



## Integration of Crops and Cows Inspires Cornell Student

*By Lisa Fields*

Sarah Moss earned her B.S. in Animal Science with a minor in crop management from Cornell University in January 2010. Initially she focused on dairy cattle nutrition but with the emphasis on forage quality in feeding the cow, Moss became interested in crop management as well. "I was searching for my direction within agricultural science. I've always been cow oriented, so Animal Science was a natural fit, but in my sophomore year I took soils courses and absolutely loved them. I decided to minor in crop management to connect knowledge of forage production with the science of feeding cows," Moss explained.

In 2006, Moss's freshman year, she sought on-campus work. Her advisor Dr. Tom Overton, Associate Professor and Associate Director of Cornell's PRO-DAIRY program, suggested she approach Dr. Quirine Ketterings, Associate Professor and leader of Cornell's Nutrient Management Spear Program (NMSP). "Sarah is bright, organized, and keen to be successful. I felt that these qualities combined with her cow and crop interests would be a good fit with Quirine's program," Overton commented.

Ketterings explained, "In our program we focus on extension and research projects that aim to help farmers address management of nutrients in a manner that is environmentally sustainable and economically beneficial."

Ketterings noted the importance of working with students. "The students are the future of agriculture. We all benefit from having students involved in research and extension in our program. They bring a fresh perspective to our team. Sarah fit our team criteria of being positive, enthusiastic and willing to take on the unfamiliar."

Moss commented on similarities between working with the NMSP and her parents' dairy business. "At home we were all equally involved in decision making. My parents, siblings and I worked well together, and everyone's opinion was respected. In the NMSP there was a lot of sharing of ideas and interest in everyone's projects. I never felt that

I was of less importance or value because I was a student worker."



Sarah Moss worked with the Cornell Nutrient Management Spear Program for three years, while working on her undergraduate degree in Animal Science. Moss graduated in January of 2010 with a major in animal science and a minor in crop management.

Moss worked with NMSP from the fall of 2006 through December 2009. Her work included the Whole Farm Mass Nutrient Balance (MNB) project, the Manure Nutrient Composition Variability study, the Sulfur for Alfalfa project, Corn Stalk Nitrate Test assessment, and the nutrient management library project. She worked with the MNB project under guidance of Caroline Rasmussen, Research Support Specialist with the NMSP. Moss explained the role of this software tool for livestock farmers: "A farm mass balance helps farm managers to determine where their greatest nutrient use inefficiencies occur." The software program calculates a nutrient balance which is the difference between nitrogen, phosphorus and potassium exported off the farm through sales of milk, crops, manure and animals, and nutrient imports such as purchased feed, forage, fertilizer and animals. The most nutrient efficient farms typically utilize a high forage diet for the cows, credit

manure nutrients, and test soils to determine nutrient needs, resulting in reduced feed and fertilizer inputs. If milk sales (the largest exports) are also high, profitability is enhanced.

The message of the MNB project truly hit home for Moss, as her family's farm initially imported all their forages until an opportunity arose to rent nearby land. "Imported nutrients were really high, but since we started growing more of the crops we saw a big change in the farm nutrient balance. The drop in purchased feed expense had a favorable impact on the farm's economics as well."

Rasmussen offered high praise of Moss. "Sarah's practical farm experience and college training enabled her to pick out data entry errors and inconsistencies. This was instrumental in creating accurate farm mass nutrient balances and providing a sound database for our research."

In her final semester, Moss completed a 1-credit project on variability in manure analyses. A farm's crop nutrient needs as well as environmental constraints to manure spreading are often based on the nutrient levels measured in one annual manure sample. The study sought to quantify the variability in nutrient content of manure among various manure storage and handling systems, across different farms and sampling years, and from one spreader load to the next. Moss analyzed data from multiple years of manure sampling on nine farms. She worked with Patty Ristow, Extension Associate with the NMSPP, Tim Sheppard, Curt Gooch and Karl Czymmek of the PRO-DAIRY program, and Ketterings to complete a summary paper on the study. The main conclusions of the study were that variability from one farm to another or from one source to another was large. This indicates the need for manure analyses of each source on the farm. In addition, a "running average" of samples taken over 2-3 years should be used to determine nutrient application rates.

"Sarah was both patient and persistent with this project, following up with farmers,

analyzing the data, and then working on ways to present the results in the most easily understandable format." Ristow remarked.

Moss confirmed her interest in the project. "The manure variability study wasn't just a project. I am interested in the outcome and what the study will lead to in the future."

Moss's internship choices also reflected her interest in the integration of crop and dairy management. She described her 2008 experience interning with Harry Austin Milling in South Dayton. "I gathered forage and grain samples, used the ration analysis software, and learned to present rations to the client." In 2009, Moss worked with the Western NY Crop Management Association's Certified Crop Advisers, scouting corn, alfalfa and soybean fields. Moss said, "I really enjoyed this, as I learned first hand about weed and insect pests and spent a lot of time outdoors."

Moss' experiences at Cornell gave her the tools to begin a career in the interface of crop and dairy management. Ketterings stressed the importance of this integration. "The challenges we face in agriculture require active involvement of people with an ability to evaluate both the animal and the crop components, people who can talk to the nutritionist as well as the crop consultant."

Ketterings added, "Agriculture needs more people like Sarah, students who pursue knowledge and skills in both dairy herd and crop management. Sarah showed us it can be done."

Moss graduated in January and accepted a position with Land O' Lakes-Winfield Solutions (NY and PA) as a Forage Management Intern. "It's exciting to be able to integrate my interests in crop and dairy science. I am thrilled to start my career by applying what I learned in my studies and work as a Cornell student."

(February 18, 2010)



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The **Nutrient Management Spear Program** (NMSPP) 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 NMSPP projects and extension/teaching activities, visit the program website (<http://nmsp.cals.cornell.edu>) or contact Quirine Ketterings at [qmk2@cornell.edu](mailto:qmk2@cornell.edu) or (607) 255-3061.