Summer 2012, Issue 3

Successful 5th Year of Summer Internship Program

The 5th year of the Dixon Springs Summer Internship program, sponsored by ACES Office of Research, recently came to a close. Eleven summer interns conducted 11 weeks of research on a variety of topics at either the Dixon Springs Agricultural Center (DSAC) or the Orr Agricultural Research and Demonstration Center. The summer culminated with the interns reporting their results not only to faculty, extension coordinators, and stakeholders, but also to the community at field days sponsored by each center. After welcoming the attendees, Dr. Elvira de Mejia, Assistant Dean for Research, began the day by pointing out the need to celebrate collaboration. She talked about how the success of the program would not be possible without the involvement of many people, including advisors, mentors, stakeholders, and the interns themselves. In particular, the stakeholders help utilize the findings and apply them for the good of the community. Accordingly, in addition to summarizing the research accomplishments of the interns this summer, we would also like to feature some of the stakeholders involved and highlight how their involvement has made an impact.

Summer Internship Program Newsletter

University of Illinois

College of Agricultural, Consumer and Environmental Sciences (ACES)

Office of Research

IN THIS ISSUE

A Tribute to Collaboration

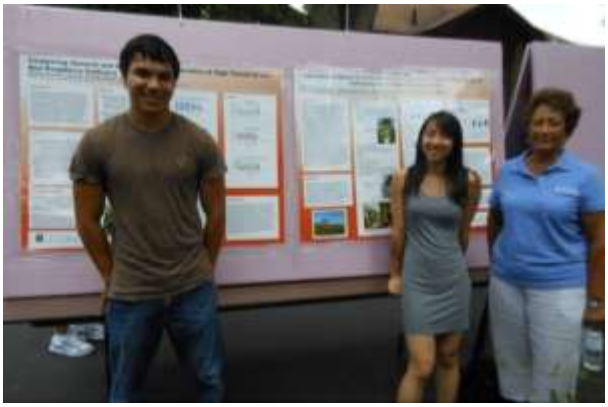
The successful completion of 11 projects in 11 weeks on diverse topics would not have been possible without the hard work of the interns, the guidance and help from research advisors on campus and on-site mentors at each center, and the contribution of stakeholders. It's the collaboration between those involved that made the experience this summer enriching for the students and meaningful for the communities surrounding the Dixon Springs and Orr research centers. All 14 stakeholders gave input on study design and provided advice throughout the duration of the study in order to ensure the results would be beneficial and provide knowledge to the community.

Cattle Production

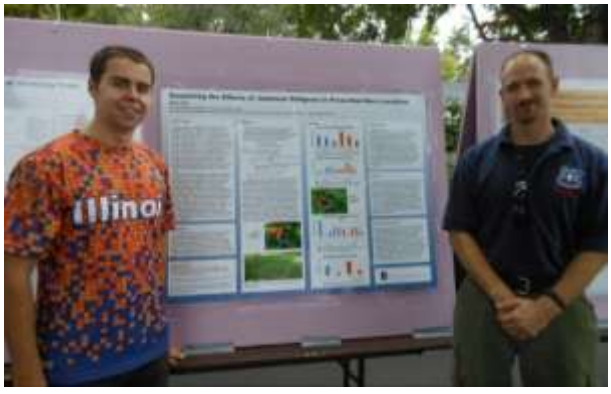
Four projects this summer focused on cattle and investigated topics important to cattle producers and the veterinarians that serve them, including feed efficiency (page 5) and cattle reproduction (page 4). Of particular interest to stakeholder and cow-calf producer **Todd Slykhuis** is the reproductive performance of cattle, since he relies on artificial insemination for breeding. **Dr. Steve Cerny** is a veterinarian and senior partner in the Meller-James veterinary clinic that services Dixon Springs. **Dr. Kevin Kackley** and **Dr. Wade Pollitt** are veterinarians with Mt. Sterling Veterinary Clinic near the Orr Center. The findings of the studies will impact the recommendations these veterinarians give to their clients concerning insecticide treatment, breeding, and grazing practices.

Specialty Crops

Three projects this summer focused on specialty crops by characterizing their nutritional components (page 7) and investigating methods to improve their profitability and distribution (page 3). Two extension coordinators that serve five counties in southern Illinois were involved with the projects. **Sonja Lallemand**, a horticulture specialist, helped the interns gain experience in the community by getting them involved with nutrition extension activities. **John Pike** specializes in local food systems and small farms and was interested in furthering the Farm to School program. Specialty crop producer **Andy McNitt** invited the interns to tour his farm McNitt Growers in Carbondale, IL and provided the open-field berries for the comparison studies.



Dixon Springs Field Day Presentations Left: Mike and Vivian with extension horticulture specialist Sonja Lallemand, Top Right: Amanda with small farm specialist John Pike, Bottom Right: Sean with Scott Crist from the Forest Service.



Forestry

The Illinois Forest Resource Center has been helping the Dixon Springs State Park and Shawnee National Forest evaluate the ecological impact of Japanese stiltgrass invasion. This summer two projects studied the impact on bird reproduction and prescribed forest burns (page 6). Fire management officer **Scott Crist** helped pick 40 plots as potential burn sites that could be scored for fire potential. He'll use the results to make informed decisions prior to the burn and follow-up after the burn takes place.

Biodiversity of Bioenergy Crops

In order to improve biodiversity and determine the ideal genotype of the bioenergy crop *Miscanthus*, **Dylan Walker** monitored the height, stem diameter, and growth rate of three varieties grown at Dixon Springs: *M. sinensis 'Undine'*, *M. sinensis 'Zebrinus',* and *M. x giganteus 'Illinois'*. Dylan determined that all the varieties had similar growth rates, despite the fact that they had significantly different overall heights. The results indicate that in order to produce greater biomass it may be important to extend the duration of growth by selecting for a later flowering time. Dylan was also able to accurately determine plant height remotely utilizing digital photography and mathematical analysis software. However, his current methods require more time than manual measurements and will need to be further streamlined in the future. Dylan's results will be finalized this winter when the Miscanthus is harvested and follow-up studies will help determine the impact of the drought on his findings.

Top: Dylan takes digital images of Miscanthus for establishing remote sensing methods. Bottom: Dylan poses with advisor Erik Sacks (Dept. of Crop Sciences) at the Dixon Springs field day presentations.

In Dylan's Words

Overall, I had a fantastic experience this summer. I feel over the summer I gained incredible experience going through the entire research process. After Dixon Springs I feel infinitely more confident in my ability to design, implement, and fully carry out a research project. This research internship has helped me form a better idea in my mind of what specific types of work I want to look for post-graduation.

Amanda hands out surveys to local specialty crop producers for her project.

Illinois Farm to School Program

This summer **Amanda Rosendale** investigated ways to improve the Farm to School program in the southern 16 counties of Illinois. Although Amanda is still waiting to hear back from some of her survey participants, her initial responses indicate that schools are more aware of the farm to school program than producers. She identified common crops that schools purchase and Illinois farmers grow, such as tomatoes, apples and peaches. The major concerns for schools were finding farmers to supply produce and overcoming distribution barriers. In contrast, farmers were concerned about the quantity requirements and limited overlap between the growing season and the school year. Amanda's survey findings will help to focus the next steps required to reduce the barriers for both schools and farmers in order to ensure the success of the program.

In Amanda's Words

My summer experience was filled with many learning opportunities and chances to meet people within my field of study. I have always known that I wanted to work more on the business aspect of the food industry rather than in development. This experience has reassured my decision and has driven me to pursue a career that allows me to work with specialty crop producers to sell their crops to schools, restaurants, nursing homes, or other consumers in order to expand their business, help their local economy, and ultimately to provide fresher, more nutritious food to consumers.

Insecticides and Cattle Fertility

Bull Fertility

In order to determine the effect of pyrethroid insecticides on bull fertility, **Tim DelValle** evaluated on a weekly basis semen quality in bulls treated with pyrethroids at standard label dosages. The project was benefited by the involvement of 4th year veterinary medicine students, who helped collect samples and give wellness exams. Throughout the 62 days of study, Tim observed no detrimental effects of pyrethroid treatment on semen quality, where semen motility and morphology remained normal. This fall Tim will confirm these results at a molecular level by measuring the amount of dihydrotestosterone in seminal fluid and blood plasma collected throughout the study.

Tim helps with the bulls on the farm at Dixon Springs.

In Tim's Words

My internship this summer was a great mental and hands on learning experience. I am planning on becoming a veterinarian so the opportunity to work with a 1,000 cow beef herd was immensely beneficial in gaining knowledge of livestock and large animal medicine. It was also great to see how research is performed outside in a farm setting and contribute to a study that will help the beef cattle industry. This was the most valuable large animal experience that I have had so far in my life and it has strengthened my desire to become a veterinarian.

Cow Conception Rates

At the Orr Agricultural Center, **Ashley Kloth** conducted the counterpart study investigating the effect of pyrethroids on the conception rate of female cows. Ashley determined the pregnancy rates for artificially inseminated cows with and without insecticide treatment. Two separate trials were carried out during the summer with vastly different conception rates, likely due to extreme heat during the second period. Overall, the study revealed no adverse effects due to insecticide treatment in cows, since the conception rates were similar in the two treatment groups. This fall using blood samples she collected throughout the study, Ashley will also make sure the treatment did not alter progesterone levels. The combined results on bulls at Dixon Springs and cows at Orr will be the first controlled study to address the controversy surrounding the effect of pyrethroid insecticides on cattle reproduction.

Ashley prepares to apply insecticide to a cow at the Orr Center.

In Ashley's Words

I had a wonderful experience at the Orr Beef Research Center this summer. I was really excited to expand the hands on experience that I had gained last year at Dixon Springs. Although some work was similar, the two facilities are vastly different so I learned many new things as well. I was able to run a skid steer and draw blood, tasks that became some of my favorites after I learned how to at Dixon Springs. Some new experiences that I was introduced to included high-tensile electric fences and tractors. Repairing fence at the Orr Center certainly provided some of my most "shocking" experiences. My passion, however, lies with the cows, which is what these centers revolve around. I am confident that I want to pursue a career within the beef cattle industry, thanks to the great experiences I have had thus far.

Cattle Nutrition

Co-product Supplementation

Dixon Springs is conducting an 8 year study on the effect of co-product supplements, such as Distiller's Grains with Solubles (DDGS) and soybean hulls, on fetal development and performance. This summer **Eileen Sul** studied calves that received either zero, low, or high levels of supplements during their fetal development. She found that the average daily weight gain was similar between the treatment groups. Interestingly, the residual feed intake (the actual minus expected feed intake) varied widely between calves. The most efficient calf needed approximately 400 lbs less food than the least efficient calf in order to gain the same amount of weight. Eileen has submitted blood samples and muscle biopsies for genetic sequencing in order to identify the potential genes involved in the observed differences. The ability to genetically select for food efficient cattle could make a huge impact on the beef industry and the environment in the future.

Eileen and Tim feed a calf born at Dixon Springs this summer.

In Eileen's Words

My experience at Dixon Springs was life-changing. Not only was I exposed to a different side of research that focused on larger scale research in nutrition and reproduction and real-life applications, I also learned about the differences in culture between living in the Chicago suburbs and living in Southern Illinois. I always thought that I would specialize in small animal medicine, but working on a beef research farm made me fall in love with large animal medicine. I hope to pursue a mixed veterinary practice.

Forage Optimization

The common fescue used for grazing cattle is toxic due to a fungus contained within the plant. Recently, a novel form of fescue has been created that contains a non-toxic form of the fungus, although it is more expensive than its toxic counterpart. **Madeline Milnamow** analyzed cattle grazing on these two fescue types for indicators of fescue toxicity by monitoring average daily weight gain, respiration rates, prolactin levels, and grazing behavior. She observed cattle that graze on novel, non-toxic fescue gain weight faster than those eating the toxic form of the plant. Half-way through the summer some of the cattle grazing on the toxic form were switched to the novel fescue in order to determine the compensatory benefit. The conclusion of Madeline's study was delayed by the drought, but ranchers will be able to use her results to determine the cost benefit of switching fescue types in order to limit losses due to fescue toxicity.

Madeline measures respiration rates as a sign of fescue toxicity while keeping her distance in order to limit the influence of her presence.

In Madeline's Words

I couldn't have asked for a more amazing summer. I will truly never forget this experience. I only wish it wasn't so hard to say goodbye. I learned that when working with animals if you're too scared that you're going to hurt the animal, you won't be able to help it. This experience has helped me decide that in the future I would like to become a vet tech for a mixed practice and train service and therapy dogs on the side.

Ecological Impact of Invasive Plants

Japanese stiltgrass (*Microstegium vimineum*) is an invasive plant species that covers areas of both Dixon Springs State Park and Shawnee National Forest. Two interns this summer investigated the ecological impact of Japanese stiltgrass on songbird populations and prescribed forest burns.

Songbird Populations

Scott Cinel determined the reproductive success of songbirds in areas with and without stiltgrass invasion, where 20% or more coverage is classified as an invaded zone. Scott identified 40 nests of eight different species throughout the summer. The majority of the nests were located at similar heights from the ground in elm trees containing coverage from vines. Scott observed similar success and survival rates in invaded and non-invaded areas, indicating stiltgrass influence on songbird populations is minimal. However, continuing the study through next summer will be important in determining the impact of the drought on his findings, since the lack of rain this summer severely limited stiltgrass growth.

Scott monitors a bird nest for his project.

In Scott's Words

My experience during the internship program was one I will never forget. Being able to put my research plans into action in a professional, real-world atmosphere was both inspiring for my future work and incredibly enriching for my overall academic career. I learned a great deal about working on a professional research level and adjusting to changing conditions as they happen throughout a research project. This internship and summer went a long way in solidifying wildlife research as an integral part of my future career.

Sean, Scott, and collaborators prepare a stiltgrass invaded plot for fire potential analysis.

Prescribed Forest Burns

In order to determine the influence of Japanese stiltgrass on prescribed forest burns, **Sean Hill** studied 20 pairs of plots to compare the fire potential of invaded versus nearby non-invaded areas. He found the invaded zones had more herbaceous coverage, whereas non-invaded zones had more shrubs and organic material on the forest floor. When all the variables that contribute to fire potential were considered, the invaded areas were found to have more woody mass than non-invaded areas. The study confirms that the presence of Japanese stiltgrass changes the composition of the forest floor. Being aware of this difference will allow the forest service to take precautions to ensure the prescribed burns are beneficial in both invaded and non-invaded zones. The study will be continued next summer when the same areas will be revisited and analyzed after the burns take place.

In Sean's Words

My experience this summer was unlike any other. I never thought it was possible to have so much fun doing "work." Even when we weren't working we were going on beautiful hikes through countless amounts of trails within the forests. This internship provided great insight as to what lies ahead for either doing future research or any career connected with the environment around us.

Nutritional Qualities of Fruits

Raspberries

Mike Fornaris compared eight raspberry varieties (*Polka*, *Autumn*, *Joan-Irene*, *Caroline*, *Polana*, *Joan-J*, *Josephine*, and *Nantahala*) grown in either open-fields or high tunnels for differences in physical and chemical characteristics. He found the characteristics that varied the most between raspberry types were yield and total phenolics, which can provide potential health benefits. The field grown raspberries had a much higher sugar content and total phenolics than those grown in the high tunnels, whereas the high tunnel raspberries were larger. Taking into consideration both yield and total phenolic content, Mike determined that the *Joan-Irene* raspberries performed the best of the varieties studied.

In Mike's Words

My experience was overwhelmingly positive. I learned all the intricacies that go into proper scientific research, many of which I was previously unaware of, I have also learned a lot about where food comes from and how it is distributed, especially specialty crops. In the near future I plan on attending graduate school and also plan on participating in food science human nutrition related research while I am there. This internship has given me a very unique "do it yourself" experience in research that I am not likely to find anywhere else, and thus did a fantastic job of preparing me for future research positions.

Mike uses the chemical hood in the Dixon Springs laboratory space.

Vivian prepares strawberry pulp for analysis.

Strawberries

Sui (Vivian) Lau conducted a similar study on five varieties of strawberries grown in open-fields or in vertical stacks hydroponically, including *Chandler*, *Camarosa*, *Sweet Charlie*, *Radiance*, and *Monterey*. The varieties had very similar characteristics, where major differences were seen only in size and yield. Similar to the raspberry study, the strawberries grown in high-tunnels were larger, whereas the ones grown in open-fields had higher sugar content. Supplying different hydroponic food sources had minimal impact on strawberry characteristics. Overall, Vivian observed that strawberries have characteristics that remained relatively constant across the conditions tested. Accordingly, the highest yielding Radiance strawberries have a slight advantage over the other varieties studied.

In Vivian's Words

My summer experience at Dixon Springs was absolutely unforgettable. It was a tough summer that was full of hard work and busy days, but I have learned so much from this experience and I truly believe I've grown from it. This experience has opened up my mind to really want to get adventurous and travel out of my comfort zone to gain more experience. The people I have met, the beautiful things I've seen, and all the new things I have tried and learned truly made my summer unforgettable.

The two studies combined indicate that high-tunnels provide a growing environment that permits enhanced size with similar nutrient levels as open-fields at the expense of sugar content. Between strawberries and raspberries cultivation methods have made a greater impact on the nutritional content of raspberries. In the future, it would be interesting to pinpoint the genetic factors that influence the similarities and differences between varieties and identify methods to improve sugar content in the high-tunnel environment.

Water Quality at Orr Research Center

Rachel collects a water sample from the stream that flows through the Orr Research Center.

This summer **Rachel Welch** monitored the impact the Orr Research Center has on local water quality. By sampling a stream that runs through the Orr center, Rachel determined that the center has both positive and negative impacts on nutrient levels. The agricultural practices helped lower nitrogen levels of stream water compared to nearby areas that plant continuous corn, whereas phosphorus levels increased possibly due to manure input from cattle grazing in the stream. Since the results were obtained during a drought, the findings will be a useful reference for future years and allow the Orr Center to consider water quality when making decisions about agricultural practices. Rachel also determined the accuracy of a water quality gauge recently installed by US Geological Survey (USGS) on the Illinois River near Florence, IL. Rachel found some discrepancies when comparing her results to the publically available USGS results online, indicating further studies will need to be conducted.

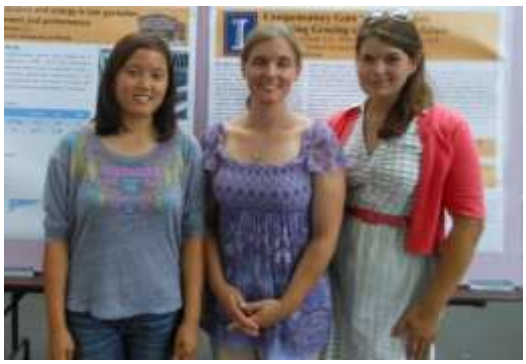
In Rachel's Words

Having the opportunity to participate in the Summer Internship Program a second summer was incredible. To be able to intern at another University research center was a truly enriching experience that I am so honored to have been involved with again. Through this experience, I have learned so much about how research is conducted and how to organize myself to efficiently and thoroughly get a project completed. This internship has prepared me greatly for graduate school, and I look forward to using the skills I have acquired through the program in my future career. Working with the USGS has shown me where my major can lead and what possible path I could follow. Conducting my own research has convinced me that I would like to pursue an academic and professional career in research and possibly education.

Rachel stands in front of the USGS van that contains a mobile water quality laboratory inside.

Companion Animal Initiative

Eileen (left) and Madeline (right) pose at the Dixon Springs Field Day with their mentor for the companion animal project Amy Fischer-Brown (center) from the Dept. of Animal Sciences.



Eileen Sul and **Madeline Milnamow** started a Companion Animal Initiative in Southern Illinois this summer. After visiting five shelters in the area, they found that most shelters were at capacity and in need of funds for spay/neuter services, microchipping, and flea, tick and heartworm prevention. Now Eileen and Madeline are planning to raise money this fall for Project Hope, a shelter in Metropolis, IL. They hope their work will help establish a long-term program in the future.

Contributors

Agricultural and Biological Engineering

Dylan Walker: "Growing *Miscanthus* for Bioenergy "

Advisor: Erik Sacks, Tony Grift **Mentor:** Steve Ebelhar **Stakeholders:** Grover Webb

Animal Sciences

Tim DelValle: "Pyrethroid Effects on Beef Cattle Fertility""

Second Research Project: "Verification of Valley City, IL Water Quality Gauge on the Illinois River"

Advisor: Dan Shike **Mentor:** Frank Ireland **Stakeholders:** Dr. Stephen R. Cerny, DVM; Todd Slykhuis

Ashley Kloth: "Effect of Pyrethroids on Cow Reproduction"

Advisor: Dan Shike **Mentor:** Nathan Post **Stakeholders:** Mike Tenhouse, Dr. Kevin Kackley, Dr. Wade Pollitt

Madeline Milnamow: "Dixon Spring Rescue Grazing Study"

Advisor: Nicki Engeseth; Mani Nakamura **Mentor:** Frank Ireland **Stakeholders:** Dr. Stephen R. Cerny, DVM, Todd Slykhuis

Eileen Sul: "Effect of Pyrethroids on Cow Reproduction"

Advisor: Dan Shike, Amy Fischer **Mentor:** Frank Ireland **Stakeholders:** Dr. Stephen R. Cerny, DVM, Todd Slykhuis

Food Science and Human Nutrition

Michael Fornaris: "Raspberry Nutrient Study"

Advisor: Nicki Engeseth; Mani Nakamura **Mentor:** Jeff Kindhart **Stakeholders:** Andy McNitt; Sonja Lallemand

Sui Kwan ("Vivian") Lau: "Nutrient Density: Strawberry Comparison"

Advisor: Nicki Engeseth, Mani Nakamura **Mentor:** Jeff Kindhart **Stakeholders:** Andy McNitt; Sonja Lallemand

Amanda Rosendale: "Raspberry Nutrient Study"

Advisor: Nicki Engeseth; Mani Nakamura **Mentor:** Jeff Kindhart **Stakeholders:** Andy McNitt; Sonja Lallemand

Natural Resources and Environmental Sciences

RACHEL WELCH:	"The Effects of the Orr Research and Demonstration Center (ORDC) on Stream Quality" *Second Research Project: "Verification of Valley City, IL Water Quality Gauge on the Illinois River"*		
	Advisor: Maria Villamil, Emerson Nafziger	**Mentor:** Michael Vose	**Stakeholders:** George Czapar, Paul Terrio
SCOTT CINEL:	"Invasive Japanese Stiltgrass-Effects on Common Passerine Populations and Their Fitness"		
	Advisor: Jeff Brawn; Michael Ward	**Mentor:** Jim Kirkland	**Stakeholders:** Chad Deaton
SEAN HILL:	"Effect of Pyrethroids on Cow Reproduction"		
	Advisor: Jennifer Fraterrigo	**Mentor:** Jim Kirkland	**Stakeholders:** Scott Crist

Thank You!

The Office of Research would like to thank all of the advisors, mentors and stakeholders for their generous contributions to our Summer Internship Program past and present. This program is enriched because of you!

This issue is dedicated with appreciation to Associate Dean for Research Dr. Jozef Kokini for establishing and developing this successful ACES Internship Program.

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