



## Dairy Changes N Fertilizer Applications for Corn

**Joe Lawrence** wants to know more about nitrogen (N) needs and use for corn crops on dairy farms. It's the Master's degree project for the Cornell University student who grew up on a Cape Vincent, NY, dairy.

Working with Quirine Ketterings of Cornell's Department of Crop and Soil Sciences and Karl Czymmek of PRO-DAIRY, Lawrence is conducting a research project to determine N needs for corn over a rotation following grass, alfalfa or various combinations of the two. Extension educators and consultants across the state selected cooperating dairy farmers for the study, one of whom is featured here.

"The farmers worked the fields and planted them with corn as usual," Lawrence says. "When corn was 6 to 12 inches, we applied sidedress treatments of 0, 50, 100 and 150 pounds of N. We selected corn fields that followed sods in the previous year and are tracking these fields over 2-3 years."

"One of the questions often asked when we talk about nitrogen credits from turned over sods is whether we should expect a difference in N needs depending on the composition of the sod (ranging from 100% grass, 100% alfalfa and percentages in between) and timing of sod kill (Fall or Spring)" Lawrence says.

"We had a total of 16 first-year corn trials (2005 and 2006 combined), and there wasn't a single site that responded to sidedress N showing that even the grass sods that were killed in fall released enough N for the following year corn crop" he says. Lawrence adds, "We typically expect to see a response to sidedress N in the second year of corn." What we found was that some sites did not respond to sidedress N the second year either, even when no manure was applied! Our work continues to try to predict these fields.

### N cutbacks

It wasn't just money that prompted Dan Mulvaney to participate in the study of nitrogen (N) needs on first-year corn after sod. Watershed protection is important too. Mulvaney's 60-cow Conesus, NY, dairy sits three-quarters of a mile from Conesus Lake,

with one field of the 450 acres he farms as close as 1,600 feet. He serves on the Conesus Lake Watershed Planning Committee and worked with the Soil and Water Conservation District to develop a conservation plan.

Mulvaney operates the dairy, beef, hog, horse and chicken farm with his wife, Nancy, and their children. He grows between 120 and 140 acres of corn for grain and silage, 30 acres of wheat, 60 acres of alfalfa and 100 acres of an orchard grass/timothy mix. He strip-crops 200 acres and minimum tills, especially closer to the lake.



*Nancy Glazier, technical associate with the North West New York Regional Dairy Livestock and Field Crops Program, and Dan Mulvaney, participating producer from Livingston County.*

In an effort to do "the right thing in the watershed," Mulvaney began to change his fertilizer and manure application program about five years ago. That led to his collaboration on the nitrogen project with Nancy Glazier, technical associate of the North West New York Dairy, Livestock and Field Crops Extension team.

Glazier's soil sampling showed N spikes in some fields. Mulvaney used to apply about 280 pounds of 10-20-20 starter fertilizer on his corn ground, along with 50 to 70 units of N with herbicide.

"It didn't matter whether corn was after sod or how much manure I'd applied," he says. "I

only grew 100 acres of corn so I didn't figure I grew enough to change."

But he's changed his mind and his practices. Mulvaney still applies a starter fertilizer blend, but it's a 9-16-17 which he applies at rates between 180 and 240 lbs/acre. For the N trial he and Glazier selected a field that did not have a recent manure application history as it was rented land with houses close-by. The trial results showed his corn had no significant response to sidedress N at the different rates – 50, 100 and 150 pounds, says Glazier. That showed very clearly that on first-year corn he needed no sidedress N and only about 30 pounds in the starter, she says.



*Nancy Glazier stands in front of the first year corn trial at Dan Mulvaney's farm. This corn was grown without manure and with just a small starter nitrogen application.*

Mulvaney is limiting fertilizer use on first year corn to just the starter application. He was not surprised there was no yield response for the first year, but he was surprised when he saw the results of the 2<sup>nd</sup> year: 30 tons/acre silage and again no response to additional N. This 30 tons/acre was grown with just the starter!

Mulvaney bases fertilizer needs for 2<sup>nd</sup> and 3<sup>rd</sup> year corn on soil samples, manure applications and whether the field is second- or

third-year corn. He changed manure applications to spread on fields farther from the farm. Three years is the longest he would generally plant corn but he will participate in the project for the 3<sup>rd</sup> year as he is anxious to see if there is a response this coming growing season, three years after sod turn-over. "Economics played a role," Mulvaney says. He cut fertilizer costs from more than \$300 to \$160. The other good news: Yields increased. Corn silage climbed 4 to 5 tons per acre and shelled corn increased from 110 bushels per acre to 140 bushels.

Czymmek adds, "The winter and spring before a sod is plowed will continue to be a preferred place to spread manure because of better trafficability than corn silage stubble, when soil conditions are marginal. This research shows that this is not the best use of manure N, especially if the manure could have been used on another field given fertilizer N is running 40 cents per pound."

Ketterings concludes, "Thanks to the hard work of Cornell Cooperative Extension educators, PRO-DAIRY staff, industry and the participation of producers like Dan Mulvaney and others, we demonstrated that producers can save a significant amount of money by applying just a small starter N application and not sidedressing (or using broadcast N fertilizer) for first year corn. Those dollars would be better invested in buying lime to keep the pH optimum and/or purchasing fertilizer for fields that really need the extra fertilizer. This helps both production and the environment."

*By Eleanor Jacobs*



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Cooperative Extension



The **Nitrogen for Corn Project** was initiated to evaluate the need for starter and sidedress N for corn following plowdown of grass or legume sods. Cornell University's Nutrient Management Spear Program (NMSP) faculty and staff, PRO-DAIRY staff and Cornell Cooperative Extension educators worked together to conduct 16 first year corn trials and 12 second year corn trials on-farm and on Cornell research stations in 2005 and 2006. The project was funded with grants from the New York Farm Viability Institute (extension-industry grant), the Northern New York Agricultural Development Program (NNYADP, for NNY sites in the project), and federal formula funds (feed quality component). The results of the first year corn trials show us that (1) no additional N beyond a small (30 lbs N/acre) starter is needed for optimum yield and quality of first year corn, independent of sod composition or turnover time – fall vs. spring, and (2) we can skip the PSNT for first year corn. As for second year corn sites, five of the twelve sites showed a significant yield increase, with the average optimum economic N rate ranging from 90 to 110 pounds of N per acre, plus the 30 pounds N per acre as banded fertilizer. The other seven sites did not show a yield response upon sidedress N addition. This included a field that yielded 30 tons per acre in the second year following spring plowdown of a 20% alfalfa sod and no manure or sidedress N. We are currently evaluating six management tools that might help identify fields that don't need the additional N.