

What a Difference a Year Makes!

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What a difference a year makes. Last year, we dealt with the effects of too much water, but this year, we are dealing with the opposite problem: not enough water. I don't think I have to tell you that drought has had a significant impact on crop yield and quality in much of the Northeast this summer. If you are feeding livestock, then chances are good that you are concerned about the nitrate content of your homegrown or purchased forages. Below is a "refresher" about nitrates and dairy cows, followed by information about drought impact on soil fertility and crop management in 2013.

Nitrates and Dairy Cattle

Nitrate is a major precursor of plant protein. At certain times, environmental conditions can cause excessive nitrate accumulation in the plant. These conditions include heavy nitrogen fertilization, drought, low light intensity, and low temperatures. Nitrate concentrations can rise immediately after a drought-ending rain, which is an important consideration when making harvest decisions.

Crops susceptible to nitrate accumulation include sorghum, sorghum-sudangrass hybrids, sudangrass, corn forage, small grain forages, and certain weeds, including red root pigweed, lambsquarters, and Johnsongrass. Drought can also result in elevated levels of prussic acid in sorghum, sorghum-sudangrass hybrids, sudangrass, and Johnsongrass, so extra precautions should be taken to protect against prussic acid poisoning as well.

Ensiling can reduce nitrate concentration by up to 50%, but safety precautions should be taken to protect farm workers and livestock from silo gas, which may be more likely when ensiling high nitrate forages.

Nitrate levels (DM Basis)

% Nitrate	ppm Nitrate Nitrogen	Comments
< 0.44	< 1012	Safe to feed
0.44 - 0.66	1012-1518	Safe for non-pregnant animals. Limit to 50% of ration dry matter intake. Animals may go off feed, experience a slow drop in milk production or abort in some cases.
0.66 - 0.88	1518 - 2024	Limit to 50% of ration dry matter. Above symptoms, some death.
0.88 - 1.54	2024 - 3542	Limit to 35% - 40% of ration dry matter. DO NOT FEED TO PREGNANT ANIMALS.
1.54 - 1.76	3542 - 4048	Limit to 25% of ration dry matter. DO NOT FEED TO PREGNANT ANIMALS.
> 1.76	> 4048	TOXIC - NO NOT FEED.

<http://www.dairyone.com/Forage/FactSheet/Nitrates.htm>

For more information on dealing with the risk of nitrate toxicity in drought-stressed forages, please refer to Cornell's new Agronomy Fact Sheet, 70 Drought and Risk of Nitrate Toxicity in Forages, found at <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet70.pdf>. This provides additional information on the causes of nitrate buildup in drought-stressed plants, nitrate testing guidelines, signs of nitrate poisoning in livestock, and management options if high nitrate levels are known or suspected.

In a nutshell, if high nitrates are suspected:

1. Delay harvest until a week or two after drought is "over".
2. Raise the cutter bar for harvest to avoid the highest concentration of nitrates located in the lowest part of the plant. This may be difficult but necessary to do when yields are already compromised by the long drought.
3. In hard-hit areas, grain producers may decide to harvest their crop for silage. This is good because it helps alleviate potential feed shortages and provides a market for drought-damaged corn crops that will produce little grain, but it is very important to know the nitrate status of this "salvaged" grain crop.
4. Make silage instead of hay or green chop. But beware, elevated nitrates will also increase the risk of potentially deadly silo gas, so be sure to follow adequate precautions to avoid injury to farm workers or livestock.

5. Test suspected forage to determine if it can be diluted with a low-nitrate feed, or to determine if you should avoid feeding it altogether.
6. Feed a balanced ration and make sure that livestock have ready access to nitrate-free water.
7. Introduce forage with elevated nitrates gradually. Feed cows low-nitrate hay before turning them into a suspected high-nitrate pasture.
8. Avoid feeding greenchop, especially if it has heated in the forage wagon or feed bunk.
9. Don't overstock high-nitrate pastures, since it encourages consumption of the lower canopy, which will be highest in nitrates.
10. Consult with your nutritionist or veterinarian for other management practices to reduce the risk of nitrate toxicity on your farm.
11. Observe livestock frequently. Remove animals and call a veterinarian promptly if symptoms occur.

Dairy One Forage Lab can test suspected forages for nitrate content. If added to a routine package, it will cost an additional \$6 per sample. Nitrate alone costs \$12 per sample. For a complete list of services and prices, please refer to <http://www.dairyone.com/Forage/services/Forage/ForageInfoForm.pdf>.

Impact of Drought on Soil Fertility and Crop Management in 2013

Some areas of the Northeast got some much needed rain the last week in July...an inch or two or three...enough to green things up a bit, but it was too little and way too late. Even if we get normal rainfall for the rest of the summer, much of the damage is already done.

At this point, we really need to start thinking about the impact of the drought of 2012 on soil fertility and crop management in 2013. After reading numerous publications on the subject, I would like to offer these observations and suggestions.

Fertilizer use can become an important consideration during the year after a drought. Low crop yields during the drought year means that a significant amount of unused nutrients could remain in the soil or in the crop residue of unharvested crops and weeds. In other words, if your 2012 crop yield was 1/3 of your goal and nutrient uptake is proportional to yield, then roughly 2/3 of the phosphorus (P) and potassium (K) applied in the 2012 was not used and may be available for use by your 2013 crop. Nitrogen is a bit more tricky, but there may be a lot of that left over as well.

Nitrogen (N)

As most of you know, N is perhaps the most critical and costly nutrient of all. It is also the most volatile and mobile nutrient with the shortest life in the soil. Carryover is most likely if:

- The 2012 crop received moderate-to-high amounts of N from fertilizer, legume or manure inputs.
- If yields were lower than expected.
- If soils are heavy textured.
- If winter precipitation is normal or below normal.

The use of fall cover crops may help hold expensive N in place for the 2013 crop, as well as provide a much needed source of supplemental feed. However, be mindful of herbicide residues that may damage more sensitive crops like oats or wheat. Check herbicide labels for replanting restrictions.

Consider reducing your total nitrogen rate or splitting nitrogen applications to corn the year following a drought if the prior crop was heavily fertilized or low yielding and the fall and winter precipitation was below normal. Using a Pre Plant Nitrate Test can be used to determine if and how much additional nitrogen is needed at side-dress time.

Boron (B)

Drought reduces B availability and may be quite noticeable in high B-requiring crops like alfalfa. In alfalfa, deficiency shows up as a bronzing to yellowing of the top leaves, especially on dry ridges and light sandy soils. It can be also be confused with potato leafhopper damage.

Drought also reduces leaching of B from the soil (especially sandy or coarse textured soils), so it is hard to tell if your soil is truly deficient or if you have a drought induced deficiency. The amount of B required by any crop is quite small, so application should always be based on soil test results, since excess B can be toxic to many other crops at levels that are needed by high-

B crops like alfalfa, beets, or brassicas. Boron is NOT included in the standard soil test analysis, but can be requested as an additional test for a cost of \$10 per sample. <http://www.dairyone.com/AgroOne/soiltesting/SoilTestingServices.pdf>

Phosphorus (P) and Potassium (K)

Phosphorus and potassium are more stable in the soil than nitrogen. Fertilizer that is not used by the 2012 crop due to lower yield caused by the drought will most likely be available in 2013 for use by the next crop. It is important to determine the levels of these nutrients through soil testing to avoid applying excess fertilizer, which is hard on your wallet and bad for the environment.

Unfortunately, taking a representative sample in dry hard soil can be very difficult. Shallow sampling depth that is common in these conditions can result in very different and misleading results. Specifically, you may see higher levels of P and K and lower soil pH. If the soil is too hard to sample, it is better to wait until you can sample to the correct depth and take the appropriate number of sub-samples per field vs. compromising accuracy.

In addition to soil fertility, it will be important to consider persistence and carryover of 2012 herbicides into the 2013 cropping season. Drought can reduce microbial activity and breakdown of some herbicides, which can increase their persistence and potential for carryover and damage to the rotational crop.

Check with your Certified Crop Adviser, the herbicide label and/or University Herbicide Restrictions included in their Agronomy Guidelines, especially if you used herbicides that are at a higher risk of carryover, such as Atrazine or Command.

Forage analysis and soil testing are important management tools every year, but they are even more important in a year of extreme drought like we had in many areas in 2012. For a complete list of our forage analysis and soil testing services, please visit www.dairyone.com.