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CATEGORY ARCHIVES: FIELD CROPS NUTRIENT MANAGEMENT APPLIED RESEARCH AND EXTENSION INTERNSHIP

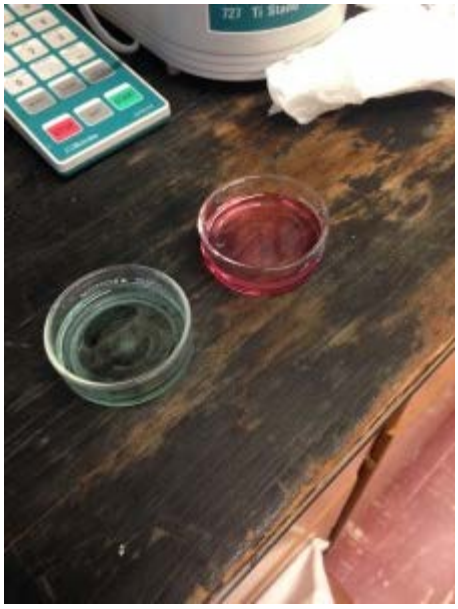
Weeks 7, 8 & 9: Colorful titrations

Posted on **July 19, 2015** by **Jeffrey Du**

Week 7

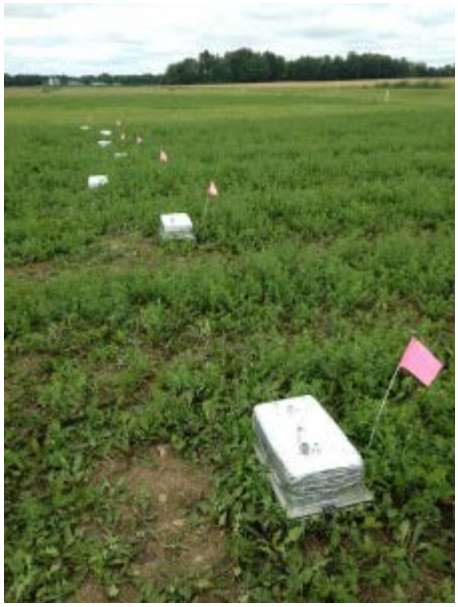
This week was a bit of a short week for me because I got sick, but luckily I was still able to be productive while I was still able to work! On Monday, I attended the Worker's Protection Safety training program in order to be certified to work in the fields. This training session was very informative and helped to give me a better understanding of the risks of working out doors. The program taught me about the potential hazards of working in fields treated with pesticides, and how to deal with them. Afterwards, we had our Monday morning meetings where two other researchers gave a presentation, keeping the rest of the staff up to date on their project.

On Tuesday, I worked with Sanjay on his double crop soil samples. To start, I weighed 1 gram subsamples of each one into individual mason jars and then combined with deionized water. Attached to the lid of the mason jar was a small petri dish that I filled with boric acid. The mason jars were placed in a griddle where they were then heated for 5 hours. When that was done, we were able to measure the ammonium levels in the samples via titration.



— Mason jar samples before and after titration.

On Wednesday, I went out into Aurora to help out with the emissions experiment. This time, we took samples from both corn and alfalfa fields. It was a bit muddy and pretty chilly when we got there. However, toward the end of the sampling, the weather cleared up and we were able to enjoy the nice sunny afternoon.



— Emission chambers prepared for alfalfa field sampling.

Unfortunately, I got sick toward the end of the week and was unable to go into work. However, I am feeling much better after some rest and am excited for what is to come!

Weeks 8 & 9

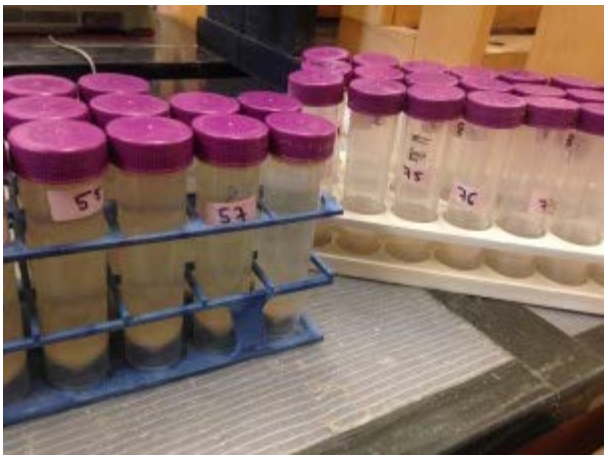
During the past two weeks I continued my work, weighing samples and titrating as part of the Illinois Soil Nitrate Test. Not much too different happened so I just wanted to update everyone while keeping it short and sweet!

Posted in **Field Crops Nutrient Management Applied Research and Extension Internship**

Week 6: A warm welcome to acid whey

Posted on **July 12, 2015** by **Jeffrey Du**

This week began my first working in Ithaca for the remainder of the summer! On Monday, I was introduced to the lab and everyone in it and went straight to work. I spent the day measuring the potassium levels found in a number of ground up corn samples that have been collected over a few years. First, I made subsamples of the powdered corn by weighing 0.5 grams of each sample into individual test tubes. Afterwards, I treated each with aluminum sulfate solution which would help to detect potassium concentration later on. Once all samples were treated, they were put on a shaker to allow for all the corn to be exposed to the solution. Finally, each sample was treated with ionic strength adjuster (ISA) in order to obtain a more accurate reading for the potassium concentration.



— Grounded corn samples with and without treatment.

On Tuesday, I attended the Cornell Seed Growers Field Day. Here, professionals spoke about the struggles seed growers encounter with their crops and the projects they were working on to resolve these problems, such as breeding disease resistant strains or pest management techniques. Afterwards, I tagged along with some other lab

members to help with their emissions trial. This involved creating small chambers on corn and alfalfa fields and extracting the gas produced in the chambers. Gas samples were collected at constant time intervals using a syringe.

— Seed growing professional speaking about various strains of barley.

— Gas chamber prepared for gas emission extraction.

On Wednesday and Thursday, I continued my work with the potassium measurements in the corn samples. I also worked with Sanjay Gami on his project with acid whey. Acid whey is waste created as a byproduct of the Greek yogurt industry. Our project works to determine its possible agricultural use to help crop growth. To get a feel for its effects, the acid whey was combined with manure at various measured ratios to see how it affected the pH of the fertilizer. On Friday, we went back out to the fields to procure more gas emission samples.

Although it has only been a week, I find that I am enjoying myself much more performing lab work than the farm work I was doing in St. Lawrence County. I am looking forward to helping Sanjay and the rest of the lab in their experiments and contributing to research!

Posted in **Field Crops Nutrient Management Applied Research and Extension Internship**

Week 5: See you St. Lawrence County!

Posted on **July 8, 2015** by **Jeffrey Du**

This week marked my final week working in Canton, New York in St. Lawrence County. Fortunately, my blog and my work are still here to stay! Instead, I will be spending the remainder of my summer working with Quirine Ketterings and her team back in Ithaca.

On Monday, I tagged along with Kitty as she went on a few farm visits to help remedy the problems of a couple of

local farmers. The farmers suffered from a number of issues including a weed problem because of nutsedge or unproductive corn fields due to many potential pests. After scouting the fields, Kitty was able to come up with possible solutions to their problems and we headed out.

— Nutsedge weed plaguing a local farm.

— Empty corn field after pest attacks.

Because Kitty was out for the next few days, I spent the remainder of the week preparing large pastures for the sheep to graze on. Initially, I worked to fence the entire perimeter of the pasture. After the shape was figured out, I put more fence on the inside in order to divide the area into five separate fields for the sheep to graze on.

Fortunately, we were able to get Friday off in order to celebrate the Independence Day weekend! Working in St. Lawrence county has certainly been quite an experience. Although it is difficult to give my overall impression of the North Country, one thing that I can conclude is that I will not miss the massive swarms of mosquitos we faced every week! Tune in next week as I move along and adjust to working in the labs in Ithaca!

Posted in **Field Crops Nutrient Management Applied Research and Extension Internship**

Week 4: Sheep scoring & Soil sampling!

Posted on **June 28, 2015** by **Jeffrey Du**

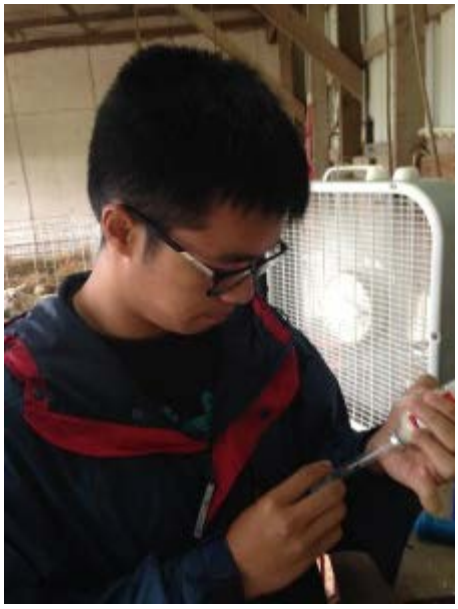
This week involved a whole lot of traveling around the North Country. On Monday, we rounded up all the lambs and ewes on the Extension Farm; once we moved them all into the barn, Betsy scored them according to the FAMACHA

method and treated them if necessary. FAMACHA is short for Faffa Malan Chart and was developed in South Africa as a way to determine if sheep in a flock required treatment against worms. We examined each and every sheep by looking at the mucous membranes in their eyes and checking for anemia. The scores for each sheep were scaled, those with a dark pink in their eye were given a 1, the best score, and those with a very pale color in their membranes were given a 5. Fortunately, all of the sheep on the farm were in the 1-3 range; none of the 1's were treated, a few of the 2's were, and all of the 3's were given a dewormer.

— Taking a look at mucous membranes in the eye for the FAMACHA test.

— Sheep that did not score well received an oral dose of dewormer.

The next day, we had a lot of help with vaccinating the sheep! A student studying to be a veterinary technician and an aspiring pre-veterinary student came to the farm and assisted Betsy, Conor, and me. We vaccinated the sheep against *Clostridium perfringens* to protect them against tetanus. The shots were all administered at the neck, just above the shoulder. Now that all the sheep have been vaccinated, all we need to do now is to give them a booster shot every couple of weeks to keep them nice and healthy.



— Drawing the tetanus vaccine into the syringe.

— Betsy administering the vaccine in the neck of the sheep.

For the remainder of the week, I accompanied Kitty on her travels throughout the state; together, we took soil samples from a number of farms, some local and one all the way by the border of New York and Vermont. Before visiting the corn fields, we checked each one using Google Maps and look at the soil types for all of them. For this study, the aim is to determine the effect of varying soil types on the productivity of corn fields. To do this, we measured out a 10-acre plot, ensuring the area we measured was a uniform soil type. For the most part, this was pretty easy as we were able to get a rectangular plot, which made it easy for us to visualize what areas we could collect from. However, some of the corn fields consisted of a number of soil types so we had to work around the borders and set down flags. One struggle we encountered was the tall corn fields. The flags were effective for the first couple of fields where the plants were still fairly young; when the stalks were too tall, it made it very difficult to locate the flags.

For each field, we sampled at 15 locations throughout the field. We used a soil probe to penetrate the earth and gathered separate samples at 8-inch and 12-inch depths. With different lengths, we were able to see how deep the levels of soil reached. The upper layer was a dark brown soil which we mainly saw in the 8-inch sample. Looking at the 12-inch sample, we were able to reach the second layer of soil, which was a bright orange color.

— 8-inch soil samples in the black bucket;12-inch soil samples in the red bucket.

Another project we worked on this week was with the Western Bean Cutworm, a pest that negatively impacts corn fields. Throughout our travels, we set up traps for the pesky moths. Each trap consisted of a bucket, a small plug that released attractive pheromones, and a pesticide strip that released a fume to kill the moths once they were inside. The traps were placed on posts in between fields to try to attract the most moths possible. Each week, we will return to the post locations in order to collect data to get an approximation for how many months are in the area.

— Cutworm trap in place ready to catch some moths.

In the midst of a busy week we were able to take a quick break and check out the Dannemora prison, where two prisoners had escaped from just a few weeks ago. The week was exhausting but it was great to get out and get my hands dirty!

— Dannemora prison.

Posted in **Field Crops Nutrient Management Applied Research and Extension Internship**

Week 3: Birdsfoot baking, elderly education, and sheep surgery!

Posted on **June 21, 2015** by **Jeffrey Du**

This week included tons of different things to do! On Monday and Tuesday, I continued my work on the birdsfoot experiment by sending the trefoil samples I collected last week to the ovens. Collectively, all the bags from each quadrant of the Extension Farm and the two halves from Asgaard Farms totaled to 72 samples to dry. Before putting them in the oven, we took the wet weights of each sample. The purpose of drying all those samples was to determine the dry matter content found in the pasture, which allowed us to determine the nutritional content the animals received while grazing and to more accurately measure the proportion of birdsfoot in the fields. Afterwards, we brought over two of Betsy Hodge's dogs, Peaches and Candy, to guard the sheep. The two Great Pyrenees were put in the field with the sheep to help protect them from predators such as coyotes.

— Collected birdsfoot samples before being heated in the oven.

— Peaches and Candy getting ready for guard duty.

On Wednesday, I tagged along with Kitty on her trip to Clinton County. Here, we scouted the plots of land of local farmers in preparation for the lesson we planned for them that night. We took a look at one of Steve Gokey's corn fields to check for any pests or malnutrition. Immediately, Kitty noticed a couple of potential problems; after walking through the fields, we saw yellowish leaves, visible striations, and purple stalks which indicate nitrogen, zinc, and phosphorous deficiencies, respectively. However, these problems may not be a result of poor soil, but because of the strange weather the North Country faced in the past few weeks. After having a drought in May and then scattered days of heavy rain in June, the weather conditions have not been favorable for crop growth.

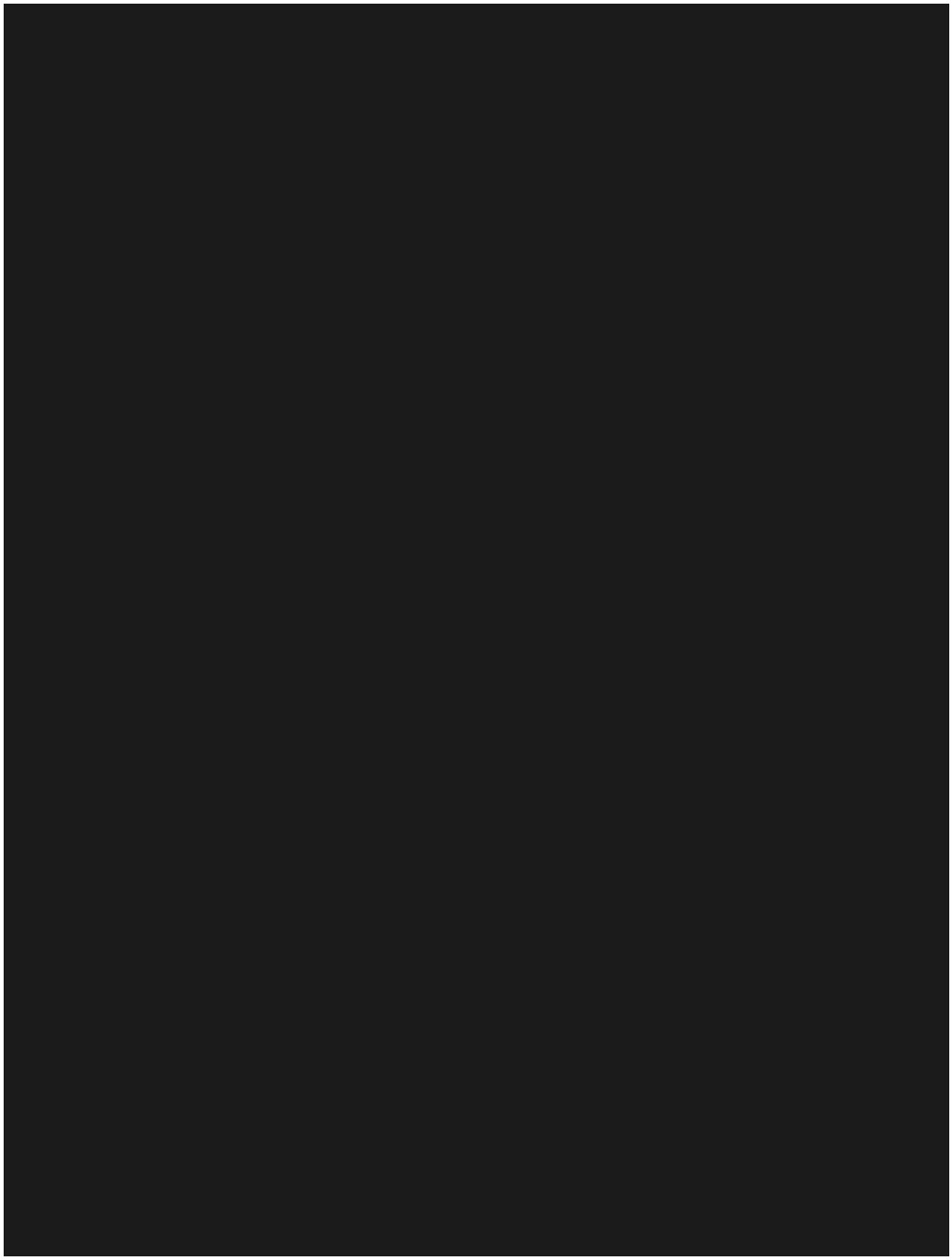
— Striations observed on leaves of

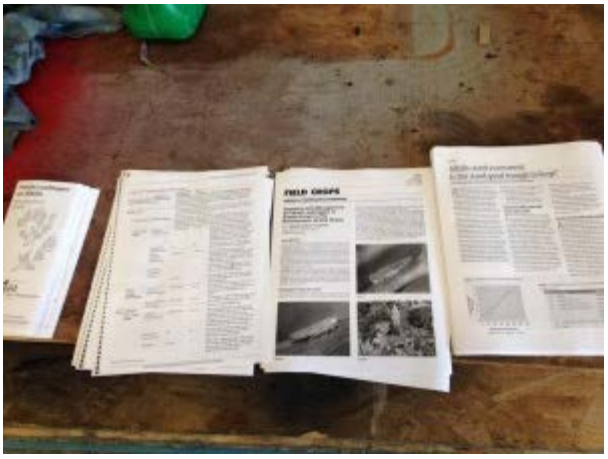
— Purple pigment seen at the bottom

growing corn.

of the growing stalk.

Later that night, we met six neighboring farmers to teach them about corn and alfalfa nutrition and pest management. We wanted to promote the idea that they should not spray their fields with pesticides given the first sign of an infestation. Different treatments were appropriate to put in place depending on the growth level of the crop and the concentration of insects found per unit area. After the brief lecture, we went out to the field and Kitty demonstrated proper sampling technique. With a large bug catching net, she swept the field in three locations ten times each. In the net, there were a number of bugs, including the benign pea aphid and the potentially very dangerous leafhopper. Both species were similar shades of green so we provided everyone with magnifying glasses to allow them to distinguish the differences in their appearances.



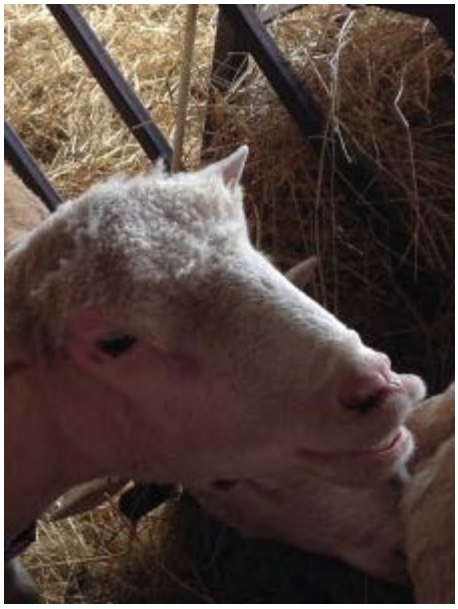


— Guides given to farmers during our education session.

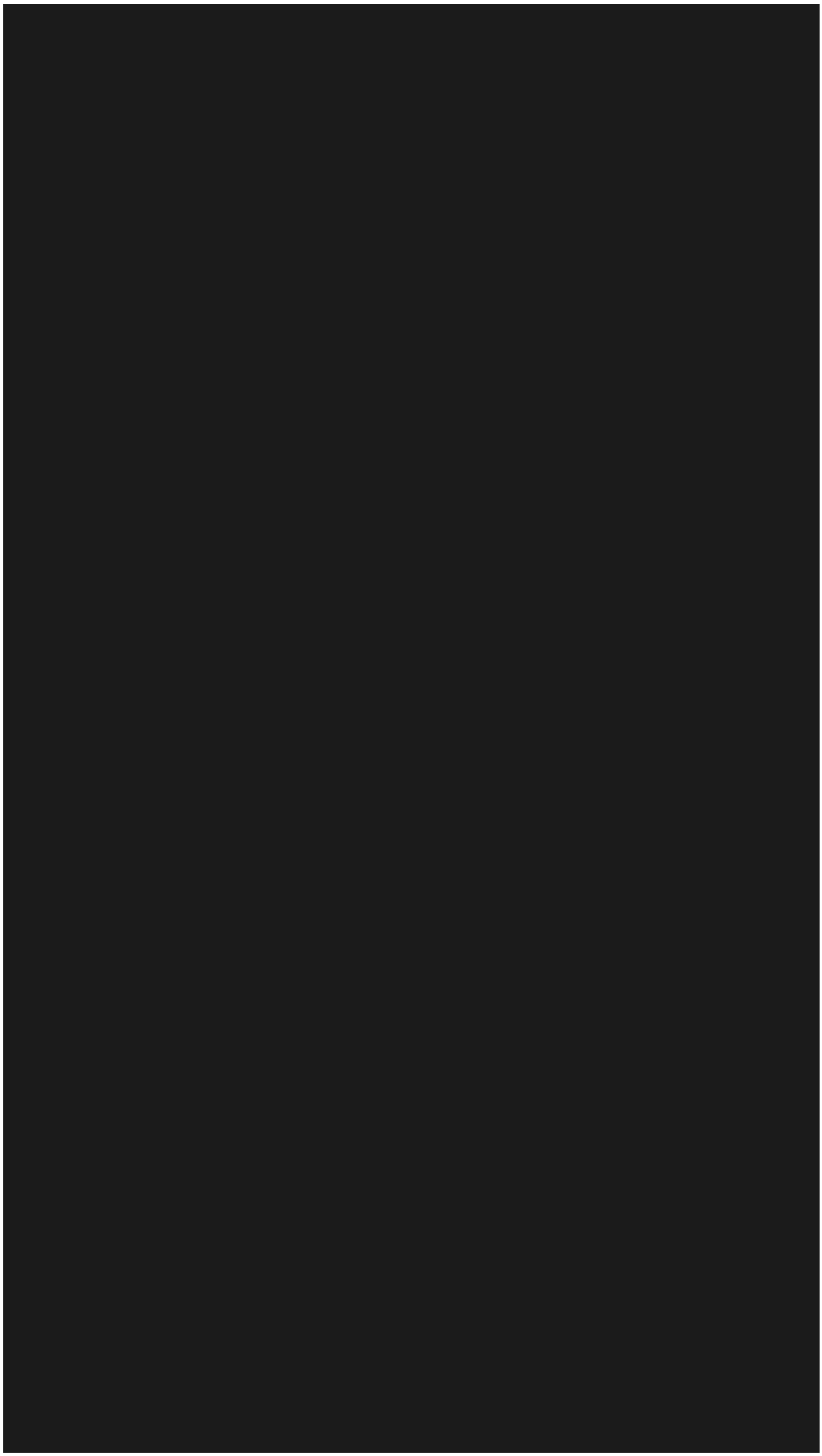
On Thursday, I accompanied Conor and Betsy to a nearby farm where I observed a necropsy. The farm owner noticed that her sheep seemed unhealthy recently and that morning, one of them had died. Unsure of the cause of death, Betsy opened up the sheep to try to find out any clues to the potential cause. After taking a look at the major digestive organs, we didn't see too much; though we did observe an unusually dry omasum, a discolored spot on the liver, and some very large lymph. nodes. However, it was not clear what exactly had caused the death so we took some fecal samples to do further analysis.

— Necropsy being performed on a sheep.

On Friday, I took the samples out of the oven after drying for three days and recorded the dry weights of each. Each sample weighed significantly less than they did during the first weighing, retaining only about 20% or less of the original. At the end of the day, Conor and I went with Betsy to the sheep barn on the Extension Farm to practice artificial insemination methods. We brought an ewe to the rams in order to gauge their interest in mating. To test this, we looked for the Flehmen Response, which can be identified by the raising of the upper lip. Once interest was detected, we placed the ram behind the ewe and hoped that it would mount so that we could collect semen.



— Flehmen response observed in a ram.



I think what made this week so exciting was that on many occasions, I was able to apply the information I learned

from my courses at Cornell and put them into practice. At this point, I am about a quarter through with the program but there is still much more to learn and see!

Posted in **Field Crops Nutrient Management Applied Research and Extension Internship**

Week 2: Birdsfoot, Bovinae, and Beans

Posted on **June 14, 2015** by **Jeffrey Du**

This week, I worked closely with Betsy Hodge, another CCE researcher, and her intern, Conor McCabe. Kitty and Betsy are conducting an experiment to test the anti-parasitic properties of Lotus corniculatus, or more commonly known as Birdsfoot Trefoil. The legume is a perennial plant with yellow flowers. It gets its name from the appearance of its leaflets, which develop in bundles of five, with three of them protruding further than the others. To examine the medicinal characteristics, a number of farms in the county, including the Cornell Extension Farm, have agreed to participate, setting aside plots of land to plant birdsfoot seeds with a variety of others.

On Monday and Wednesday, Conor and I walked over to the experimental field where the Extension Farm grew its birdsfoot. The 3-acre field was divided into quadrants, which we labeled as Northeast, Northwest, Southeast, and Southwest. We divided the field not only for ease of sampling, but also to test the effectiveness between organic and inorganic areas of the plot. We were tasked to collect the birdsfoot trefoil and to determine the proportion of how much was growing in the field. In order to do so, we had electric cutters, plastic Ziploc bags, and a set of pipes which were arranged into a 20″ x 20″ square.

We started in one corner of a quadrant and walked across to the opposing corner, stopping to take six samples on the way, each roughly equidistant, spanning the distance. We took samples this way in order to get a feel for the representative distribution of the birdsfoot and to minimize potential bias in the study. In each sample, we placed the pipe square on the ground and used it as boundaries for our sampling area. We cut the plants approximately 3-4 inches off the ground instead of simply removing the whole plant, in order to mimic what would happen if animals were to graze on the field. As we gathered our samples, we categorized each plant as either “birdsfoot” and “non-birdsfoot” and separated them into their own plastic bags. We repeated this process in each of the six samples, in each of the four quadrants, accumulating a total of 48 sample bags to be used later on.

— Gathering birdsfoot trefoil samples from the Cornell Extension Farm.

On Tuesday, we drove out to Au Sable Forks, New York to collect samples from Asgaard Farm & Dairy, another farm participating in our study. The drive to Au Sable Forks took about five hours round trip, but we were able to stop by Lake Placid, a town that hosted the 1932 and 1980 Winter Olympics, along the way!

— Herb Brooks Arena, the Lake Placid hockey rink.

After sightseeing, we continued our way to the Asgaard farm. The experimental plot was divided differently from the at the Extension Farm. Instead of organic and inorganic quadrants, it was split in half, grazed and non-grazed. Just as we did on the other two days, we took six samples in each sector, walking equal paces from one to another, collecting 24 bags by the end of the day. By working quickly, we were able to finish just narrowly avoiding the huge thunderstorm approaching!

— Land grazed by cows on Asgaard Farms.

— Non-grazed plot of land.

On Thursday, we drove out with Betsy to visit a farm owned by two brothers, Joe and Paul. There, we helped them take weights of 40 cows to be used in another experiment. The purpose of this experiment was to compare the effect of a hormone on the growth of the cow. To try to minimize the variance, they chose for cows that were of similar breeds and were close in size. We selected 20 bulls and 20 heifers to participate, randomly assigning half of each group to receive the implant. Joe and Paul rounded up the cows which we then weighed one at a time. After the weighing, the cows that were selected were locked in place to receive the implant, which was a small pellet injected in the ear.

— The many cows of the brothers' farm.

— A heifer held in place before receiving the implant.

On Friday, I tagged along with Kitty to Dan Kent's vegetable farm, where we helped Amy Ivy, the Clinton County agricultural team leader. Amy wanted to measure the profitability of potentially growing soybeans in the North Country. With previous instruction from Amy, Dan allotted a 10′ x 210′ field for us to experiment with. Her experiment is a comparative study to test how effectively different strains of edamame fare in this new region. Using a seeder, we planted four 30-foot lines of each of the seven varieties across the field, placing seeds approximately an inch apart. There were some difficulties using the seeder because the large bean seeds became wedged into the gears, causing the machine to malfunction. However, we bypassed this by doing things the old fashioned way; we planted the seeds by hand.

— Seeding a variety of edamame strains.

Going out into the field and getting my hands dirty this week was great! As a hands on learner, I definitely feel that experiences like these will keep this summer exciting. Look out for my next post to stay updated with my progress!

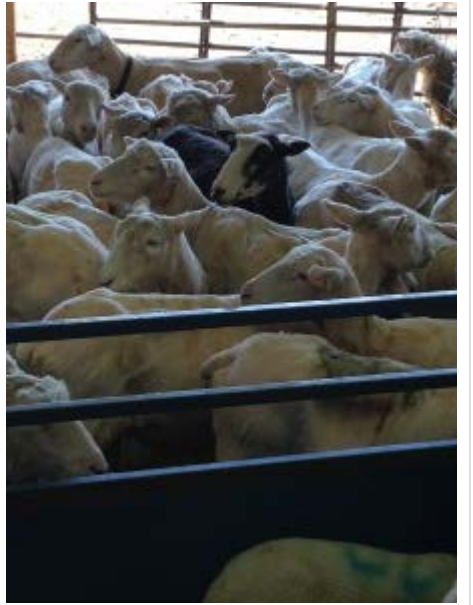
Posted in **Field Crops Nutrient Management Applied Research and Extension Internship**

Week 1: Introduction to Agriculture in the North Country

Posted on **June 6, 2015** by **Jeffrey Du**

This week was my first of many working in Canton, New York as an intern, working with Kitty O'Neil as part of the Cornell Cooperative Extension. Over the course of this summer, Kitty and I will work together in order to analyze the nutrition of field crops in the North Country and to educate farmers in areas such as nutrient management and methods aimed at optimizing forage production.

At the start of the week, Kitty and I drove across St. Lawrence County and measured the heights of alfalfa plants on a number of farms; this allowed us to gather data so that we could inform local farmers on ideal cutting times in order to produce high quality forage. Afterwards, we contacted a few farmers and took a look at plots of land they were struggling with. After hearing what they had done with their land so far and what their goals were, we advised them on potential solutions that could help to remedy their problems. During the middle of the week, I worked around the extension farm and aided faculty in a myriad of tasks, including: bovine vaccinations and sheep shearing. Additionally, we had some elementary school students visit the extension farm. Through a number of information sessions, I taught the students about what agronomy is and its importance in our lives.



Growing up on Long Island with no previous exposure to agriculture, I felt like the black sheep of the flock when I moved up to this new rural environment. However, the CCE staff have been very welcoming and I am excited for what is to come in the upcoming weeks.

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