

The New York CAFO Program: Successfully Connecting Science, Policy, Regulation, and Implementation

by Karl Czymbek, Quirine Ketterings, Jeff Ten Eyck, and Tibor Horvath

New York State is now well into the second five-year cycle of the State Pollution Discharge Elimination System (SPDES) permit for concentrated animal feeding operations (CAFOs). Implementing this permit has been challenging, but it has proceeded exceedingly well. Participation of large CAFOs in the permitting process is believed to be 100 percent. The vast majority of medium and large CAFOs have developed a Comprehensive Nutrient Management Plan (CNMP), and many have implemented dozens of structural and managerial practices with numerous more changes scheduled through 2009 and beyond. Reports indicate that farm inspections by personnel from the Department of Environmental Conservation (DEC) find that most operations are making good progress, with some experiencing a few minor, mainly technical violations. Dozens of private and public sector planners regularly attend training sessions to keep up to date on the latest developments in CAFO planning, science, and policy. The annual Northeast Region Certified Crop Advisor Training held in December and the annual Water Quality Symposium in March offer numerous hours of beginner and advanced CNMP training, including updates on new research, tools for planning, and environmental related sessions. A strong partnership has developed between the New York State Departments of Agriculture and Markets and Environmental Conservation, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), Cornell University and Cornell Cooperative Extension (CCE), the New York State Soil and Water Conservation Committee, and soil and water conservation districts (SWCDs). This partnership fosters communication links among the organizations so that multiple priorities and perspectives can be balanced.

NRCS Standards and Land Grant Guidelines

NRCS standards are central to the CNMP and so to the CAFO permit. They provide a framework for the plan development process. The Nutrient Management Standard (NRCS 590) incorporates by reference Cornell University guidelines for nutrient management and risk assessment indices. Because of this, planning according to land grant guidelines becomes a requirement. Cornell University and NRCS have worked closely over the past several years to integrate the guidelines and risk assessment tools in a relatively seamless fashion. As new needs arise, the organizations find ways to address the issues. For example, through NRCS support, the Nutrient Management Spear Program in Cornell's Department of Crop and Soil Sciences provided major revisions to a nutrient management planning software tool called Cornell Cropware. This software package incorporates Cornell guidelines and is "CAFO compliant." The software is used by private sector planners and CCE field crop educators and is also installed in all NRCS and SWCD offices in New York State. Cropware has been used to develop hundreds of CNMPs and has become the nutrient management planning tool of choice for many public sector planners, as well as for most private sector planners who have not developed in-house software. The partners continue to work together to find creative ways to provide technical support, training, and software updates.

The NRCS 590 standard for nutrient management requires, among other things, that a runoff and leaching risk assessment be performed for each field. The NY P index is used to assess phosphorus runoff risk, and the NY N index is used to assess nitrate leaching potential. When the original CAFO SPDES permit was issued, New York did not have a working P index in place. The New York Phosphorus Working Group was formed to address this issue. Members included Cornell faculty and staff from the Departments of Crop and Soil Sciences and Biological and Environmental Engineering, staff from the New York City Watershed Agricultural Program, as well as staff from the New York State Soil and Water Conservation Committee and NRCS. The group worked diligently over a two-year period to mesh field practices with current science to formulate weighting factors that combine to determine the P index runoff risk score for a particular field. Subsequently, private crop consultants and field staff from soil and water conservation districts and NRCS helped to field test the P index. The P index is a practical management tool that was designed so that higher scores can generally be reduced by selecting lower risk practices for implementation. At the end of the day, if a score cannot be managed below a certain threshold, no phosphorus can be applied from either fertilizer or manure sources. The index has been supported by dozens of field training sessions, publication of a P index user's manual, and a downloadable P index spreadsheet calculator. While the P index is based on many scientific principles, the amalgamation of these principles needs more rigorous testing, and this is currently ongoing.

The original NY N index was placed in service around 1990, so it was time for an update when the new CAFO permit was instituted. An informal N index working group was established at Cornell to develop revisions. The N index is based upon soil hydrologic group and a seasonally weighted rainfall factor. NRCS provided updated rainfall data that were interpolated to the township level, and this serves as the basis for the revised NY N index. The addition of township-based data was especially important because the earlier N index was expressed on a county-average basis, and there are some counties in New York State with substantial rainfall differences from township to township. Also, appropriate N leaching risk reduction practices were updated to require that fall manure applications be made on fields with a live sod or cover crop in high leaching risk soils and locations. To the general public, cover cropping is one of the most discernible best management practices (BMPs) on a farm, and producers should be congratulated for the increasing adoption rate of this practice in New York! Cornell also initiated an informal groundwater

“... there was an important gap between the Cornell P fertility guidelines and producer practice at many operations.”



The increasing use of fall planted cover crops after corn silage harvest, like the cereal rye above, is a highly visible example of the many best management practices that producers are implementing for environmental protection.

working group two years ago in response to a couple of agriculture related groundwater concerns. This group worked with NRCS soil scientists to develop a set of guidelines and a list of soil types that need to be managed carefully to reduce groundwater contamination risk.

One challenge identified early in the first permit period regarding gaining a better understanding of phosphorus fertilizer needs for crops grown on high-fertility fields: Phosphorus availability is very low in native mineral soil conditions of the region, and in these soils crops have historically responded very well to phosphorus fertilization in a concentrated band placed near the seed at planting. Because of the observed phosphorus response in yield when soil fertility levels were lower on many farms, producers were hesitant to follow Cornell phosphorus fertilizer guidelines for corn on fields that now exhibit high soil test P. Consequently, again with assistance from NRCS as well as Northeast Sustainable Agriculture Research and Extension (NESARE), donations of fertilizer and seed from the industry, contributions by the Northern New York Agricultural Development Program, as well as a large number of local extension educators and participating farmers, a statewide project was carried out to address producer concerns. Various rates of phosphorus (including a “0” rate) were “banded” near the seed at planting time in replicated trials on both research farms and production fields. Plant growth, color, and height were observed throughout the season, and yields and silage quality were determined at the end of the year. The results over three years confirmed that there is often a significant response to banded nitrogen but not to phosphorus on cornfields where manure is applied and soil test phosphorus is high or very high. A preliminary impact study has found that two in five producers that are aware of this research have lowered their phosphorus starter use on corn, resulting in a substantial reduction in total P fertilizer imports into the state. We have embarked on a similar effort to address fertilizer and manure nitrogen guidelines.

Where Do We Go from Here?

While much has been accomplished, a lot remains to be done. We need to know more about the impacts of various practices and the science of landscape processes and nutrient and pathogen transport. We also need to maintain and further strengthen our collaborative research and extension efforts. In the end, researchers and policymakers must find ways to help producers located in areas of concentrated livestock production to economically address the impacts of that type of high-density land use. Some of this must be accomplished by a combination of reduced nutrient imports, mitigation in the landscape, and increased nutrient exports off-farm. It is a cold, hard fact that manure is costly to transport because it is of relatively high volume and low nutrient concentration. This places livestock producers in a bind: as animal numbers increase to maintain a decent standard of living, more manure is generated in a central location that must be hauled farther away. Even with large trucks, hauling manure more than 10 miles or so uses up all the value of the net nutrients in the tanker. As many readers of this publication know, it was not so long ago that a substantial quantity of human waste was discharged directly into water bodies with little or no treatment. This has been substantially remedied with significant public and private investment, but it took time to get there. Agriculture will need a similar investment in time and funds to make adjustments.

Karl Czymmek is a senior extension associate with PRODAIRY in the Department of Animal Science at Cornell University, 607-255-4890, kjc12@cornell.edu. Quirine Ketterings is an assistant professor with the Nutrient Management Spear Program in the Department of Crop and Soil Sciences at Cornell University, 607-255-3061, qmk2@cornell.edu. Jeff Ten Eyck is an associate environmental analyst for the New York State Soil and Water Conservation Committee, 607-838-3353. Tibor Horvath is the New York State conservation agronomist for the U.S. Department of Agriculture–Natural Resources Conservation Service (NRCS), 315-477-6530.