



Cayuga County Dairy Tests Alternative Manure Incorporation Methods in On-farm Research

By Anne Place

Sunnyside Farm Inc. has been in Greg Rejman's family since 1939 when his grandfather, Jim, started farming in Cayuga County. Greg and his brother Neil, who are both Cornell graduates, share ownership of the family farm with their father, Jack, and currently milk a total of 3,300 cows and operate about 5,000 acres of crop land.

Sunnyside Farm is one of ten farms across New York State involved in a study examining manure incorporation alternatives for reduced tillage systems. This two-year study will be completed in the 2009 crop year and is funded by the New York Farm Viability Institute and the Northern New York Agricultural Development Program. All ten farms in the study are comparing at least two different manure incorporation methods. Common among the farms is the use of an aerator tool directly after manure application to provide shallow mixing of manure and soil. Most project farms are comparing shallow incorporation to more aggressive incorporation with a chisel plow or field cultivator. In addition to the two incorporation methods, a control treatment of surface-applied manure with no incorporation is also being tested.

The goal of the manure application study is to compare corn yield and quality along with nitrogen and residue-conserving capabilities of each treatment. Additionally, the cost of crop production is being assessed to determine if shallow mixing with an aerator can reduce a farmer's total input costs while maintaining good crop performance.

Brian Aldrich, field crops extension educator with Cornell Cooperative Extension of Cayuga County, has been helping the Cornell Nutrient Management Spear Program (NMSP) with the study at the Rejman's farm and another farm nearby. "On-farm research is an excellent way of working with farmers to test if practices that seem promising on research farms are applicable to their farm too," he commented. The research that takes place on-farm not only helps farmers stay informed, but

also keeps the researchers informed of the issues that farmers face. Aldrich added that, "When researchers interact with farmers, it provides the 'reality check' that keeps their work grounded in the production challenges that farmers really need help with."

As a farmer who has been involved in research work before, Rejman realizes that there are benefits he can gain from collaboration with the Cornell NMSP. With a large dairy operation, being able to implement effective and environmentally sound manure management strategies is a necessity. "We have always done test plots," he mentioned. "By being involved in the different trials and trying different things we have learned how to better manage our manure and have been able to cut back on the fertilizer we use."



Greg Rejman of Sunnyside Farm Inc. in Cayuga County is one of ten farmers involved in a statewide manure incorporation project.

Implementing more efficient ways to utilize manure is important with fertilizer and fuel

prices increasing and the instability of milk prices. In general, the Rejman's use direct-injection with no-till shanks for most of their manure. In this study, a Krause Dominator™ was compared to an Aerway® aerator. The Dominator™ uses a combination of shanks, discs, coulters and rolling baskets to both till and prepare a seedbed in one pass. "We prefer conventional tillage over reduced tillage on our land because it seems more straightforward and more guaranteed to provide a decent crop," Rejman said. "We thought it would be interesting to see how the two tillage systems compared."

Manure was spring-applied at the rate of about 8,000 gallons per acre and corn was planted five days later. Karl Czymmek, senior extension associate with the PRODAIRY program and key collaborator in the project, explains, "With this application rate, an estimated 60 lbs of available N per acre was applied for the plots where manure was not incorporated and about 115 lbs N per acre with direct incorporation of manure. The difference comes from the loss of ammonium-N in the manure if we don't incorporate the manure shortly after application."

Silage yields ranged from an average of 21.2 tons per acre without incorporation to 21.6 and 21.7 tons per acre for the Aerway® and the Dominator™ treatments. But, the differences were not statistically significant. "This means that the manure application methods did not impact the yields or in other words what looks like a half ton lower yield on the surface application plots in this case is due to some other differences between the plots, not the manure treatments that were applied", Czymmek explains. "Although, we expect to see lower yields with the surface application plots, we did not see this in 2008 at Rejman's site because the amount of nitrogen supplied with the surface application was sufficient to complement the nitrogen already supplied by the soil."

The results that Rejman found most impressive from this study were the end-of-

season corn stalk nitrate test results. This test measures nitrate levels in the lower portion of the corn stalk taken at harvest to help determine whether the corn received sufficient amounts of nitrogen, more than it needed, or not enough. "If stalk nitrate levels exceed 2000 ppm, the corn had more nitrogen available that year than was needed for optimum economic production", Czymmek explains. "Optimal levels are between 250 and 2000 ppm."

"I really didn't expect them to be very high," Rejman said in reference to the fact that they had only applied about 30 lbs of nitrogen per acre with the starter, in addition to the manure. Also the Pre-Sidedress Nitrate Test (PSNT) taken when the corn was 10 inches tall at the end of June (in 2008), showed that the corn had received adequate nitrogen from the manure and starter and that there was no need for nitrogen sidedressing.

The results also showed that with the Aerway® treatment residue coverage was reduced compared to the surface application but higher than for the conventional till system. "Similar results were found when comparing chisel plowing with aerator incorporation at other farms," Czymmek adds. "This could have additional benefits over the long-term, especially in grain systems where there is more crop residue at the start of the growing season."

Each of the participating farms received a project update with the results of the study. Rejman appreciates the updates. "The information that we received back is worth a lot," he commented. "It pretty much summarized everything that was measured in the trial and we really look forward to being able to compare the 2008 results with this growing season."

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Cooperative Extension



The **Nutrient Management Spear Program (NMSP)** is an applied research, teaching and extension program for fieldcrop fertilizer and manure management on dairy and livestock farms. It is a collaboration among faculty, staff and students in the Department of Animal Science, Cornell Cooperative Extension, and PRO-DAIRY. Our vision is to assess current knowledge, identify research and educational needs, facilitate new research, technology and knowledge transfer, and aid in the on-farm implementation of strategies for field crop nutrient management including timely application of organic and inorganic nutrient sources to improve farm profitability while protecting the environment. An integrated network approach is used to address research, extension and teaching priorities in nutrient management in New York State. For more information on NMSP projects and extension/teaching activities, visit the program website (<http://nmssp.css.cornell.edu>) or contact Quirine Ketterings at qmk2@cornell.edu or (607) 255-3061.