



Practical Research with Broad Implications

By Kate Birchenough

"I didn't want to spend all my time in a lab doing research that was removed from field applications," said Liz Brock, a New London, NH native. "I wanted my research to mean something; to be used by someone for real results."

With a desire for more applied on-farm research, she joined Cornell's Nutrient Management Spear Program to pursue her Masters degree, feeling her priorities and the program's priorities were "in perfect alignment."

When Quirine Ketterings, Associate Professor in the Department of Crop and Soil Sciences and leader of the Spear Program proposed a graduate research project focused on the implications of long-term manure applications on phosphorus dynamics in the soil, Brock found just what she was looking for.

"It was a great blend of practical research with broad implications and use," she said of the Spear Program.

Brock studied the link between phosphorus losses from fields related to runoff and leachate and manure applications, to determine an indicator for farmers to use when applying manure to their fields.



Liz Brock works on calibration of the indoor rainfall simulator for her MS research project at Cornell University.

"Excess [phosphorus] is stored in the soil for future crop use, however, with continued application, there is concern that the excess may build up to a critical state in the soil – like a sponge that has reached capacity," Brock said. "The concern is, when a soil reaches this state, where does the phosphorus go?"

"Liz's research was critical to the improved understanding of how manure management practices over the long-term affects nutrient loss from New York soils," said Peter Kleinman, Lead Scientist with USDA-ARS-Pasture Systems and Watershed Management Research Unit in Pennsylvania and committee member of Brock's research project. "Through considerable innovation, Liz was able to show that under the wrong conditions, phosphorus can be transported via sub-surface flow – something that has not been well reported."

Ketterings agrees, "Statewide phosphorus balances and phosphorus fertilizer use have declined dramatically over the past 10 years, which is a great improvement, but we still have a statewide excess, and with about half of New York's agricultural land testing optimum or higher in phosphorus, Liz's project became very relevant."

Kleinman credited Brock's research with providing insight into the practices that are needed to curtail environmental phosphorus losses, as phosphorus is a limiting nutrient in fresh water systems that leads to algal blooms and decreased water quality.

"I was very impressed with Liz's ability to distill complex issues relating to phosphorus chemistry and transport and extend them to practical solutions for mitigating non-point source phosphorus losses," said Kleinman.

Kleinman felt working with Brock and the Spear Program was "extremely productive from a research stand point, given Liz was able to address issues of importance to farmers as well as expand current scientific understanding of phosphorus and copper and zinc movement, documented in the three peer-reviewed journal articles she published based on her work."

"I am hopeful that there will be more opportunities of the like over the coming

years," he said.

Though Brock's interaction with CCE educators during her research program was limited because she conducted her research on a single farm in the Southern Tier, the occasional contacts at extension events was beneficial.

"My interactions with the larger group of CCE educators were mostly centered around bi-annual extension retreats that Quirine hosted. These events were held to share Cornell research with the field educators and to discuss joint research and extension programming," said Brock. "I routinely updated them all on my research as the project evolved and results were obtained."

During the retreats, Brock was able to present her findings and receive feedback from people in the field, which she said is "an essential tool for any agricultural professional."

"Based on their experience working with farmers on a daily basis, the extension educators gave me feedback that allowed me to focus and sharpen the scope of my research in order to make it more practical and useful in the end," she said. "The [CCE] educators can provide useful information about what questions producers most want answered, directing future research in the field," she said. "My research project would have been much more limited in scope and applicability, affecting its overall use as scientific discovery if it hadn't been for the input of CCE educators".

"This feedback and interaction is invaluable to researchers. It is a two-way communication that is really irreplaceable," she said. "and I would have missed out on incredibly valuable education received from the educators themselves."

The CCE educators were able to teach Brock about current farm practices and trends in New York, which she said has proved significant to her career. They also played a significant role in conveying the results of studies.

"When you are working on applied research – research that is meant to be used by farmers – having field educators understand and

explain it to the producers they work with, carries weight," she said. "When research results are released, especially when the findings have management and financial implications for the farm, the field crops educators can more effectively communicate these implications of the work to producers in the counties and achieve impact as they know their producers."

Now the Hudson Valley Field Representative for the American Farmland Trust, Brock works to protect farmland through planning, education and advocacy in the Hudson Valley region. Through her degree program at Cornell University, she was quickly introduced to the agricultural circles within the state, allowing her to experience the vast agricultural world in New York.

"Throughout my graduate career, it became clear to me that I enjoyed working with the farmers and [Cornell Cooperative] Extension educators, more so than doing research in the lab," said Brock.

Through this experience she was able to narrow her job hunting to the "people side" of agriculture, as opposed to the research facet.

"The connection with the field staff across the state has exposed me to a network of qualified and knowledgeable professionals that helps me to this day in my current position," she said.

Now more removed from the world of field crop educators, Brock still calls on their knowledge and expertise from time to time.

"The connection to them has opened doors for me with farmers and other Cornell Cooperative Extension educators," said Brock.

And, those she fostered relationships with while at Cornell, now occasionally contact her with questions regarding farmland protection issues.



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The **Nutrient Management Spear Program (NMS)** is an applied research, teaching and extension program for field crop fertilizer and manure management on dairy and livestock farms. It is a collaboration among faculty, staff and students in the Department of Crop and Soil Sciences, Cornell Cooperative Extension and PRODAIRY. 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 NMS projects and extension/teaching activities, visit the program website (<http://nmsp.css.cornell.edu>) or contact Quirine Ketterings at gmk2@cornell.edu or (607) 255-3061.