

**THE MANAGER****FORAGE MANAGEMENT**

Extra N applied and not taken up by the crop is subject to loss to the environment

# Corn as a luxury consumer of N? Really?

Yes, really, but in a special way. Many of us learned that alfalfa is a luxury consumer of potassium (K) in our earliest agriculture classes. In the case of alfalfa, it means the plant will take up more K than it needs for optimum growth. Generally speaking, as available soil K level increases, alfalfa tissue K increases. But alfalfa and corn and K and N are different beasts in many ways. Then, what makes us say that corn is a luxury consumer of N?

Let's revisit the Corn Stalk Nitrate Test or CSNT. This is a test where a portion of the corn stalk (between 8 and 14 inches off the ground) is sampled and analyzed for nitrate-N. The CSNT is primarily used to see if manure and fertilizer application levels in support of optimum yield were attained or exceeded. The tool is useful as an end-of-season assessment because nitrates not needed by the plant can accumulate in the lower portions of the corn stalk. When CSNT results are excessive for two or more years, this provides an indication that fertilizer or manure N rate adjustments can be made (see sidebar 2). The optimal range target is a CSNT between 750 and 2000 ppm. Higher levels do not correspond with higher yields and hence the term luxury consumption when we see levels beyond that needed for optimum yield.

In many regions of the state, 2012 was classified as a drought year. When crops are fertilized for a certain yield level, and drought causes actual yields to be lower, a portion of the additional N can accumulate in the bottom portion of the corn stalks. So, what kind of CSNT levels did we see this year and how do these levels compare to previous years? Of the 923 CSNT samples received by the Nutrient Management Spear Program in 2012, 14% (130 samples) tested greater than 5,000 ppm, similar to the portion of CSNT's testing more than 5,000 ppm in 2010 and 2011. The highest CSNTs from 2010-12 are all in the same range: 14,000 to 17,000 ppm, indicating that it is not only drought years that can produce high nitrate levels.

When some of the CSNTs this fall came back at

levels exceeding 10,000 ppm, more than five times the critical value between optimal and excess, it triggered some phone calls about whether CSNT levels like this were a feeding concern. While it is true that diets heavy in drought-stressed pasture, hay or green chop can be a problem, fermented forage-based diets usually have little risk. Even the samples from corn plants with the highest CSNTs are not a problem once fermented and mixed with other forage and concentrates with normal nitrate levels for a balanced diet.

As with K for alfalfa, the farm receives no value for excessive stalk N levels. We readily see symptoms of nutrient deficiency in crops. The symptoms of excess are not so obvious, but can cost the farm money just the same. While a small amount of the extra N shows up as crude protein in forage tests, this is only of marginal value in a ration that includes alfalfa and grass. We do know that much of the extra N applied to achieve excessive levels of nitrate in the stalk, if not taken up by the crop, is subject to loss to the environment. While we cannot predict drought years, and must expect some losses when a field yields short of its potential, the data suggest that also in normal years, some fields are over-fertilized, while others are under-fertilized. So, while great progress has been made in New York State reflecting implementation of nutrient management plans on dairy farms, CSNT tests indicate that there are additional opportunities for redistribution of manure and fertilizer N among corn fields. As nitrogen use and losses in agriculture face increasing attention across the humid regions of the US, this is an issue that dairies will be increasingly called upon to examine more closely. □

## FYI

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