredder can be used to chop the sample.

If relatively dry keep samples cold and ship to the laboratory immediately. Avoid shipments late in the week to avoid delayed arrival. If samples have high moisture, they should be frozen before shipping and shipped overnight or taken to the laboratory in a cooler.

Nitrate levels higher than 3,400 to 4,500 micrograms per gram (same as parts per million) are considered potentially dangerous to feed. Levels in green-chopped (direct cut and immediately fed) corn can be reduced by ensiling. During the fermentation process, 40 to 60 percent of the nitrates will be eliminated. Caution is advised as various nitrogen oxide gases produced during the fermentation process are highly toxic to humans and livestock. For the first three to four weeks after ensiling, do not enter a silo without first running the blower for 15 to 30 minutes. Nitrate levels will not be reduced if the corn is baled as hay. Test the forage for moisture

content before cutting the corn to make sure that it will store properly. Forage moisture should be approximately 65 percent when harvested for silage. If wanting to make hay, cut the crop and allow to wilt in the field to less than 20 percent moisture. If not dry enough the hay may mold or spontaneously combust.

If nitrate levels are high in the samples submitted, work with a livestock nutritionist to develop rations that can utilize the corn by blending it with low-nitrate containing feed resources.

Ask for forage quality values, too, while you are getting a nitrate test done if the sample submitted (green chop, silage or hay) is the feedstuff to be fed. A basic nutrient analysis should contain the amount of dry matter (DM), energy (TDN or NE), crude protein (adjusted for heat damage), neutral detergent fiber (NDF), calcium, phosphorus, potassium, and magnesium. From this nutrient profile, a diet can be formulated to meet the animals' requirements in a cost-effective manner to optimize performance. Share the nitrate and forage quality results with a trained livestock nutritionist so a safe ration can be formulated.

If utilizing the corn as green chop there are some items to consider. To further reduce the chances of nitrate toxicity and founder (another animal disorder that is caused by an abrupt change in diet with increased energy) (1) raise the cutter bar to 12 inches the first few days of chopping, (2) gradually introduce animals to green chop, (3) use other feeds that are low in nitrate as part of the ration, (4) feed green chop in small quantities throughout the day rather than large quantities once per day, (5) don't allow green-chop forage to set on a wagon overnight, (6) feed two to three pounds of grain with high nitrate feeds, (7) nitrate levels tend to increase for two to three days following rain, thus take extra precautions during this time period, (8) as plants mature, nitrate levels decline; also, animals become acclimated, thus chances for toxicity decrease with time.

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