



Internship Allows Cornell Undergraduate Sarah Hetrick to Combine Interests in Dairy, Crop and Soil Science

By Lisa Fields

Since arriving at Cornell as a freshman in 2014, Sarah Hetrick's interests have expanded as she's explored connections between subjects. She explained, "After taking environmental science at my high school in South Central PA, I got interested in water quality issues. I chose the Plant Science major at Cornell with the thought of pursuing studies and future work in ecology and conservation. In my freshman year I took a writing seminar, Food Systems in Developing Countries, and my eyes were opened to the importance of agriculture and food security throughout the world. The class was in the department of Applied Economics and Management, so it placed the broader issues in the context of decisions at the farm level. That piqued my interest in Agricultural Science, and after viewing the curriculum, I decided to double-major in Plant and Agricultural Sciences."



Sarah Hetrick (right) and Amy Langner (left) present on soil health at the 2016 Musgrave Research Farm Field Day.

Hetrick wasn't raised on a farm. She approached subjects and activities without pre-conceived notions. "I joined the professional [Agricultural Sorority Sigma Alpha](#), and the [Dairy](#)

[Science Club](#)," she said "My sorority sisters and fellow students who grew up on farms have been super helpful. I worked the dairy sale knowing nothing about cows at the outset and learning a lot along the way."

In Hetrick's sophomore year, she became a Sustainable Dairy Coordinated Agricultural Project (DAIRYCAP) intern in the Nutrient Management Spear Program (NMSP) led by Professor Quirine Ketterings. The DAIRYCAP is an initiative of the United States Department of Agriculture (USDA) - National Institute for Food and Agriculture (NIFA).

Ketterings commented, "Sarah's summer internship allowed her to get exposed to several aspects of sustainable dairy farming and to see how the many disciplines connect in a research project. She was engaged in on-farm research, laboratory techniques, attendance of field days and the DairyExpo, and development of extension materials and delivery of an extension talk."

Hetrick's DAIRYCAP project was part of a long term manure management and crop rotation study at Cornell's Musgrave Research Farm in Aurora, led by NMSP post-doctoral associate, Dr. Amir Sadeghpour. The study aimed to determine the impact of different sources of nutrients, including manure, compost and fertilizer on soil organic matter and soil test phosphorus levels in a corn-alfalfa rotation. Hetrick contributed to two articles with Sadeghpour as principal author in Cornell's "What's Cropping Up?" newsletter. One focused on the study's results regarding soil [organic matter trends](#) and the other on [soil test phosphorus trends](#).

Hetrick's research examined soil health impacts of the different nutrient sources by assessing soil aggregate stability. "The field with the plots had been in the study for 16 years," she noted, "so the changes over time showed trends that really meant something. I learned the whole research process by being in the field pulling samples on some days and on

other days processing the samples in the lab and compiling data. To assess soil health, I first tested the distribution of aggregate sizes in dried soil samples. This is done with stacks of different sized sieves attached to an automatic shaker to correctly partition soil aggregates into their size groups. I also determined the stability of the aggregates when submersed in water. When I compiled the data it was really exciting to see the results because of the connection between our fieldwork and the numbers."

The data showed that plots with manure additions had a higher percentage of larger aggregates and current analyses suggest that compost amended plots have more stable aggregates. Currently Hetrick is working on a Soil Aggregate Stability fact sheet as part of the [NMSP Agronomy Factsheet](#) series describing her study's results and the management practices that enhanced aggregate stability.

Sadeghpour commented, "Sarah is passionate about learning and gaining new laboratory and field work skills. She ran her experiment meticulously and got very interesting results. It was a great experience to work with and guide her in the research and the development of the extension materials."

The 2016 Musgrave Research Farm Field Day in Aurora, NY, gave Hetrick the chance to get her feet wet as an extension educator. She co-presented results of the long term manure management study along with Sadeghpour, PRODAIRY Senior Extension Associate Karl Czymmek, and Amy Langner, soil scientist with the Natural Resources Conservation Service (NRCS). Hetrick explained, "Our presentation was called "Tracking Soil Changes from Long Term Manure Application." Experiencing how the farmers and farm advisors in the audience related to the project data was awesome for me. We demonstrated the difference in water infiltration between the soils treated with manure, compost or just fertilizer. It was a great conversation starter to get people talking about the impact on the soils' health and productivity of the different manure management practices."

Langer added, "It is energizing to meet a student who is as willing to listen and learn about soils as Sarah. She prepared herself well for the field day and is an excellent presenter. It was enjoyable working with Sarah at the field day and on the agronomy factsheet. Soil health is an important and relevant topic for agriculture students. She will use the skills she learned through her experience with NMSP to do great things."

Hetrick continues to be part of the NMSP team. "Something special about NMSP is that nothing is stagnant," she noted. "Quirine is always examining new methods and tools. If you're part of the team, you're immersed in that. For a Senior Honor's Thesis project I'll be examining permanganate oxidation technique as a method to isolate labile soil carbon."

Describing the highlights of her internship, Hetrick said, "I gained a lot of technical skills and the exposure to extension was super important as it was completely new to me. We're all expected to work hard and produce high-quality work, but we truly do that as a team with everyone helping each other and we have fun, too. It's been a very motivating experience for me." She added, "Working with NMSP was a big part of the support I had in exploring what my interests are. As I've learned about different subjects I've also been able to see how they integrate. At this point I know I want to be connected in some way with the dairy industry. I've yet to determine just how that's going to be defined, but I'm gaining experience and skills to make a well-informed decision. That way, I can choose a path that serves what I'm seeking, which is to contribute to agriculture in a career I feel passionate about that has a positive impact on people's lives and the environment."

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The **Nutrient Management Spear Program** (NMSP) 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 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://nmsp.cals.cornell.edu>) or contact Quirine Ketterings at qmk2@cornell.edu or (607) 255-3061.