

LINCOLN UNIVERSITY

Summary of Cooperative Extension and Research Programs

LINCOLN UNIVERSITY
COOPERATIVE EXTENSION
(LUCE)
PROGRAMS

LUCE - SOUTHEAST OUTREACH CENTERS

LUCE's Southeast Missouri, or Bootheel, Outreach Center develops programs to improve the lives of youth, families, farmers and communities that are underserved. The main offices are located in Sikeston, Caruthersville and Lilbourn. Southeast Missouri has limited resources but is rich in human resources and cooperative spirit. Most programs are accomplished through the collaborative efforts of many agencies pooling their resources together in order to produce successful programs.

Afterschool Tutorial Program - This program provides afterschool tutorial programs for at-risk youth in first through sixth grade in various communities throughout the Bootheel. The afterschool tutoring program consists of homework assistance, computer skills training, character education and individualized tutoring. Over 225 students participated in the programs on a daily basis. The program was in operation from October 2007 through May 2008 in Sikeston, Poplar Bluff and Caruthersville.

Summer Enrichment Program - In partnership with the YMCA, CBC Family Life Center and USDA Summer Food program, we were able to provide fitness and health education, character development, arts and crafts, self-esteem building, recreation, and educational field trips. Summer camp was held Monday through Thursday from 8:00 a.m.-3:00 p.m. for the months of June and July 2008. The camp afforded the students an opportunity for experiential learning in a fun and safe environment. A consistent group of 75 youth attended every day in Sikeston and Lilbourn, and 45 was the daily attendance in Caruthersville.

Women's Wellness Conference - A group of area women representing about twenty different agencies collaborated to plan the 4th Annual Multi-County Conference for Women. The goal of the conference was to facilitate public awareness of the organizations and services available regarding women's health in the Bootheel. The conference theme was "A Time for Me". Health screenings were available to determine bone density, cholesterol, blood glucose and blood pressure. Over 250 women were in attendance.

Community Development - The Technical Assistance/Community Development Program assisted community groups and organizations in researching funding opportunities, coalition development, and organization.

Expanded Food and Nutrition Education Program (EFNEP) - The purpose of this program is to provide nutrition education and food safety skills to families and children. The Sikeston Center has developed partnerships with the State of Missouri Division of Youth Services. This relationship has helped to cultivate young teen mothers' interest in cooking and is inspiring them to engage in healthy eating. New partnerships have been established with Sikeston Adult Education that offers the GED program, WIC, New Deliverance Recovery Group, Jubilee Youth Group, Southeast Missouri State University Educare program, who works with parents of infants and toddlers, and CrossRoads (acronym?) ISL. The goal of 30 participants has been reached.

Health and Fitness Program - An exercise program developed to promote healthy living and nutritious eating habits. The objective of the program was to help adults and youth lose pounds and inches, increase the energy level of participants, promote alternative physical activities, and increase nutritional education knowledge. The program was implemented for 200 Headstart students for eight weeks, Hope Center youth, and adults.

Octoberfest Health Fair - This program is designed to educate youth on nutrition and fitness, and the dangers of alcohol, tobacco and other drugs. The event was planned by several agencies collaborating to provide an alternative to Halloween in Caruthersville. The event was held on October 30, 2007 with over 250 youth in attendance.

Teen Pregnancy/Teen Talk Program - This program provides a “plain talk” approach designed to empower community teenagers in order to address issues related to adolescence. It is presented twice a week for one hour to the Division of Youth Services, and for four weeks at Charleston Junior High School and East Prairie Junior High School with over 1,000 students participating.

Science and Technology Program - This is a collaborative effort with the Bootheel Youth Museum and AmeriCorps volunteers to teach science and technology utilizing experiential learning methods. Over 6,000 contacts have been made.

KID’S BEAT - is a program designed to train 30 community volunteers and club leaders on how to work with youth in their community on an ongoing basis. The program brings all of the students, leaders and volunteers together for the events listed below:

Field Day - a culmination of educational workshops on a variety of topics, a talent show, and entertainment for all ages. The event was held on October 26, 2007 with over 2000 contacts during the event.

Fall into Fall - a back-to-school rally designed to prepare students for the upcoming school year that ended with a quiz bowl competition among the various schools. The event took place at Scott Central School on August 8-9, 2008. There were over 350 youth in attendance.

Spring Bling - an HIV/AIDS/STD Awareness program that provides educational workshops on the dangers of sexually transmitted diseases and pregnancy prevention. Over 500 students attended the event.

Black History Month - the program celebrates the richness of African American culture on the last Saturday in February. Over 600 students attended the event.

Night of the Stars - is an evening designed to recognize volunteers and club leaders in the various programs. The event was held in Sikeston at the Clinton Building on September 6, 2008.

IMPACT (acronym?) - workshops for participants to learn new information and increase their knowledge that is reflected in responses to pre- and post-testing and workshop evaluation surveys. The afterschool tutoring program showed an increase in grades and improvement in behavior reported by parents and educators.

LUCE gives youth and families the opportunity to participate in unique programs. Community development components introduced at least seven community leaders to information that will strengthen the infrastructure of their organizations. Faith-based organizations acquired \$360,000.00 and at least eight additional jobs were brought into the community.

Brenda Robinson-Echols,
Coordinator

Sikeston
Felecia Anderson
Rosie Davis
Audrey Emmanuel
Emma Walker

Lilbourn
Treneshia Farr
Sherry Maxwell
Tamala Strayhorn

Caruthersville
Patricia Cagle
Matt Kronz
Louise Tipler

LUCE - KANSAS CITY URBAN IMPACT CENTER

Another of LUCE's satellite offices is the Kansas City Urban Impact Center. The Center changes and restores the lives of the people they serve. This is the way we approach our work with people in the urban core.

LUCE-KC diligently worked on the goal of developing sustainable programs and partnered with many organizations to become a change agent from health, fitness and nutrition to parenting and community organization, and restoration. It has developed programs that have become model programs throughout the nation. Some of those programs are:

Teen Health Summit - This program was a partner with several local, state and federal health and educational organizations. The goals of the summit were to:

- facilitate and conduct educational and informational workshops targeting students from area schools in high risk communities
- bring youth together in structured and non-structured environments, provide tools to assist in recognizing primary dangers to their health and wellbeing
- provide skills training to the youth participants to provide peer to peer education, training and counseling
- decrease incidence of primary risk factors with the targeted population

The student participants decided two days were not enough to gain and use all of the information provided so it was decided to have a series of five follow-up sessions to ensure knowledge and support from relationships gained.

Double Dutch program - This program was created in response to the growing number of obese diabetic youth in Kansas City, Missouri. A Double Dutch clinic focuses on teaching students strategies to become healthy, make wise food choices, and to understand the importance of exercise while having fun. Double Dutch clinics were conducted around the state. Selected teams participated in a statewide Double Dutch competition. Each year the partners increase as jumping rope and Double Dutch become more popular. LU, in partnership with local and state agencies, recruits youth for the statewide "Jump Off" held in Jefferson City, Missouri.

Teen Parent Program - This program provides lessons in decision-making, parenting, health and fitness, nutrition, budget and finance, job skills and healthy eating habits to teen parents. The program also provides a support system to teen parents by hosting round table discussions and field trips. It helps teens achieve educational and career goals, along with stress reduction.

Centennial Villa Socialization and Zest for Life - The Senior Assisted Living Program provides social activities for seniors such as garden clubs, crochet and knitting circles, and model building. The seniors may also choose to participate in community outings, workshops and forums. The Break Time Club is a respite for seniors who are caregivers. The program focuses on health concerns by providing health presentations from a nutritionist, pharmacist and fitness instructor. Social outlets such as, support groups in managing

grief, a multi-cultural festival, spiritual guidance and support, educational topics, senior sexuality, and volunteering are just some of the wide array of topics covered. The caregiver is grateful for a few hours a week away from the stress and strain of caring for a loved one who is ill.

4-H Youth participate in individual and group learning experiences that help them learn skills for living. This “experiential learning” occurs when youth participate in an activity, look back to reflect on the activity, draw conclusions or observations from the experience and relate it back to their own lives. The youth develop basic transferable skills useful for real life experiences today and in the future. LUCE-KC has youth who are State Representatives and officers in the national 4-H organization.

Summer Leadership Academy - This annual event focuses on encouraging youth who have demonstrated high levels of skills in academics, leadership, and entrepreneurial skills, etc, by offering programs to further develop those skills.

After School Program - We work with the Kansas City Missouri School District and Charter Schools to provide various workshops after school, such as tutoring. The program offers teams and membership to youth who choose not to participate in typical school sports. Some youth join the chess club, debate team, etc. as a form of team development. The program is also another introduction to higher education.

Expanded Food and Nutrition Education Program (EFNEP) - This program combats obesity and poor nutrition among low-income families by providing nutritional education and food safety. Sessions teach healthy eating habits, physical health, budgeting and overall proper nutrition. EFNEP helps Missourians learn how to make healthy food choices for the entire family, prepare delicious and safe food, and how to make money and food stamps go further. By including all family members in the EFNEP program, the entire family is able to make food changes together. When participants complete the program they are better informed, more educated and have learned to ‘buy better and eat better’ through this program.

Marion R. Halim, Coordinator

Nina Grimes

Keverick Wilson

Tina Wurth

LUCE - ST. LOUIS URBAN IMPACT CENTER

4-H Leadership Academy 2007-2008

The St. Louis 4-H Urban Extension Leadership Academy is a joint effort of LU and MU to assist urban at-risk teens 12-17 years of age in developing positive leadership skills that will prepare them as future leaders.

A total of 113 students participated in the academy in 2007 and 2008. The highlight of the 2007 Leadership Academy was the field trip to the National Civil Rights Museum in Memphis, Tennessee. Prior to this trip, many of the students had not traveled outside of the St. Louis area and none had been to the museum. All the students recognized the significance of the museum and the legacy of Dr. Martin Luther King, Jr. Emphasis of the 2008 academy focused on the importance of voting and the presidential, state and local elections. The highlights of the Fall 2008 academy were the field trip to a political rally and conducting a voter registration drive.

Outcomes

- Improved interagency collaboration between LUCE and MU-Extension in the St. Louis area.
- Increased visibility of LUCE Programs in the St. Louis area
- Expansion of each organization's ability to effectively reach at-risk youth
- Greater impact on the St. Louis community

Impacts

- Youth received access to constructive programs and activities during non-school hours
- Provided youth with positive and supportive role models
- Provided opportunities for youth development
- Formation of an LU Cooperative 4-H club in St. Louis called Extension Leaders Motivating Others
- Participation in local, regional, state and national 4-H events such as Youth Futures, State 4-H Congress, and National 4-H Congress.
- 4-H Members serving in new leadership and/or decision-making roles with school programs and communities.

Men On Business (M-O-B)

The vision of Men On Business (M-O-B) is to institutionalize an academic and social development program that results in the transformation of young African-American boys into young men with high integrity, character, respect and professional ambition. The mission is to provide male students opportunities, resources, and mentors to develop leadership skills, promote academic achievement, community building and college focus. Currently the program is established in three high schools in the St. Louis area: Riverview Gardens, Sumner and Berkley. Riverview Gardens has been actively involved in the program since fall 2005, with 90 students completing school and 60 members currently in the program. Sumner began in 2007, with two students who have graduated and progressed to college. Currently, there are 25 members actively enrolled. Berkley began this fall with 20 members.

Outcomes

- 92 students from Riverview and Sumner have completed the program and graduated from high

school with several continuing on to college

- Program participants have become mentors for 7th and 8th grade boys
- Expanded the visibility of LUCE in the St. Louis County and city school systems
- Changing the culture and perspective of African American males and their future

Impacts

- Participants build a positive network for completing high school
- Better prepared to enter college
- Developed an appreciation for college
- Involved in the community and school
- Develop team building and leadership skills
- Develop a positive character
- Make better life choices

4-H Clubs

Extension Leaders Motivating Others (ELMO) - This is an onsite leadership 4-H club, consisting of 12 members. Intelligent Women and Men (IWAM) is an in-school program at the Northwest Academy of Law High School with 31 members. The clubs are a community service based program that teaches youth the importance of servicing the community, college preparation and leadership skills.

Outcomes

- Enhance the visibility of LUCE in the St. Louis City and County School systems.
- Provides a safe haven for students after school.
- Expands visibility and knowledge of 4-H throughout St. Louis area
- Enhances the diversity of the state 4-H program.

Impacts

- Participants gain knowledge of college preparation
- Awareness of community resources and networking
- A stronger appreciation of school and college
- More involved in community and school projects
- Learn how to work with others as a team to complete task
- Develop stronger communication skills and goal setting skills

American Association for Retired People (AARP)

Summary/Highlights

In March 2008 LUCE-St. Louis established a workforce development partnership with the AARP Foundation that includes: (1) training workshops that focus on the basics of computer hardware, basic typing/ keyboard navigation, Microsoft Word and Excel, and using and living on-line. (2) LUCE serving as a host volunteer training provider for senior citizens who are prospectively preparing to transition back into the workforce. (3) A training/meeting location for other services and resources to assist senior citizens with their work search and/or skills. (4) Host provider via AARP the volunteer trainees are paid an individual stipend during their on the job training with our organization courtesy of AARP. (5)AARP partnership

includes a WorkSearch Navigator person on-site for ten to twelve hours per week with access to desk space, equipment, phone, computers, internet, etc. courtesy of LUCE for the purpose of assisting senior citizens in the community to seek and obtain employment.

Outcomes

- Familiar with Microsoft Word and Excel programs to better navigate typical office assignments and productivity
- Experienced Internet capabilities, both in navigating various employer websites, testing and in completing on-line applications/resumes.
- Basic Computer Literacy educational competencies acquired upon completion include: Typing 25 words per minute with 85 to 90 percent accuracy expected applying skills from using Mavis Beacon typing tutor software.

Impacts

- Over 25 people have received computer instruction in 2008.
- Several people have been promoted in current jobs or have obtained employment as a result of the training they received from participating in the computer class.
- 33 AARP participants have used the WorkSearch service and several have obtained employment.
- LUCE-SL staff has increased productivity and manpower by acquiring in-kind annual labor cost valued at \$18,673.20 for the three volunteer trainees and for the WorkSearch Navigator making the annual labor cost only \$8,645.00.
- AARP recognized LUCE-SL for our efforts in assisting senior workers.
- Improving computer skills has improved seniors' self-esteem and enabled them to be more productive citizens in terms of applying technology skills during everyday life.

Patrice Dollar, Coordinator

Ernest Bradley

Marla Moore

Gus Robinson

RREA

In 2008, funds from the Renewable Resources Extension Act (RREA) were used at LU's Alan T. Busby Farm for a prescribed burn and to seed over 25 species of forbs and wildflowers. We had 70-80 percent cover by native plants and an increased diversity of arthropods and birds.



With grasses and wildflowers better established, we organized the first annual Alan T. Busby Farm Field Day, an outreach event that brought together more than 80 rural landowners, urban homeowners, speakers and exhibitors. Exhibits and events included grassland restoration and management, native plants, water gardens, hayrides, composting and managing habitats for upland birds.



During 2008, we continued sampling at six locations in central Missouri. We measured vegetation indicators and sampled invertebrates to examine how they react to restoration measures. Our program, employing two students, is aimed at refining grassland restoration methods for enhancing availability of above ground invertebrate prey to songbirds and game birds. While still a work in progress, our program will benefit many landowners who manage grasslands for cattle and wildlife.

Adrian Andrei, PhD

SMALL RUMINANT HEALTH

The Small Ruminant Health program participates in numerous programs in Missouri throughout the year. The 4-H Meat Goat Camp held in Savannah is where youth and parents attend informational seminars such as “Recipe for a Healthy Goat” and “Quality Assurance and Biosecurity” which fulfill the 4-H’ers requirement to receive the quality assurance certification necessary to participate in county and statewide fairs.

The Goat Health and Parasites conference held in Birch Tree is a dinner program designed for area producers in order to educate them on common diseases, management tips, parasites and various treatment regimes. A demonstration is given on selection, hoof care and foot rot. This helps producers in this economically depressed area better select healthier stock and manage health issues in a economic way which will enhance their income return.

Our very own Goat Conference in Jefferson City has an attendance of about 135 goat producers who become informed of diseases most commonly encountered and the zoonotic potential in relation to human health. Other meetings and seminars, such as the World Wool Festival in Bethel and FAMACHA training in Maryville, show the outreach and education we provide.

Staff attend several professional meetings in order to stay up with current issues. Those meetings include the ASAS/SSC in Dallas, CSREES Grantsmanship Workshops in Memphis and Salt Lake City, eXtension in Louisville and MATCH meetings in Atlanta.

Some of the funding was used to promote producer awareness of goat diseases that pose a threat to community health (MATCH Project). This information was used to compile an extension publication distributed to goat producers throughout the state called Goat Diseases and Farm Safety. SARE grant funds were used for a PDP-ISE program held at Carver Farm for 15 extension specialists. Instruction from this program will provide these specialists in the field the knowledge to plan and conduct programs with information on goat and sheep production from research supported information presented. We team up with the Missouri Department of Agriculture (MDA) to deliver a program to 30 agriculture industry representatives and livestock producers on ‘Animal Agriculture Emergency Planning and Response’ held at Carver Farm. This program creates awareness of the threat for foreign animal diseases in the state and throughout the US.

Charlotte Clifford-Rathert, DVM

We serve on the eXtension Goat Industry CoP (meaning?) Health Committee contributing information on health issues that have an impact on the goat industry. This website launched in March of 2009 and is accessible by the public to answer production questions. The anticipated impact of such an informational website supported by experts in the field will offer a one-stop knowledge base for producers interested in goat production, meat and dairy.

The Goat Management Wheel Committee, which is designing a management wheel to be used as a tool by producers to manage the health and breeding of goat herds, will be marketed by LU, MU and ATTRA.

MISSOURI STATE PUBLIC SPEAKING PROGRAM

The Missouri State Public Speaking program continues to be popular with youth in Missouri. Over 150 youth from Missouri participated in the program with over 100 parents, specialists, moderators and judges attending. Youth presented their prepared speeches in two categories: Seniors, 14-18 years of age, and Juniors, ages 8-13. Senior speeches were five to seven minutes long and junior speeches were three to five. Topics for the speeches ranged from stem-cell research and sheep production techniques to how computers affect today's society. All participants received Certificates of achievement.

Trophies and Certificates awarded to the Senior winners:

First Place Overall Winner: Brittany Sanders; Gladstone, MO

Second Place Overall Winner: Charlotte Jackson; New Cambria, MO

Third Place Overall Winner; Rachel Longan; California, MO

Fourth Place Overall Winner: Julie Ziler; Reeds, MO (above group pictured).

Trophies and Certificates were awarded to Second Place Senior Section winners:

Section 1: Matt Yarick; Hume, MO

Section 2: Andrew Fisher; Bowling Green, MO

Section 3: Emily Rolan; Corder , MO

Trophies and Certificates were awarded to First Place Junior Winners:

Section I: Ben Brown; Appleton City, MO

Section 2: Kathryn Brown; Lake Winnebago, MO

Section 3: Emily Ziler; Reeds, MO

Section 4: Tai Thrasher; Lamar, MO

Trophies and Certificates were awarded to Second Place Winners:

Section 1: Trent Ludwig, Linn, MO

Section 2: Katy Harlan, Salisbury, MO

Section 3: Shelby Newcomer, Savannah, MO

Section 4: Gabe Richner, Warrensburg, MO

The major purposes and objectives for the development of youth in Missouri are to:

- provide county 4-H members across Missouri with the opportunity to demonstrate the knowledge and skills they have learned in 4-H through statewide educational events
- provide 4-H members an opportunity to practice skills in communication, decision-making and human interaction in a competitive setting
- qualify individuals representing Missouri at regional or national events

Youth receive feedback and training by competent judges in communication and social interaction, in order to develop speaking and listening skills. Youth feel better prepared for the skills and competencies needed in the workplace. Many begin a career in the public eye and take 4-H leadership roles at county, regional and national events. They are recognized by peers, parents, guests and the media.

Wilda Harrison, Ph.D., State Specialist

COMPOSTING

LU is the only university in the State of Missouri equipped with an in-vessel composting machine capable of composting cafeteria food waste. The facility was constructed in 2005 from a from Missouri Department of Natural Resources (DNR) Solid Waste Programs grant. The LU staff has since developed an efficient operational system that can process one thousand pounds of food waste in two hours or less, managing one and a half tons of food waste per week. The facility utilizes a horse barn clean-out as a carbon source to compost cafeteria food waste in a two-month active composting program, producing a soil amendment of N, P and K (2%, 06%, and 2%, respectively). Moisture, oxygen and temperature are monitored to ensure a favorable environment for composting aerobic microbes. The end product is examined by senses, analyzed by laboratory tests for physical and chemical properties (nutrient values), and evaluated by plant growth responses before field use. A study was conducted to examine the



LU composting process and compare the composted product with materials produced by other composting facilities in the central Missouri area. Results showed that LU composted materials changed in physical and chemical properties during processing. All composted products examined were of various qualities with more variation in chemical profiles than in physical appearances. For field applications, the amount of compost used should be guided by the results of soil tests, compost quality and maturity to ensure good plant growth responses.

The facility has been an effective center for compost training and consultation. In 2008 compost training programs were conducted at LU's Alan T. Busby Farm in Jefferson City and the LU satellite Extension service offices in Kansas City, St Louis and Bootheel. Grants received from DNR and the North Central Region (NCR) Sustainable Agriculture Research and Education (SARE) financed the 2008 workshops and will support the workshops planned for the spring 2009. The LUCE compost program mission includes environment quality improvement in addition to producing quality compost to support organic agricultural production. A rain garden was constructed close to the facility on Labor Day weekend in 2008 for the purpose of controlling storm water run-off and soil erosion. LU compost will be used to support the landscaping of the rain garden and a prairie garden in the coming years to showcase a diverse and ecologically friendly area benefiting plants, wildlife and the community.

Hwei-Yiing Li Johnson, PhD

COMMUNITY LEADERSHIP AND DEVELOPMENT

LUCE's Center for Community Leadership and Development primarily focuses on serving the underserved citizens in rural small townships and villages in southeast Missouri communities. The Center assists with implementing the infrastructures that will improve the quality of life for citizens, support livable communities and encourage the overall economic development of each community through strategic planning, organizing, and by preparing grant proposals to secure funding to develop new program initiatives.



Darrell Martin, Community Specialist

NATIVE PLANTS EXTENSION PROGRAM

During the first year of LUCE's Native Plants program approximately 500 small farmers, landowners and native plant enthusiasts attended events in Marshall, Jefferson City, Columbia, Booneville, St. Louis and Kansas City to learn about native plants for conservation practices and as specialty crops. The public learns about services and funding opportunities from Federal and State agencies. Two field days, one in Marshall and one in Jefferson City, are offered in early Fall. Seminars are presented during these and other events throughout the year.

In Marshall, a cross-cultural field day: Gardening with the Umaña family was conducted in September 2008. Hispanic and other local families were introduced to LUCE's horticulture, native plants, value-added and composting programs through sessions about the Hispanic culture which are presented to Extension specialists. This event is in collaboration with MU-Extension and brings 45-50 participants together. Exhibits about services and funding opportunities for farmers and other citizens are presented by MU-AgrAbility, MU-Alternative Center, Missouri Department of Conservation (MDC), DNR Conservation Service, Farm Service Agency and others. Bilingual interpreters are available during the event.

Also in September, the field day 'In Touch with Nature' is held. More than 75 children and adults from Jefferson City and surrounding communities participate in the event. A native grass pasture, a compost facility and a recently established rain garden are demonstrated to participants. Outdoor educational exhibits offered entertainment for children and adults.

Indoor presentations covered information about building prairie and rain gardens, and native plants that attract pollinators. Extension

Nadia Navarrete-Tindall, State Extension Specialist

specialists and researchers from LU, MU and several agencies including the Natural Resources Conservation Service, Farm Service Agency, Missouri Department of Natural Resources, and Grow Native! Program, Columbia Parks and Recreation, Missouri Department of Conservation, and the Missouri Wildflowers Nursery offered presentations or hosted exhibits.

Establishing native plants in urban or rural areas costs less to maintain than introduced species. Native plants are more tolerant to local pests and diseases than introduced ones and most do not require fertilizers. Native species support more native beneficial insects than introduced plants. By adding native plants into the landscape, more balanced communities can be created. Native plants provide habitat for native bees who are as important a pollinator as honeybees.

LINCOLN UNIVERSITY
COOPERATIVE RESEARCH
(LUCR)
PROGRAMS

DESIGN OF AN ACCURATE AND SENSITIVE GOLD NANOPARTICLE-BASED NANOSENSOR FOR DETECTION OF LUTEINIZING HORMONE IN GOAT AND SHEEP

One of the important determinants to the economics of production success is the genetic quality of the animals. One alternative to owning an expensive male is artificial insemination. A major problem, especially in sheep, is determining the appropriate time to inseminate. If a device could be developed to determine the appropriate time to breed in the absence of a male, this would be highly beneficial and could result in increased use of artificial insemination by small farm family operations. One of the most common changes that can be measured in the blood that occurs prior to estrus and ovulation is luteinizing hormone (LH). An LH surge occurs prior to ovulation and sets the time for ovulation.

Zahra Afrasiabi, Ph.D.

The objectives were to optimize protocols for bioconjugations of gold nanoparticles of different sizes and shapes to anti-LH antibody, reveal the interaction of LH with anti-LH-AuNP conjugates protein and monitor the aggregation characteristics, evaluate the concentrations of LH that can be visually detected by antibody conjugated gold nanoparticle conjugates, and evaluate the LH detection ability utilizing different sizes and shapes of nanoconjugates (AuNP-antibody conjugates)

In our proof-of-concept study, we devised a simple nanosensor for detection of protein-A (PA). A non-toxic and biocompatible phosphorus based reducing agent was used for reduction of gold (III) and formation of nanoparticles. Physicochemical properties of protein-A stabilized gold nanoparticles were investigated. Optimal antibody concentration for the coating was determined by immunodiffusion assay. Result of immunoassay experiments confirmed the potential of the synthesized anti-protein-A conjugated gold nanoparticles for use as a simple and inexpensive test for quantitative screening of protein-A samples. The nanosensor developed is highly robust and indicates high stability. Same sensor design was applied to luteinizing hormone (LH). Aggregation of LH binding to anti-LH was determined by colorimetric strip assay. Stability of antiLH-AuNP conjugate with various solutions (NaCl, BSA, HSA and different buffer solutions, Histidine, and Cystine) was monitored. Covalent conjugation method using EDC, NHS was applied for site-specific conjugation of anti-LH to gold nanoparticles and further testing it in the strip immunoassay experiment. After a detailed research and database survey, a peptide sequence of LH was synthesized, and gold nanoparticle was conjugated to the antibody that was raised against the synthesized peptide. This anti-peptide gold nanoparticle conjugate will be further implemented in the sensor structure for more specific binding to LH during detection process.

The outcome of this project has a direct impact on increasing genetic quality in the herd/flock, economics of production, increased use of artificial insemination by small farm family operations and design of nanosensors for accurate detection of biomolecules.

EFFECTS OF VEGETATION STRUCTURE ON IN-VERTEBRATE COMMUNITIES IN RESTORED WARM SEASON GRASSLANDS.

During 2008, we continued sampling at six locations in central Missouri. We measured vegetation indicators and sampled invertebrates to examine how they react to restoration measures. Our program, employing two students, is aimed at refining grassland restoration methods, for enhancing availability of above ground invertebrate prey to songbirds and game birds. While still a work in progress, our program will benefit many landowners who manage grasslands for cattle and wildlife.



Adrian Andrei, PhD



OPTICAL INVESTIGATION OF VAGINAL MUCUS

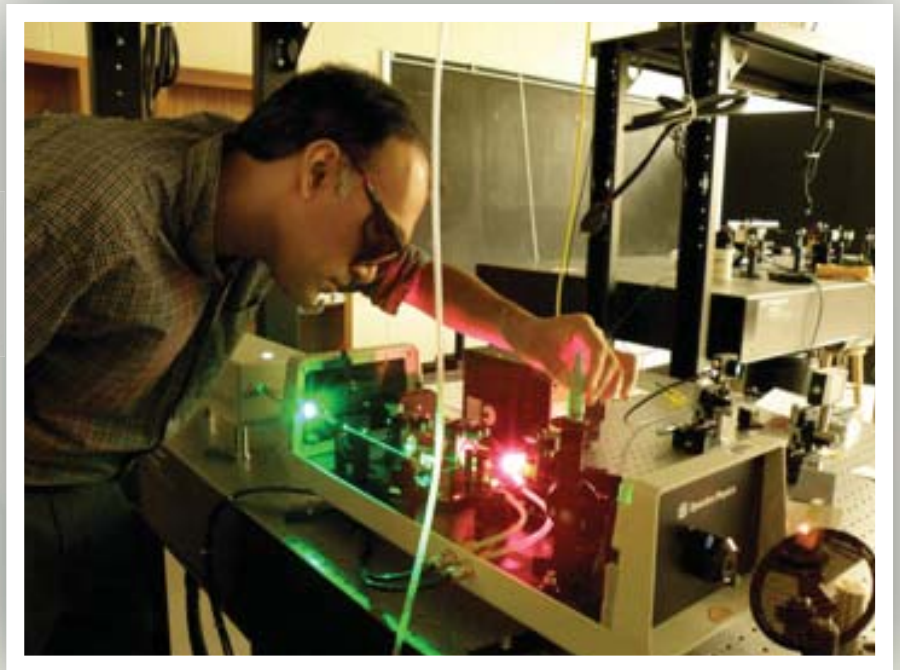
The optical table for absorption and emission experiments has been set up. A tunable Ti-Sapphire laser system will be the primary laser source. Emission spectroscopy will be accomplished by using the laser as an excitation source and a sensitive spectrometer as a wavelength filter. Fast photo-detectors along with ultra-fast oscilloscopes have been installed to allow us to be able to do time-resolved fluorescence measurements.

Detector responses have been tested to varying light wavelengths and intensities. A spectrometer table has been setup to characterize the size of nanoparticles according to their plasmon resonance.

Absorption spectra from standard semiconductor thin films have been obtained to test the Ti-Sapphire laser table. The table is functioning as expected for dry samples. Computer programs in LabView have been developed to automate data collection as well as sample movement. These will be used in all aspects of the project. Computer control has been added to other optical systems that will be used in sample characterization, including an optical microscope.

A benchtop diode-laser system has been set up along with the Ti-Sapphire system to cover light wavelengths in the range of 400-650 nm where one cannot use the Ti-Sapphire system (650-1100 nm). This has been tested against building temperature fluctuations and is performing within specifications.

Sunder Balasubramanian, PhD



NUTRITION, EXERCISE AND HEALTH RISKS ASSOCIATED WITH OVERWEIGHT INDIVIDUALS

Obesity is a serious nutritional problem in the US estimated at over 20 percent of the adult population. Overweight individuals add another 40 percent so that two-thirds of the adult population is at risk of becoming overweight or having obesity-related health problems. These problems include hypertension, insulin resistance and lipid abnormality. We successfully established a rat obese model gaining 30 percent more weight by feeding a high fat, high energy diet, comparable to human obesity. To induce obesity in



rats, six-week-old male Sprague-Dawley rats had unlimited access to high-fat diet fat for 12 weeks. Rats from greatest and least weight gain quartiles were assigned to diet induced obese (DIO) and non-obese, diet-resistant (DR) groups, respectively. For 10 weeks DIO and DR rats had unlimited access to high-fat or low-fat diet and were exercised or kept sedentary. Exercise consisted of treadmill running with weekly increases in speed and duration. In DIO rats, exercise and low-fat diet reduced weight and energy intake (12 percent) but did not affect ($p>0.05$) carcass energy. Exercise reduced epididymal fat weight by 42 and 31 percent in DR (both diets) and by 25

percent in DIO rats fed low-fat diet only. Moderate exercise more effectively reduced carcass energy and fat in DR rats than in DIO rats. Rats fed the high fat diet had greater blood pressure than those fed the low fat diet. Plasma lipids were not significantly affected by dietary fat levels and exercise. The results of this study indicated that dietary fat play an important role for obesity and exercise can reduce body fat. This animal model can be used for further pathological and biochemical studies associated with obesity.

Caucasian and African American women participated in a study to discover differences in cardiovascular risk factors associated with obesity. African American women had higher plasma triglyceride levels. The blood pressure, plasma glucose and cholesterol were not affected by race. An intervention study for obesity in African American women was performed since they have greater incidence of obesity-associated health problems. Half the African American women were in a weight-loss program and the other half was the control group. The weight loss program included a 12-week 'slim-eating' nutrition education and treadmill exercise program. The participants who consistently participated in eating slim, nutrition education and exercise reduced body weight. The results of this study contribute to the overall knowledge of effective strategies for prevention and treatment of overweight and obesity and thereby, reduce health care costs.

Myung S. Chi, PhD

CRUDE GLYCEROL IN A BOER GOAT MODEL

The objective of this study was to evaluate 10 percent crude glycerol as an energy source in partial replacement of corn in the diet of grow-finishing Boer goat kids.

The results, if feasible, could be utilized by today's producer to provide a healthier meat product and source of energy feed. This was a pilot study in collaboration with the MU Division of Animal Science, Department of Meat Sciences, Dr. Bryon Wiegand and Kizzie Roberts, as co-collaborators for this study.

The study involved 24 weaned Boer goat kids divided into two groups: controlled and experimental diet. Each group was stratified into three groups of four animals, dependent of gender: bucks, wethers and does. The goats were weighed weekly and fed a calculated daily ration formulated by Dr. Monty Kerly, MU. The experimental diet was supplemented with 10 percent crude glycerol. Observations were noted twice daily. The amount fed was



Charlotte Clifford-Rathert, DVM

calculated weekly dependent on percentage of body weight to maintain gain and satiety. After 17 weeks the goats were humanely slaughtered at the Abattoir at MU under

USDA inspection. The carcasses were then further analyzed by Dr. Wiegand for fatty acid content, myoglobin content, fat, moisture and protein. Samples were also collected from each carcass in order to measure cooking loss, drip loss and Warner-Bratzler shear force. The results of this study are being analyzed. The goat meat is available at the MU Meat Science Lab for purchase. The impact of this study is to explore new affordable coproducts of biodiesel fuel industry as a possible energy feed source and to meet the increasing demand for goat meat by the ethnic public.

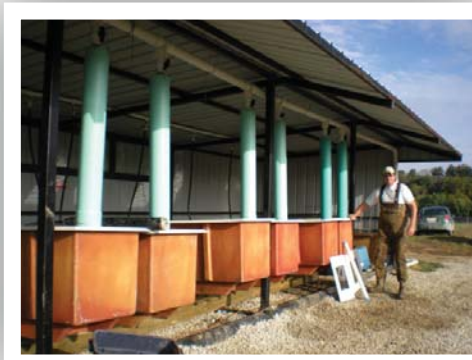
A second project is 'Embryonic and Fetal Losses in Goats.' This study is involves real-time ultrasonographic examination of bred female goats throughout

gestation in order to determine how much embryonic and fetal loss occurs in them and when these losses occur. If similar to ewes, research can be done with does to further evaluate the factors involved in pregnancy losses. If the patterns of loss are unique to goats, then the differences between species may become important for improving reproductive efficiency in both. This research is important in discovering the mechanisms of prenatal loss in small ruminants that may have a positive impact on future production practices.



AQUACULTURE

Three off the shelf feeds, with differing levels of protein and lipids were tested for growth, fillet yield, gut to total body ratio of Bluegill sunfish in 24-tank recycle systems and ponds. The test was initiated in April 2007, tested in the recycle system until June 2008 and finished in ponds. Fish were harvested in October 2008. The data from the test has been tabulated and analysis is underway with the assistance of Dr. Ellersieck, MU Statistician. Twelve new quarter-acre ponds were completed



in June. Hybrid sunfish, Redear

X Bluegill, Green sunfish X Bluegill and Warmouth X Bluegill were created in the laboratory and in ponds. These fish will be tested for growth and performance during the coming year. Selected hybrid crosses were also subjected to cold shock during the fertilized eggs second division (mitosis), at a specific time during anaphase (meiosis) to prevent the chromosomes from completing the telophase to produce tetraploid embryos. Tetraploid fish can be mated with diploid fish to produce triploids. Triploids are sterile and often exhibit faster and greater growth in other fishes.

A new larval feed was tested to determine if larvae could be started on feed in less than 21 days. The normal procedure is to hatch and feed brine shrimp for 21 days and then start feeding a prepared diet. A new larval feed was tested at seven and 14 days post-hatch.

Charles E. Hicks, PhD
Russell Gerlach, Laboratory Assistant

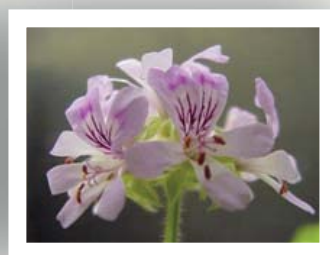


Complete results are forthcoming, however preliminary data indicates that higher protein and lipid feeds showed greater growth and fillet yields in bluegill sunfish. Even though the data is not completely analyzed, the higher cost feeds (higher proteins and lipids) appear to produce a lower cost of fish produced per pound of feed. Survival of hybrid sunfish in the laboratory was excellent. Survival of cold shocked fish was higher than expected. These fish are currently being grown to a stage where ploidy can be determined with the Coulter Counter. Success was attained in reducing the larval brine shrimp feeding time to seven days. Survival of the fish tested on the new larval feed was near 99 percent.

Commercial fish farmers may use the results of our feeding trials to insure they can produce food sized sunfish at competitive market prices. Success of producing tetraploid fish will provide LU with a stock of superior sunfish that cannot be replicated thus protecting intellectual property and providing a source of sterile fish for grow-out. Reducing the time of feeding larval sunfish brine shrimp will reduce the cost of materials and labor significantly.

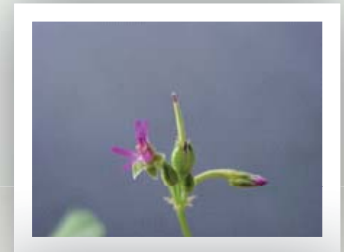
SCENTED GERANIUM USE

Scented geranium (*Pelargonium sp.*) consists of at least 60-70 varieties and cultivars in the North American nursery trade. This plant group has South African origins. It is known for its vigorous growth and tolerance to heat and drought. Active hybridization efforts in the last centuries have resulted in a large number of scented geraniums varying in growth habits, morphological characteristics and scents. Many plants have only common names due to the unavailability and/or loss of breeding records, resulting in unclear identities and genetic relationships. Scented geranium has been an important economic crop for essential oils. In recent years, this plant group has gained attention for its significant role in public health protection and environment pollution control.



Some scented geraniums have been reported and patented for repelling mosquitoes and as hyper-accumulators due to their ability to take up environmental pollutants (i.e. heavy metals and hydrocarbons). Several scented

geraniums were tested for having such effects since it is not feasible to test all scented geraniums. Therefore, a systematic examination to group scented geraniums, based on identifiable markers, will be useful for their application in field operations.



LUCR has maintained a collection of scented geraniums varying in insect resistance, morphological characteristics, and aroma. This collection has been used to support the study of insect control potential, as well as for systematic examinations. Morphological characteristics and volatile compound profiles detected



Hwei-Yiing Li Johnson, PhD

by gas chromatography were recorded and were insufficient to distinguish individual plants. A newly developed DNA fingerprinting technique named Target Region Amplification Polymorphism (TRAP) was applied to genotyping scented geraniums. Numerous DNA markers were obtained and effective in clarifying genetic identity and grouping scented geraniums. Complete results of

TRAP DNA genotyping will help reveal genetic diversity and relationships among scented geraniums.

This project also proposed to evaluate the insect control spectrum of scented geraniums. Scientists at two USDA ARS laboratories assisted with insect bioassays by using the crude and chemical extracts of selected scented geraniums. The preliminary results showed scented geranium essential oils were potent in controlling agricultural pests. One scented geranium cultivar used in a phytoremediation greenhouse study showed a hyper-accumulating effect on lead. It also showed a superior survival ability when grown under severe drought and in a soil heavily contaminated with lead, which had been collected from a shooting range. Results of this study verify that scented geranium is a strong candidate for phytoremediation projects.

SWEET POTATO

Small farms account for over 75 percent of the total number of farms in Missouri according to the New Farm Committee 1998. Almost eight out of every 10 Missouri farms were classified as small which is having gross sales of less than \$40,000. About 85,000 Missouri farms are in this category. Almost half the farms in Missouri sold less than \$10,000 in farm products in 1987. However, the vast majority of the research conducted in the state emphasizes the needs of the large scale, so called commercial, farmer. Horticultural crops are most attractive to the small-scale producer because they produce high returns per unit land area. The Center for Science in the Public Interest (CPS) ranks the sweet potato as the number one most nutritional vegetable. It ranked significantly higher in nutrients than the Idaho potato (LA Sweet



Potato Commission) yet very little research data has been collected on sweet potato in Missouri. Prior research of primary market outlets for sweet potato in Missouri (Wollo, 1993) indicate that St. Louis offers the best place for sweet potato producers in Missouri.

WATERMELON

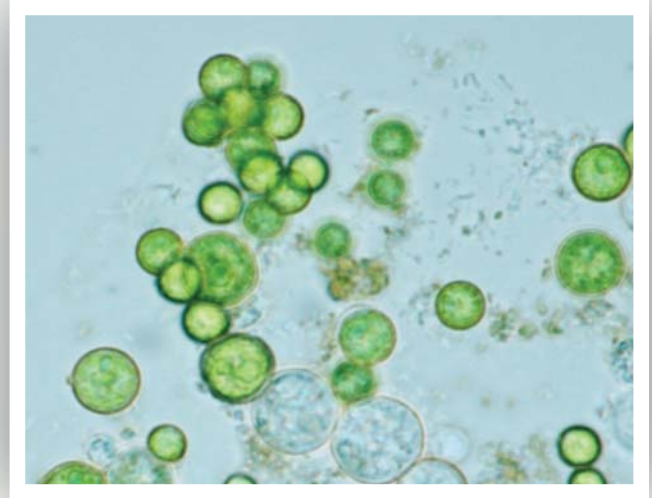
Watermelon is a major vegetable crop grown in 44 states (Levi et al., 2006). In the US, watermelon production has increased from 1.2 million tons in 1980 to 4.2 million tons in 2003 with a farm value of \$310 million. Watermelon production in Missouri has decreased from 4,800 acres harvested in 2004 to \$6,356 thousand 2005 (NASS 2006). The US harvested 136,400 acres of watermelon in 2005. Five states (Florida, California, Texas, Georgia and Arizona) produce 75 percent of the watermelons produced in the US. Per Capita watermelon consumption in 2004 was 13.0 pounds (Geisler, 2006) *per capita*. Watermelon is a good source of citrulline, which is metabolized to arginine, an amino acid needed for heart and immune health (Collins et al., 2007). There is great interest in the nutritive value of watermelon. Recently, researchers reported that watermelon contains high levels of naturally occurring pigments called carotenoids (Tadmor et al., 2005). Also, watermelon contains lycopene, a pigment that has been found to prevent heart disease and may prevent certain cancers (Perkins-Veazie et al., 2004). Watermelon is a warm-season crop that grows best in areas that have a long, warm growing season. There is a possibility that the growing period can be extended utilizing different management practices.

Dr. Rufus Jones
Dr. Wesseh Wollo
Phillip Markway

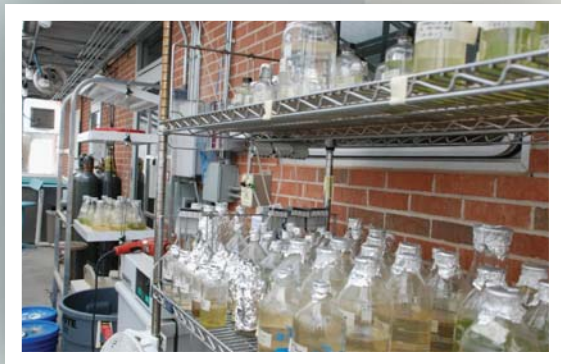
This study involves the development of cultural and management systems to improve the adaptation of sweet potato and watermelon in central Missouri, and assessing the economic implications of these practices. Such a study is very appropriate because this type of data for sweet potato and watermelon in Missouri apparently have not been sufficiently collected or at least has not been made widely available to farmers and other producers in the state. It will continue the development of a database on sweet potato and watermelon in Missouri and supply valuable economic information relevant to the production systems of these crops.

MICRO-ALGAE CULTIVATION, OIL EXTRACTION AND CONVERSION TO BIODIESEL

A comprehensive, collaborative research program has been carried out with the goal of developing an innovative technology for the economical production of microalgae-derived oils as a source of biodiesel. Over 200 microalgae strains from Missouri and other regions have been collected, isolated and cultivated. The samples identify algal strains and growth conditions for maximum biomass/oil yields. Laboratory experiments were conducted to demonstrate the feasibility of harvesting algae via gravimetric settlement. Parameters for the extraction of oils from algae and conversion to biodiesel were examined, and the optimization of the newly developed processes is currently underway. The results from these microalgae cultivation and processing research activities were disseminated to public through presentations given at the Touchstone Energy NET conference and the Missouri Natural Resources Renewable Energy Conference. A demonstration project for the mass cultivation of microalgae via the large-scale, open-pond algae culturing system has also been created by establishing a collaborative research agreement with two Missouri electric power cooperatives (Associated Electric Cooperative, Inc. and Central Electric Power Cooperative) in order to construct a pilot of approximately ten-thousand gallons capacity algae cultivation pool at their coal-fired power plant in Chamois, Missouri, and to utilize the carbon dioxide from the flue gas.



Collection of many micro-algal species, specifically the native species that adapt well to various environmental conditions and can resist the invasion by undesirable species, has been established. Two private companies have already shown interests in the test evaluation of their proprietary processes using selected algae species. The optimum conditions for separating algal cells from culture media via non-toxic flocculants have been determined, and are currently being employed for the large-scale demonstration of algae cultivation and harvesting. The new and improved transesterification method shows potential for utilization in the economical production of biodiesel from oil-bearing crops including microalgae. The project has been expanded to develop a microalgae cultivation system that can utilize carbon dioxide in the flue gas from the fossil-fuel power plant. This carbon dioxide seques-

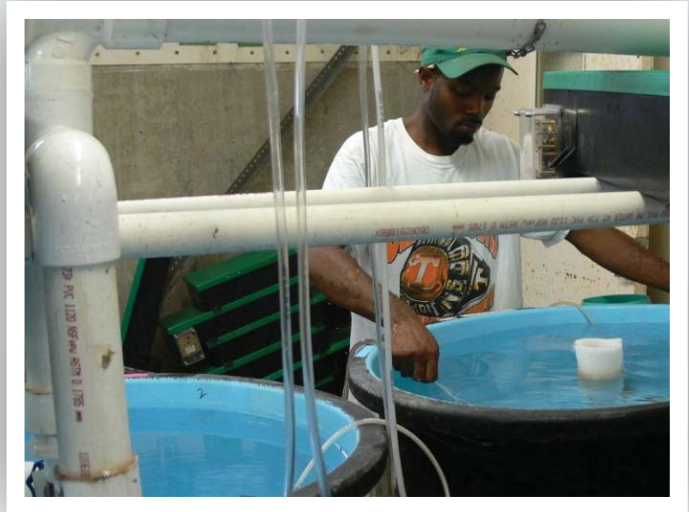


tration method is based on the photosynthetic biological fixation of CO₂ by microalgae, and can be an effective approach to mitigate global warming. The collaborative research program between multidisciplines at three universities has provided new facilities and research opportunities for eight undergraduate and two graduate students in science and engineering areas.

Dr. Keeso Lee

AQUACULTURE NUTRITION RESEARCH: PRODUCING BLUEGILL FINGERLINGS

There are no formulated diets for the production of bluegill and redear fry. Larvae must be fed live prey, generally brine shrimp *Artemia*, for their first feedings. Last year's work had identified a commercial diet that was effective as a starter feed at 14 days post-nest exodus. The purpose of this study was to evaluate the effect of varied weaning times on the production of bluegill and redear. A water recirculation aquaculture system at Alan T. Busby farm was used for the study. Bluegill and redear sunfish were bred indoors to create multiple spawns produced by single paired mating. A superior spawn from each species was selected for the weaning trial.



The larvae from the spawns were stocked in tanks one day after post-nest exodus. Fish were weaned at 2, 6, 10 or 14 days post-nest exodus with four replicates for each species. A six-day weaning period was implemented, which consisted of co-feeding brine shrimp with the previously identified commercial feed. Thereafter, only the commercial feed was supplied to the fish. The feeding trial was terminated on day 35 post-nest exodus. Data were collected on fish weight, length, abnormality, production and survival. Nutrient compositions of the commercial feeds were determined. The best production occurred on the fish weaned on day 14. Individual weights and lengths were similar among the later weaning times but significantly different

between the earlier and later weaning times. Survival rates increased with weaning age. The increase of production resulted from the increase in survival rates.

Thomas R. Omara-Alwala

Abnormalities were observed only in the earliest weaning times. The research was the first one of its kind with redear. The findings could be applicable to any other sunfishes of the same genus as bluegill and redear.



SHEEP AND GOAT HERBAL RESEARCH

The long-term objective of this study is to integrate herbs in the overall grazing study with sheep and goats. Blood sucking stomach worms that suck blood from goats and sheep are deadly killers in the hot summer months. The chemical dewormers on the market for sheep and goats are now less effective as a result of resistance of the internal parasites reported in recent years. Some southern states have reported all synthetic chemical dewormers are no longer effective.

Helen Swartz, PhD



The sheep and goats grazed throughout the experiment with conventional grazing plants. The Katahdin hair sheep, Dorset wool sheep and Boer meat goats were used in the experiments. Katahdin hair sheep have the highest number of registrations in Missouri compared to the other states in the US. The breed is attractive because of the absence of wool and very suitable for the Ozark regions and other regions in Missouri where there is a history of oak and hickory trees in abundance.

The Boer goat breed was imported into the US in 1993 and has great musculature and growing ability. This provides a higher percentage of meat in the carcass than other breeds of goats and the breed is adapting very well in the Midwest region of the US. This



project was implemented during fiscal year 2008 using hair and wool sheep and meat goats comparing natural herbs as a low cost substitute for a synthetic dewormer,



ivermectin (Ivomec). Wormwood plants (*Artemisia absinthium*) were grown in the greenhouse at LU's George Washington Carver Farm then cut, dried and fed to the sheep and goats from June through September. Plants were analyzed in composition and the ground-dried whole leaves of the wormwood herbs were added to the feed at

a pre-determined dosage. They were added once a week to the feed, according to the weight of the animals. The ivermectin (Ivomec), a commercial herbal-mixed dewormer, wormwood and control groups were compared in the summer trials. Fecal egg counts, hematocrits, FAMACHA and weights were taken every four weeks.

Results were evaluated by ANOVA and the group fed the plant material grown in the greenhouse had lower fecal egg counts, higher hematocrits and highest weights in both sheep and goats.

ABANDONED MINES OF CENTRAL MISSOURI

In central Missouri, a watershed-based study was formulated that integrates hydrology, geochemistry, geology and geospatial fields in order to assess the impact of abandoned mines on water quality and the ecosystem. The Mississippi Valley Type (MVT) deposits, host to lead and zinc mineralization primarily in dolostone, are prevalent in Arkansas, Kansas, Missouri and Oklahoma. Lead-zinc mining in Missouri took place in three regions of the state, namely the southeast, southwest and central districts. Nearly all mining activities, except for the Viburnum Trend operation in the southeast district, are abandoned. World-class lead-zinc mines of the MVT deposits in some of the districts produced millions of tons of the valuable metals while at the same time generating a staggering volume of mine waste spread over thousands of acres. A number of localities in these mining districts are listed in the National Priority List of the US Environmental Protection Agency (EPA) based on the fact that contaminants originating from the mine waste pose a threat to human health or the environment. The Central Missouri Mining District has received little attention to date because of the scattered nature and smaller sizes of the abandoned mines. However, recent studies document private water wells with arsenic, cadmium and lead at concentrations above health-based drinking water standards warranting further investigation. This research is focused on generating scientific data that characterizes the nature and magnitude of contamination and the level of environmental disturbance that may have resulted from the historic mining activity. The project has the potential to identify communities, particularly rural communities, which are adversely affected by trace contaminants that originate from the abandoned mines.

Dr. Samson Tesfaye

EXTENSIONAL TECTONICS IN EAST AFRICA

The Afar triple junction in East Africa presents a unique opportunity to investigate extensional tectonics exposed on the surface which commonly is found along mid-oceanic ridges, thousands of meters below the ocean surface. Afar offers an excellent opportunity to apply remote sensing for geologic investigations because of the absence of significant vegetation cover, the prevailing arid climate and the young age of deformation. Through the combined use of satellite imagery and digital topography data, the research work has resulted in peer reviewed publications and scientific presentations.

BLUEGILL CULTIGEN FOR USE AS A FOOD FISH

Our goal is to develop a bluegill cultigen for use as a food-fish that can consistently reach a harvest weight of 1.5 pounds in 18 months (approximately two summer growing seasons). Results of a preliminary trial indicate heritability of growth within northern bluegill sunfish appears to be extremely high approaching 91 percent justifying our efforts with broader genetic base.



A Lineage 1 Generation 1 male bluegill (Bernard, PIT# 100-513-812) dammed by a Lincoln University northern bluegill and sired by a Manatee River coppernose bluegill, at 14 months (total length = 211 mm, weight 272 g) selected as a potential sire for Lineage 1 Generation 2.

ing 91 percent justifying our efforts with broader genetic base.

We have founded two lineages using combinations of Northern, Coppernose, Southwestern and Handpaint Bluegill subspecies. The first lineage (Lineage-1 Generation-1), based only on Northern and Coppernose Bluegill, was composed of 69 surviving broods and has been

intensively reared through a four-month indoor water reuse system trial and a six-month outdoor pond trial with evaluation based on a 14-month lifetime growth performance. Fourteen broods were chosen as sources for potential sires and dams to found Lineage-1 Generation-2 in January 2009. Lineage-2 Generation-1, represented by 52 broods, was founded in August 2008 and will follow a similar production cycle with evaluation after 14 months.

Generation of multiple half-sibling broods has proven to be a challenge, especially in respect to the dam's breeding efficiency and handling of nest with embryos and pro-larvae. Teaser males and females are being used routinely to reduce stress associated agonistic encounters on broodfish. A student project underway is determining whether use of the hormone 'human chorionic gonadotropin' improves our ability to synchronize the females becoming ripe. We have identified a cheap, commercially available plastic bowl with the ideal dimensions and rigidity for production of large numbers of broods that must be moved and monitored. The nest may also enhance our ability to control the number of fry reared reducing variations associated with stocking density.



Student field crew harvested ponds in preparation for processing.

James E. Wetzel, PhD

Several novel bluegill crosses have been created with considerable variation in terms of their performance. The generation of hatchery lineages has reduced variability in growth and reproductive performance exhibited by wild funding stocks which will improve breeding efficiency of subsequent generations. Sex ratio of broods generated by crosses between

subspecies are consistent with those involving only northern bluegill in that sex ratios appear not to be determined by a simple XX/XY or WZ/ZZ system. Our lineages will provide a broad genetic base from which further genetic improvement can be realized, especially as diet formulations are increasingly based on plant derived feedstuffs.

LINCOLN UNIVERSITY FARMS

ALAN T. BUSBY FARM AND GEORGE WASHINGTON CARVER FARM

The University Farms continue to be the outdoor laboratory for cooperative research. The facilities are often used for cooperative extension programs and as departmental instructional laboratories. Alan T. Busby Farm and George Washington Carver Farm meeting facilities are increasingly being used by local state agencies such as the Missouri Department of Agriculture, Missouri Department of Natural Resources, Mental Health and others. Over 2,000 individuals visit the farm each year.

Major events sponsored by the farm include the Annual FFA Judging Contests in March, conducted by the Agriculture Club. Other major events hosted by the farm include the Sheep and Goat Conference in March, the Cole and Moniteau County Soil and Water Conservation Districts Annual Forage Day, the Fiber Festival, the Organic Farmers' Annual Conference, and other smaller events too numerous to mention. The meeting facilities are used over fifty times a year by federal, state and local agencies.

Felix Wulff, Superintendent

Two auctions were held on the farm during the past year. In the spring, a group of wether goats were sold by auction. These goats were purchased mainly by youth who then used the goats in 4-H projects and many of the goats were shown by the youth at area county fairs. The second auction was held in the fall at which time surplus Katahdin and Dorset sheep, Boer goats, large round bales of hay and a hay trailer were sold. Both sales were very successful and allowed the public the opportunity to purchase our surplus.

In the area of improvements, 12 additional aquaculture ponds were constructed and were put into production by the aquaculture research unit. One farm truck and a rotary cutter were replaced, four additional portable livestock shelters were purchased and an additional livestock trailer was put into service.

University Farms works closely with the LU Agriculture Club exhibiting sheep, goats and cattle at area fairs. Animals are shown at six county fairs, the Midwest Stud Ram Show and Sale, the Missouri State Fair and the North American International Livestock Exposition in Louisville, Kentuck. The presence of Lincoln University at these events shows the various programs offered.

ENVIRONMENTAL SCIENCE PROGRAM

Dr. Yang's research aims at the soil-related environmental problems with focuses on chemistry of environmental contaminants, environmental risk assessment, remedial technology and soil-plant interactions. His current activities include metal immobilization to reduce human exposure and ecological risks of contaminated soils and mine wastes. Other activities include phytotechnologies to enhance rhizodegradation of explosives, nanotechnology to remove aqueous metal ions from contaminated water and fluorescent emission spectroscopic technique to assess the formation potential of disinfection-by-products (DBP) in water. Results from these studies have substantially improved the fundamental understanding of the contaminant-environment interactions near surface ecosystem. It will potentially lead to sustainable solutions of environmental problems. During 2007-2008, there were six manuscripts in publication in peer-reviewed journals and over 20 technical presentations were given at national and international conferences. Dr. Yang currently supervises two postdoctoral fellows and several graduate and undergraduate students.



Dr. Yang was awarded three federally funded grants by the NSF-ECS, the USDA-CSREES and the National Water Resources Facilitation Program. He was selected to serve on proposal review panels for NASA, the USDA and the State Department. He has presented and served as a Session Chair for the International Conference on Soil Pollution and Remediation along with the International Phyto-technology Conference.

John Yang, PhD

Dr. Yang is actively involved in collaborations with MU and Missouri University of Science and Technology (MST) on various research projects.



Column leaching study to evaluate the stability of Growth chamber study to screen native grasses immobilized Pb in contaminated soils collected for their capacity to rhizodegrade TNT and RDX from the Jasper County Superfund Site located in explosives in soil southwest Missouri.



Lincoln University
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Cooperative Extension and Research

A production by the
CANS/LUCER
Media Center Team 2010
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Lincoln University of Missouri, and the U.S. Department of Agriculture Cooperating. Dr. Steve Meredith, 1890 Administrator, Cooperative Extension. Distributed in furtherance of Food and Agricultural Act, 1977 PL 95-98. Dec. 22, 1981.

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