

Which fields need extra N?

Faced with high nitrogen prices, dairy producers must decide whether or not to apply additional N

By Quirine Ketterings and Karl Czymmek

There are three main goals of forage production for dairy cows:

1. Sufficient quantity
2. High quality
3. Economic production.

With N prices climbing ever higher, dairy producers should be asking several questions about nutrient management as this year's crop season approaches:

- How do you keep costs in line while not sacrificing yield and quality?
- How much N do you need for corn?
- Which fields should get extra N?
- Where can N application be reduced or even eliminated?

Some people suggest lowering N applications for all fields. Others say to lower N application by 10 to 20 pounds for higher producing fields. Still other people recommend lowering N applications to the lower producing fields. Or could you use manure alone to meet N needs?

What we know

These factors drive New York's nitrogen recommendations for corn:

- Site-specific yield potential.
- Fertilizer N uptake efficiencies, taking into account that fertilizer or manure nutrients applied will never be 100% available to the plant.
- Adjustments for N expected from mineralization of organic matter during the growing season.
- Release of N from sod in the rotation.
- N from manure.

We know there are fields where no additional N is needed, and they should be targeted first for reducing purchased N applications. Eliminating extra N applications to fields where it's not needed can result in substantial savings.

But how do you recognize fields that almost certainly have enough N for your current year's corn crop and are unlikely to respond to additional N, regardless of presidedress nitrate test (PSNT) results?

Here are some scenarios where you are unlikely to need fertilizer N beyond a starter application:

- Corn following plowdown of a good legume/



First-year corn following spring tilled alfalfa/orchardgrass with 20% legume on a Barbour soil in Delaware County yielded 20.5 tons per acre at 35% DM with only 30 pounds starter N application. Adding up to 150 pounds of N per acre at sidedress time did not result in a yield increase. Photo by Quirine Ketterings.

grass sod.

- Corn following plowdown of good grass sod with a few thousand gallons of manure.
- Corn fields where manure has been applied at a rate calculated to meet the N needs of the crop using Cornell Guidelines, allowing for credits and debits based on manure nutrient content, timing, etc.
- Corn fields that have for several years in a row received relatively heavy manure applications – between 10,000 to 15,000 gallons per acre.
- Corn fields where 8,000 to 10,000 gallons or more of manure is spring incorporated within one day or less of application.

On the flip side, there are some situations where additional fertilizer N is certainly needed. Prime candidates are continuous corn fields or corn that follows sod three to four years or more after rotation, with no manure applied in either instance. The only N supply in these fields will be the 50 to 60 pounds of N expected to be supplied by the organic matter in the soil. That won't be enough.

These fields, if decent corn growing ground and well drained, will be highly responsive to extra

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FYI

■ For information on the PSNT test, see <http://nmsp.css.cornell.edu/publications/PSNT2005.pdf>

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N. The N recommendations for such fields will depend on the yield potential, N release from soil organic matter and fertilizer uptake efficiency determined by the soil type.

Current research is retesting N needs for corn in a corn/hay rotation for current hybrids, yield potentials and soil conditions. We will compare economic and environmental implications of various N fertilization levels, including comparisons between striving for maximum yield vs. optimum economic yield.

Return on investment

The optimum economic N rate is the point at which you get a maximum return to your fertilizer dollars. When the optimum economic N rate is exceeded, return to fertilizer N decreases. A much smaller portion of the extra fertility ends up in the plant, and more is lost to the environment.

When using "on-farm" sources of N such as manure, it may not pay to lower manure application rates to the low end of the recommendation range. But remember with any decision, as application rates exceed plant requirements, more environmental losses are likely. This could have a different set of economic consequences over time.

With current high fertilizer N prices, it's economically beneficial to be on the lower end of the range when purchased N is used for sites that are responsive to extra N. In 2005, for example, we looked at N response on a very responsive site – one where there wasn't enough N in the soil for optimum yields.

For this site, optimum silage yield was just over 22 tons at 35% dry matter (DM). Optimum economic N rates, assuming a silage value of \$25 per ton silage at 35% DM, showed this range: from 146 pounds N at a price of 20 cents per pound and 135 pounds N at 40 cents per pound to 130 pounds of N per acre at a cost of 50 cents per pound.

Checking your N management

Start testing your N management practices by leaving untreated or half-rate check strips, especially if you normally end up adding extra N to manured fields. Do this either before or after planting – and on a back field if you're worried about what your neighbors may think.

Plan to run stalk tests on several fields, including the untreated check strips.

Current estimates have N prices running around 40 cents per pound of N as urea or ammonium nitrate. For highly responsive fields, optimum N rates may vary by 10 to 20 pounds N per acre depending on N prices.

Guidelines are given in ranges, recognizing that there are differences among fields even of the same soil type. For responsive sites at high N prices, it will pay to be on the lower end of that range.

In situations where manure applications may not have been enough to meet N needs, use the presidedress nitrogen test (PSNT) to see if you need extra fertilizer N.

Test your plan

Regardless of your decision about rates where extra N is applied, the only way to become confident with more precise N fertility management is to leave some test strips and evaluate the field at harvest time visually. Or you can measure loads and/or take end-of-season stalk nitrate tests to check your management.

With economic and environmental concerns, producers and advisers need to pay increasing attention to getting enough N on to make an excellent crop while not so much more that it wastes money and causes unnecessary losses and possibly pollution. Confidence in your ability to do this isn't likely to occur in one year of high N prices. You'll need to develop your ability to find balance for your crop operation over time. Get started or push harder this year. ■

As the optimum economic N rate is approached or exceeded, return to fertilizer N decreases.

