Northeast Research and Extension Center VIP Tour 1997
Welcome to the Northeast Research & Extension Center

The Annual VIP tour is one opportunity to share a part of our program emphasis with a targeted group. Co-sponsored by the Northeast Experimental Farm Association, we welcome you to this year’s event. This year’s VIPs are the Agricultural Builders of Nebraska, Inc. Also represented are campus leadership from Wayne State College, Wayne, and Northeast Community College, Norfolk. We extend a special welcome to these important partners in education and service. Through this experience, we hope that our role, process, and impact may be better understood, and that collectively, we are better able to meet the needs of the learning communities in northeast Nebraska.

A long standing theme is that research reduces risk. Part of our role is to conduct well-targeted research that addresses critical agricultural and social issues of the area, but another and equally important part of our mission is extension education. That includes getting research results into the hands of the user in a timely fashion.

Last year, staff in the 16-county Northeast District recorded over 151,000 contacts. This is equal to more than one contact by every person living in the 16-county area. We feel we are truly making an impact and a significant contribution toward making Nebraska’s good life better.

This year will be remembered as a year of transition. In December of 1997, we will move into the new headquarters of the Northeast Research and Extension Center, which will be located on the Northeast Community College campus in Norfolk. This year will also mark the end of my career with the University of Nebraska, as I will be retiring from my position effective January 31, 1998. Change is all there is.
**Swine Research**

Manipulating pig growth to enhance producer profitability and consumer acceptance

**Michael Brumm**
Swine Specialist
Professor, Animal Science

Feeder and waterer selection play an important role in controlling water waste. In previous research at the Northeast Research and Extension Center, wet/dry feeders (a type of feeder that includes the drinking device in the feed trough) were found to reduce water use 23% compared to conventional nipple drinkers and dry feeders. Total manure volume in the one year trial was reduced 32%. Many producers with deep pit storage systems have adopted this type of feeder because of the manure volume reductions, resulting in storage capacities upwards of 1 year for fully slatted grow-finish facilities.

A second trial was conducted comparing a “swinging” nipple drinker versus conventional nipple drinkers. The “swinging” nipple consisted of 2 nipple drinkers suspended on a chain from the ceiling in the middle of a pen of 24 pigs. As the pigs grew, the chain was shortened to raise the drinker. In this winter trial, pigs using the “swinging” drinker used 11% less water and created 14% less manure than pigs using conventional drinkers.

Current research efforts include a comparison of the “swinging” watering device described above and a bowl drinker that is manufactured in Denmark and sold in the United States by 2 distributors with the claim of reduced water use and manure volume. In the first two weeks after the experiment began, total water use was reduced 33% with the Danish bowl drinker compared to the “swinging” nipple drinker.

In all of the above research trials, there has been no effect on pig performance due to the type of water delivery device. However, the dramatic reductions in total water use and manure volume documented in these trials has major financial implications for producers as they manage manure utilization and water medication expenses.

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**Beef Research**

Animal responses to heat stress and management

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

Almost every year, severe heat stress results in cattle losses in major cattle feeding areas. The greatest threat occurs when extended periods of cool weather precede hot and/or hot-humid periods lasting several days or weeks. Cattle that are most affected are those that have recently arrived at the feedlot and fatter animals that are near finish.

Beef research efforts at the Northeast Center include assessing diet management regimes to moderate the effect of environmental temperature extremes, both hot and cold, on feedlot cattle.

Previous data suggests that moderate energy diets and limited feeding reduces body temperature under excessive heat load. Current studies are designed to determine affects of A.M. and P.M. restricted feeding programs on body temperature, respiration rate, and cattle behavior.

Behavioral symptoms that could indicate the development of excessive heat load in feedlot cattle include crowding over water trough; body splashing; agitation and restlessness; refusal to lie down; reduced feed intake; and grouping of animals. With severe heat load, open-mouthed, labored breathing and excessive salivation are clear signs that an animal is failing to cope.

Periods of extreme heat are usually of short duration and have limited impact. However, during periods of extended high temperature episodes, changes in management practices or facilities to alter the microclimate surrounding the cattle may be needed.
The Independent Study Course for Child Caregivers is an alternative way for caregivers to obtain training hours that meet the standards of annual inservice training requirements of the Nebraska Department of Social Services and the Child and Adult Care Food Program. Caregivers may use the independent study course over a period of three years to obtain training hours. Each of the eleven chapters provides one training hour.

There are a variety of topics included in the course. Topics include Nutrition, Food preparation, establishing a safe learning environment, guidance and discipline, and food safety among other topics.

Over a year ago, USDA announced the School Meals Initiative for Healthy Children, a proposal to ensure our nation's children have healthy school meals that meet the Dietary Guidelines and streamline the administration of the school meals program. A major part of this improvement is the nutritional standard school lunches and breakfasts must meet for the Dietary Guidelines for Americans. Team Nutrition will work closely with a variety of chefs, food producers, universities, and others, including extension personnel, to develop and distribute training programs, recipes, menus, manuals, and other assistance materials.

With support from around the country for nutrition education, Team Nutrition will improve the health and education of children.

The mission of the Nebraska 4-H program is to assist all youth to reach their fullest potential through utilizing the knowledge base of the Land-Grant University system, learning by doing, and developing life skills.

Extension 4-H and Youth Specialists in Nebraska have the responsibility for designing educational opportunities which actively involve Extension staff, youth, and volunteers in program planning, decision making, and leadership development.

Each specialist works to develop programs in current target areas based on their individual expertise. Currently, Vickie Greve has leadership responsibility for the following areas: volunteer risk management, 4-H Council development, new staff development, volunteerism, and the new 4-H statistical reporting system. She is working with a committee to develop new 4-H leader organizational materials.

She is also a member of a statewide committee who will be introducing “Character Counts” materials to Extension staff throughout Nebraska. This program, aimed at developing character in young people from 5 to 18 years old, focuses on the following six pillars of character: trustworthiness, respect, responsibility, fairness, caring, and citizenship. The program uses developmentally appropriate activities to make these abstract concepts more concrete.

Vickie is also one of four project directors for a new State Strengthening grant from USDA that focuses on “Building Family Friendly Communities.” The five year program will initiate a statewide effort to build communities in which all families are valued.
The CRP (Conservation Reserve Program) to crops research team at the NEREC is providing timely information to landowners, and others with an interest in the future of CRP lands. The research began in the fall of 1994 and is now in its third year.

Without the cooperation of Mr. Charles Paulsen, the landowner, this project would not have been initiated. Early support for the project came from our Director Robert Fritschen. From the beginning this has been a team effort of faculty and staff at the NEREC and others throughout Nebraska.

Tours of the research site during the growing season, informational meetings in the winter, and a satellite video conference have provided Nebraskans and neighboring states with up to date information on best management practices for returning CRP to crop production. The team has written articles, extension circulars, and NebFacts to provide information to individuals with an interest in CRP lands. Through these educational programs we have provided information to nearly one thousand individuals.

A study was designed to determine a viable cropping system for the return of CRP land to crops. This study investigated three vegetation management systems (no removal, shred, and mechanical removal), three tillage systems (plow, disk, and no-till), and four crop rotations (corn-corn-corn, corn-soybean-corn, soybean-corn-soybean, and sorghum-soybean-corn).

Other studies were initiated to take an in-depth look at factors that should be considered when returning CRP to crops. These included: corn fertility needs, herbicide efficacy in vegetation management, insect damage in first year out corn, potential rodent problems, and use of finger wheel residue movers to plant no-till corn.

Results from 1995 and 1996 indicate that soybean is the crop of choice the first year out of CRP. Soybean yields were the same regardless of the residue and tillage practices used to return the land to crop production. Soybeans required no nitrogen fertilizer and more options are available for controlling the grass vegetation when planting soybeans the first year.

The crop planted the first year out of CRP influenced yields the second year out. As in conventional cropping, corn following soybeans was higher yielding than continuous corn.

Initially we intended to follow the return of CRP to crops for three years to assess the long term effect of the rotation and tillage practices on crop production, economics, and the environment. However, our funding is running out and there is a lack of funding interest in CRP. The two remaining years of the study are in doubt. Our hope is that the information we have made available over the past three years will help individuals involved with the Conservation Reserve Program make informed decisions on the future of their land.
Entomology
Bt Transgenic Corn

Jerry Echtenkamp
Research Technologist

John Witkowski
Professor, Entomology

Seed corn that has been genetically engineered to express an insecticide protein lethal to European corn borer larvae was first commercially available in 1996. These hybrids are commonly referred to as Bt hybrids or Bt transgenic corn hybrids. In 1997, many more seed companies were granted licenses to sell Bt transgenic seed corn.

The insecticidal protein is a modified version of a protein present in *Bacillus thuringiensis*, a naturally occurring bacteria present in the soil. This same bacteria is commonly formulated on a granule or as a liquid insecticide against selected moth and butterfly larvae. Field efficacy evaluations of many of these Bt hybrids at the Northeast Center indicate effectiveness equal to or far greater than conventional insecticide applications.

Expected grain yield of Bt corn is one question many producers are asking. The purpose of the hybrid plot at the Northeast Center is to evaluate efficacy and grain yield of Bt corn verses non-Bt corn.

Other questions of concern are “...what is the additional fee for the new technology, and, “...how does the economics compare between treating for corn borer with conventional insecticides and the premium paid for Bt seed corn?” When our plots are harvested this fall, we should be able to answer these questions. Our plots contain 17 Bt corn hybrids and two non-Bt tester hybrids.

Forestry in Nebraska

Trees planted on the Great Plains are considered “working trees”. The trees and shrubs that have the toughest job to do are those planted for conservation purposes. Whether they are planted to control wind-borne soil erosion, provide wildlife habitat, increase crop and livestock production, control drifting snow, buffer and protect water resources from contaminants, produce a wood product or to protect a farmstead, these plantings are “working” year-round.

There is no other conservation practice implemented on a farm or ranch here in Nebraska that can provide as many direct and indirect positive environmental and economical benefits, as a properly designed and placed tree and shrub planting. These conservation tree plantings take only one or two acres of land for establishment and will provide protection and benefits for 20 to 30 times the adjacent acres.

The landowner, local neighborhood, and society benefits when well-designed conservation tree plantings are established. Establishment costs of $200 to $400 per acre is a very good investment for two farming generations of protection, benefit, and enjoyment. With some cost share assistance programs, the establishment costs to the owner are reduced to 50 percent and may be paid 100 percent with the right program. Currently, there are over 35 different species of shrubs and evergreen or deciduous trees in the Nebraska Conservation Tree Program for Nebraska landowners to select from for conservation planting purposes.

Everyone currently enjoying Nebraska’s Good Life and future generations will benefit from the trees we plant today! Remember, for our healthy environment .... Trees are the Answer!
Narrow Row Planting Patterns in Corn

Mark Langrud
Graduate Research Assistant, Agronomy

Narrow row corn allows for individual corn plants to be spaced more equidistant. At the same crop density, wide rows would have less spacing between plants in individual rows relative to narrow rows. This study compares conventional 30 inch row spacings to “narrow” 20 inch row spacings.

As planting patterns approach an equidistant spacing, competition within the crop decreases because crop plants have more room to grow throughout the growing season. This increases the crop's potential for growth, yield, and competitive ability.

Three studies are currently being conducted: a yield advantage study, a nitrogen requirement study, and a weed suppression study.

The purpose of the yield advantage study is to quantify narrow row planting patterns on leaf area development and yield. The nitrogen requirement study looks at resource management and fertility requirements. The weed suppression study investigates how corn competitive ability influences weed suppression in corn-weed interactions and how these interactions affect corn canopy development.

Overall, we are looking at the usefulness of the narrow row corn system as one of the many tools that producers can use to affect yields and weed control.

In 1996, yield increases up to 13 percent were observed using the narrow row planting patterns. Narrow row corn had more leaf area which increased photosynthetic light interception and reduced the amount of light available for weeds below the canopy.

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Crop Residue Management

Manure injection

David Shelton
Professor, Biological Systems Engineering

Leave crop residue on the soil surface for erosion control!

Incorporate manure into the soil to maximize nutrient availability and minimize odors and runoff potential!

Research to help resolve the conflict between these two Best Management Practices is currently in progress. Various configurations of manure injectors and applicators are being used in oat, corn, and soybean residues to evaluate how much of the initial residue cover is retained.

With this information, livestock producers should be better able to select a manure management system that is also compatible with their soil erosion control objectives.

Financial support for this project is provided by the Nebraska Pork Producers Association; and equipment has been supplied by Balzer, Calumet, Sukup, and Vittetoe manufacturing companies.
Determining the Environmental Impact of Irrigating with Swine Effluent

Nebraska swine annually produce manure containing 40 million pounds of nitrogen. The trend toward increased concentration of animals in large production units makes it difficult to find enough land available for economical distribution at agronomic application rates. The objective of this research is to evaluate alfalfa as a nitrogen sink for swine effluent. Data from our experiment has shown that alfalfa receiving 600 pounds of swine effluent nitrogen removed about 100 pounds more nitrogen than alfalfa receiving no swine effluent. In an established irrigated alfalfa crop more than 800 pounds of nitrogen are removed in the alfalfa hay. The corn crop, which includes stover harvest and a rye cover crop removed less than 300 pounds nitrogen under excellent conditions.

The implication is that producers could cut the land base for effluent distribution in half. This would be beneficial to producers who do not have enough land to apply their effluent when planted to corn or small grains. Additional advantages to alfalfa are that it covers the ground all year round which reduces the erosion potential, the N use curve is more constant than for annual crops, application can occur at times that are not possible in a corn system, and alfalfa is deep rooted and can scavenge nitrogen from deeper in the soil than most other crops grown in Nebraska.

The overall objective of the research is to determine if nitrate is leaching, and if so, quantify the leaching amount and at what N rate leaching is increased to unacceptable levels.

The sprinkler system distributes the swine effluent in a gradient from a full rate to zero effluent. Laboratory analysis shows that the effluent contains about 90 lbs-N/acre-inch of water. The goal is to apply enough effluent so that at the end of the season both the corn and alfalfa will have areas with an excess of applied N. Sampling takes place at five equally spaced areas giving a range of 0 to 150% of N removal.

At each sampling site a porous cup extractor is installed 6.5 feet in the ground. Soil solution passing the cup is sampled and analyzed for nitrate. Other instruments determine the flow rate of water at that point. This information is used to determine the pounds of nitrate leaching.

Based on the information collected for a conventional alfalfa, unacceptable leachate levels would occur at effluent application of 380 lbs-N/acre/year. In 1996, a non-nodulating alfalfa variety was added to the conventional variety. Unlike the conventional varieties, the non-nodulating line cannot use atmospheric N, so all the N in the plants comes from the soil and applied effluent. In 1996 the non-nodulating alfalfa N harvest was 70% of the normal alfalfa at the zero effluent rate, but equal to the normal alfalfa at the higher N rates. Due to sufficient rainfall, maximum N applied was 75 lbs-N/acre. A severe winter in 1996 caused winter kill in the experiment, so the alfalfa was replanted in 1997.

Contributions to the project also include Mike Brumm, Animal Science; Bruce Anderson, Agronomy; and Dennis Schulte, UNL Biological Systems Engineering. The non-nodulating alfalfa was received from Joanne Lamb at the USDA Dairy Forage Laboratory in Minnesota. The project is funded by the Nebraska Pork Producer’s Council and the UNL Water Center. We are now operating under a grant from the Burlington Northern Endowment.
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