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Northeast Research and Extension Center Haskell Agricultural Laboratory VIP Tour

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Welcome to the Haskell Agricultural Laboratory. Thank you for attending and showing your support to our many programs. Today you will receive the results and summaries of our faculty’s many experiments and programs, the fruits of their hard work and dedication. To the many cooperating landowners, agricultural operations, families, and communities across the district and state we graciously say THANK YOU for being such an important part of our programs. These partnerships are essential to our mission and we appreciate your cooperation.

Steeped in history, the Haskell Agricultural Laboratory has been investigating, solving, and disseminating information since 1957. Research here is diverse with several areas of interest. Starting with our natural resources, soil, water, and air and following through to crop, plants, livestock, and people, the faculty is constantly searching for answers that will improve farms, ranches, feeding operations, and Nebraska’s rural communities.

Extensive and thorough field research and demonstration efforts have been environmentally focused. Our mile long riparian buffer strip has provided us with numerous opportunities to study water quality and plant diversity. Irrigation management studies have progressed to include subsurface drip irrigation system analysis. Scientists have continued to address water quantity and quality issues as they arise.

Integrated Pest Management has been a focal point with real-time implication for Nebraska grain producers. Insects affecting corn, soybean, and alfalfa production are routinely studied. Several of our specialists are working with organic crop production. Control of invasive weed species in cropland, rangeland, and aquatic habitats remains a cornerstone at HAL. Livestock research, both swine and beef, continue to be an intricate part of our mission. Beef production research has focused on managing feedlot cattle environments and nutritional concerns. Research efforts continue in key areas of finishing cattle and have been expanded to include manure management. Development of swine health, housing management, nutrition, manure management, and niche pork production systems continue in importance.

Positive youth development, family, and community development are supported by many of the Northeast District Extension staff. They offer educational programs to human, social, and financial capital with several key areas of technology education, leadership development, community planning, 4-H, and after school programs.

For additional information, please go to our website: http://nerc.unl.edu.
Conservation Buffers

Conservation Buffers to Protect Water Quality

Dave Shelton
Professor, Biological Systems Engineering and Extension Agricultural Engineer

Conservation buffers are strips or small areas of permanent vegetation often established along the edges of streams and other water bodies that provide a “buffer” between the water body and adjacent crop land. Riparian buffers help protect water quality in two ways: sediment and other pollutants are trapped within the buffer; and runoff water, often containing nutrients and pesticides, is reduced through increased infiltration in the buffer. Although farmers and landowners generally strive to be stewards of the land, installation of a conservation buffer requires that land be removed from crop production. Buffers also require a certain level of maintenance, which can increase expenses.

Installation of approximately 23 acres of conservation buffer at the Haskell Agricultural Laboratory is nearly complete. Primary objectives are: 1) Develop a large-scale living laboratory featuring both conventional and non-conventional conservation buffer plant materials and designs in a working agricultural environment to be used for demonstration and research purposes; and 2) Determine, investigate, and evaluate factors that influence the successful initial establishment, early growth, and long-term performance of a buffer.

Current investigations include:

- Pruning and restraint of woody floral plants (red-stemmed dogwood, flame willow, and pussy willow) to improve stem quality and increase value. Jointly with Nebraska Indian Community College and funded by USDA-CSREES.
- Uptake of hormones in cattle manure by conservation buffer grasses. Funded by EPA.
- Development of a runoff simulator to evaluate conservation buffer performance. Funding from the UN–L Alan & Irene Williams Endowment and the Charles B. and Katherine W. Baker Fund.

Crop Nutrition

Nitrogen Use Efficiency

Charles Shapiro
Professor
Agronomy & Horticulture
Soil Scientist - Crop Nutrition

Anyone want to predict nitrogen or phosphorous prices for this fall and beyond? Who would have thought that we would see this kind of input cost increases in less than a year? While this situation is not the one we wanted it does give us an opportunity to rethink many of the decisions and assumptions that we have used for a long time about what is profitable and what is not profitable. The questions that we need to rethink in soil fertility are based on the change in relative costs and returns.

For example, in the past, purchasing an additive to extend or stabilize nitrogen might cost about 8 cents a pound of nitrogen. When nitrogen was twenty cents a pound it was less expensive to apply 25 more pounds of nitrogen than worry about using an extender that might only be needed one in three years. However, now that the extra 25 to 30 lbs of nitrogen are much more expensive, it might be worth it to use the extender.

This is just one example of how we need to rethink our decisions and our recommendations. At my stop on this year’s VIP tour I will discuss what is new in products available to improve nitrogen use efficiency.
Beef animal production facilities typically use artificially implanted hormones to increase the rate of gain in feedlot animals. Some of those hormones are excreted with feces and urine in the feedlot and subsequently distributed to field areas as manure where the nutrients are used to produce grain. Manure application timing places the manure on the field at a time when rainfall events are common. Thus, surface runoff generated by the rainfall could transport the hormones contained in the manure to other surface water bodies where the hormones could impact aquatic species.

During the summer of 2008 we have returned to the rainfall simulator in an attempt to determine whether tillage impacts the runoff of artificially implanted hormones from row crop areas.

We have applied manure from animals receiving the hormone and those that did not receive hormones. We also composted and stockpiled some manure to determine the effect of the composting process on the hormone. Those combinations yield 4 types of manure: 1) treated stockpile; 2) treated compost; 3) untreated stockpile; and 4) untreated compost.

We have applied the manure to corn field areas that were moldboard plowed followed by a single disk, single disked, and undisturbed soil surfaces to evaluate incorporation of the manure on hormone concentration in surface runoff.

To add to the mix, we have applied the manure and imposed the tillage treatments and we will conduct a second round of simulations about one month after initial application to determine if the soil residence time impacts hormone concentration in surface runoff.

Results of this project will be shared with the public as the soil and water sample analysis results are summarized.
**Beef Cattle Research**

Concentrated Animal Feeding Operations (CAFOs)

**Terry Mader**
Professor, Animal Science
Beef Specialist

Concerns about the concentration of hormones in animal waste produced from concentrated animal feeding operations (CAFOs) have recently attracted the attention of regulatory agencies and various livestock groups. Reproductive hormones, such as testosterone, estrogen, and progesterone, are naturally occurring but are also used in the livestock industry to enhance growth and alter reproductive cycles. Estrogens, in particular, under high enough concentrations, have been shown to influence the male:female ratios in some fish species. Thus, run-off from CAFOs is of interest although with new and more stringent guidelines for waste management systems, this run-off is less of an issue compared to the migration of hormones through the soil and run-off of water from areas in which animal waste has been applied to land.

The objective of on-going research focuses on the occurrence, fate and transport of exogenous and endogenous hormones from manure (animal waste). This is a multi-disciplinary project involving scientists from various academic backgrounds. The study involves a cattle feeding component to produce the animal waste plus measuring hormone levels in collected waste throughout composting and crop land application processes. To date one cattle feeding study has been completed with stockpiled and composted manure prepared for field application this spring. Field studies are on-going. Results of the cattle feeding study found that the use of hormonal supplements improved cattle gain 21.7% and efficiency of feed utilization by 11.0%, while decreasing cost of gain by 11% when compared to cattle which did not receive any growth promotants. The data from this project will provide valuable information to both regulators and farming entities to promote and balance agricultural production with environmental protection.

**Integrated Weed Management**

Flaming for Weed Control

**Stevan Knezevic**
Associate Professor
Agronomy & Horticulture
Weed Science

Increasing number of herbicide-resistant weeds, higher costs of herbicides, and more concern about pesticides in the environment, have resulted in a renewed interest in flaming for weed control. For these reasons, weed scientists are studying alternative systems of weed management. The objective of this study is to provide information on corn and soybean tolerance to broadcast flaming. Field experiments are being conducted from 2007-2009 at the Haskell Agricultural Laboratory utilizing different rates of propane including 0, 2, 6, 10, 14 and 18 GPA. In general, soybean was more susceptible to propane flaming than corn; 20% injury was achieved with 4 GPA in soybean compared with 10 GPA in corn. The propane dose (also known as effective dose, ED), which caused injury levels of 5% (ED5), 10% (ED10) and 20% (ED20) at 3 hours after treatment were 2, 3, and 4 GPA, respectively, and these rates did not change significantly over time. In contrast, the ED20 values in corn for 3 hours, 7, and 14 days after treatment were 3, 4, and 9 GPA, respectively, suggesting that the corn crop was able to recover after flaming. This is likely because the growing point at time of flaming was below the ground level and thus remained unaffected.

These results demonstrate that soybean flamed at V3 growth stage was more susceptible to flaming than corn at V5 growth stage, suggesting that broadcast flaming perhaps has more potential for use in field corn than in soybean. These results may have differed if the flaming was done at different crop growth stages. High levels of soybean injury suggested also that there is a need to evaluate various timings of flaming procedures relative to the plant crop growth stage, and the positioning of the flame. Adjusting the timing of flaming, or flaming inter-row space, as well as positioning flames below the crop canopy (e.g., away from crop’s growing point) might be much safer for soybean.

Propane flaming has potential for use in conventional and organic agriculture, grassy crops like corn, or could be integrated with other weed management strategies.
Entomology
Comprehensive Insect Management

Tom Hunt
Professor, Entomology

The goal of NEREC Haskell Ag Lab Entomology is to develop and provide comprehensive insect management recommendations that are specific to the unique combinations of environmental conditions, pest complexes, and cropping systems of northeast Nebraska. This includes being responsive to the current needs of our clientele and anticipating and responding to new needs and emerging problems. Our approach is based on the principles of integrated pest management. The entomology team includes Tom Hunt (Entomology Specialist), Logan Dana (Entomology Technologist), and Keith Jarvi (IPM Assistant).

Our research program covers a variety of issues important to farmers in northeast Nebraska. Projects are selected that directly apply to the concerns of area farmers. Our research projects focus on corn, soybean, and alfalfa. They fall in the general categories of economic threshold development, resistance management, insect pest biology & behavior, emerging problems, and product efficacy. Although our research focuses on issues important to northeast Nebraska, many of the projects have a broader application and impact crop production across the U.S. corn and soybean growing regions. The results of our research are funneled directly into our Extension programming. Collaborators/cooperators are included on most of the projects and include farmers, industry, commodity groups, and researchers and extension personnel from UNL, other Universities, EPA, and the USDA.

Some of our most current projects concern the soybean aphid. Injury from this insect can result in a 20% to 30% yield loss. The projects include soybean aphid population dynamics studies, economic threshold studies, and biological and chemical control studies. Other new projects examine the biology and management of the western bean cutworm and the alfalfa weevil. We also have ongoing projects on the bean leaf beetle and European corn borer.

Makin’ Money
Entrepreneurship Camp

Sandy Preston
Extension Educator
Dixon County

It was a Great camp! This year the number of participants more than doubled. As the two day camp at Wayne State College progressed, campers learned advertising and marketing methods, created business plans and developed a business name, and decided how to price their product. Each participant had to present their business plan to the banker to get a loan for their business, and purchase a license to operate their business — very much like what happens in real life. For the camp itself, the youth participated in making one of four products selected for the camp. These products included: Nature photography made into note cards, friendship bracelets and key chains, fishing lures or birdhouses. The camp included a marketplace to sell the product. Youth had the opportunity to tour entrepreneurial businesses in Wayne. Characteristics that are needed in the workplace such as honesty, responsibility, respect, and trustworthiness were discussed.

Outcomes:
✦ The participants’ evaluations showed they learned a lot.
✦ Adults helping with the camp noticed by the end of the two days that the youth were much more aware and had developed an appreciation for business/entrepreneurship
✦ Several youth are interested in returning next year.

Swine Research

PRRSV

Don Levis
Professor, Animal Science
Extension Swine Specialist

Research program. Porcine reproductive and respiratory syndrome virus (PRRSV) has caused devastating losses to swine herds on a worldwide basis. It has been estimated that PRRSV costs the United States pork industry approximately $560 million per year. It is known that pigs may become infected via exposure to PRRSV by any of several routes, including saliva, nasal secretions, urine, feces, intramuscular injections, vaginal contact, mammary gland secretions, semen, fomites (boots, coolers, shipping parcels and vehicles), trucks, and possibly by aerosol. Reliable methods to prevent, control and/or eliminate PRRSV have not been achieved by management methods or vaccines. Genetic selection of pigs resistant to PRRSV might be a viable option to eliminate PRRSV. The primary objective of the swine research program at HAL is to determine differences in growth rate and expression of specific immune function genes and levels of cytokines (small secreted proteins which mediate and regulate immunity, inflammation, and production of blood cells) between pigs that are more resistant and more susceptible to PRRSV infection. Research results from experiments at HAL have identified pigs that are resistant to PRRSV.

Extension program. The HAL swine educational programs focus on: (1) design and management of breeding-gestation facilities; (2) designing and managing boar studs, (3) managing boars, sows and gilts for reproductive efficiency; (4) implementation and use of artificial insemination, and (5) increasing reproductive performance of niche pork production systems.

Extended Education
Extending Campus Resources in the District

Vicky Jones
Extended Education Coordinator,
Lifelong Learning Center

With a focus on technology-delivered distance learning programs, Extended Education and Outreach efforts give clientele in the district access to many university resources. Some examples include:

- Distance education courses and programs from the high school through doctoral levels.
- Complete Independent Study High School offering more than 160 high school level courses and a high school diploma.
- Advanced Scholars program offering college courses for academically-talented high school students.
- Over 80 undergraduate college level independent study courses, many meeting general education requirements.
- 20 graduate degree programs available online from a Masters of Agriculture to Textiles, Clothing and Design and doctorate degrees in Education.

Grant-funded special projects have included:

- Increasing agricultural literacy by helping area high school teachers incorporate agriculture as a context for teaching social studies, science, and business.
- Increasing the number of minority and bilingual teachers, and increasing the number of ESL-endorsed teachers in northeast Nebraska to better serve and impact the educational achievement of English language learner children.
- Teaching Hispanic business owners basic computer operations and how e-commerce can impact their business.

For more information on distance education, go to the following website: http://extended.unl.edu.
The Great Plains Tree and Forest Invasives Initiative (GPI) is a multi-state project designed to help evaluate and prepare for invasive pests of trees in the northern Great Plains. The GPI is a two year grant funded by the U.S. Forest Service in collaboration with the respective State Forestry agencies in Kansas, Nebraska, North Dakota and South Dakota. Of specific concern is the expectation of the eventual arrival of the ash tree killer, Emerald Ash Borer (EAB) (*Agrilus planipennis* Fairmaire) to this region where green ash (*Fraxinus pennsylvanica*) frequently comprises over 25% of a community forestry resource and is represented in close to 50% of rural conservation tree plantings.

Since October 2007, some initial activities include sharing of resources and information among the four state forestry agencies in the region; outreach efforts to inform the public about EAB and the potential devastation of local ash tree resources; visiting 1,200 rural and urban inventory plots in the four states to determine both rural and urban tree resources; the distribution of EAB Awareness Packets to over 1,000 county and field Natural Resource offices and the development of EAB Detection Kits for citizen involvement in monitoring and identifying potential EAB arrivals and outbreaks.

Future activities include planning for continued inventory work and awareness efforts; a multi-state EAB Readiness Plan by the four state forestry agencies; assistance in helping determine utilization options for killed trees; and integrating strategies for addressing invasives in state forestry resource planning processes.

For complete information on EAB, where it is and what is being done, visit the national website at www.emeraldashborer.info.

With the advent of transgenic corn and seed treatments, farmers have been presented with more choices than they have had in the past to control corn rootworms. Because of the popularity of transgenic corn providing in-plant control, insecticide manufacturers have been exploring ways to regain a part of the lost market share in the rootworm area. Along with testing individual products we have been looking at combinations of granular or liquid insecticides, seed treatments, and insecticides with transgenics.

We have been screening corn rootworm control products for more than 25 years. Our experience has shown that one management option, applied correctly, can prevent yield loss from corn rootworms. Therefore, we discourage the use of a “combination” of techniques in the same year for rootworm management. In other words, using a soil insecticide on top of a transgenic corn should not be necessary in a very large majority of fields.

Growers under heavy pressure from corn rootworms (i.e. those fields in continuous corn) should rotate the field to a different crop to break the life cycle of the rootworm and reduce overall populations. Keeping corn out of the rotation for two or more years would almost entirely eliminate the corn rootworm population in that particular field.
Now is a good time to transition your farm to organic production. There are many reasons to consider transitioning into organic farming. The high crop prices farmers will receive can help to off-set the cost of transitioning to organics. The Natural Resource Conservation Service has Environmental Quality Incentives Program (EQIP) monies to help with the cost of transitioning crop and pasture ground.

Marketing organic crops has become easier due to consumer demand and is continuing to grow for all organic products: meat, milk, grains, vegetables, and packaged foods. There are several processing plants in Nebraska that are looking for organic crops such as soybeans, feed-grade corn, popcorn, wheat, barley, flax, and oats. The price you receive for an organic crop is higher because of the cultural practices and labor invested to raise an organic crop.

Current UNL projects funded by USDA-CSREES “Improving Organic Farming Systems across Nebraska Agroecoregions” have transitioned Agricultural Research and Development Center, Mead; Haskell Agricultural Lab, Concord; High Plains Agricultural Lab, Sidney and South Central Agricultural Lab, Clay Center to have between 22 and 76 acres at the different sites of certified organic farm ground for research purposes. “Developing small grains cultivars and systems optimally suited for organic production” will look at winter wheat varieties that work in an organic farming system at each of the four research sites http://organic.unl.edu/wheat.shtml.

Another organic project is weed flaming at the Haskell Ag Lab. The objective of this study is to develop response curves for propane [based on usage rate (gal/acre)] needed for safe and economical weed control http://organic.unl.edu/wdfim/wdfim.shtml.

The Healthy Farm Index (HFI) is a tool for landowners to measure their farm’s ecological health and maintain or improve crop productivity. The HFI will look at how agricultural landscapes can be structured and managed to maintain sustainable crop and livestock production while preserving biodiversity http://organic.unl.edu/hfi/hfi.shtml. For more general information about organic farming in Nebraska, UNL projects, field days, workshops, seed sources, and markets visit UNL organic website: http://organic.unl.edu/ or contact Liz Sarno esarno2@unl.edu (402) 584-3856.
Northeast Arboretum

Del & Alice Hemsath

Co-Curators

Del and Alice Hemsath serve as Co-Curators for the Northeast Arboretum located at HAL. Del was Extension Educator for Dakota, Dixon and Thurston counties for 5 years and specialized in Agronomy and Horticulture. Del currently is retired and teaches part-time at NECC in Norfolk. Alice has a horticulture degree from UNL, is retired and is teaching part-time at NECC in Norfolk. Both are involved in various voluntary activities including the arboretum.

The Northeast Arboretum is a certified site of the Nebraska Statewide Arboretum. The Arboretum works to promote knowledge, appreciation, and use of Nebraska plants to introduce, evaluate, improve, and distribute useful plants for Nebraska landscapes.

There are several different types of plantings at the Haskell Ag Lab site. There are the perennial flowerbeds located in the parking lot and at signage as one enters the research center. Island plantings are found throughout the administrative building area to demonstrate the proper methods to create a desirable environment of the trees. There are some areas which contain dead plant materials which is one of the objectives of the arboretum and that is to see if certain species can survive in this area, obviously, some do not.

There is a fruit orchard located in the northeast corner of the grounds which contains apple, plum, cherry, pear and persimmon trees.

The living snow fence is located on the west side of the property and demonstrates the effectiveness of some of the suggested species available through the Natural Resource Districts for snow protection.

Another small site is located at what is referred to as the original farmstead, ¼ mile east of the administrative building. This area is primarily oak plantings, but there are other species planted there as well.

There is also a “hidden cache” that can be found if one has a GPS unit and is familiar with the treasure hunt system.
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